



## Assessment of the Climate Change Anxiety Level among University Students and the Well-being Effect of Campus Landscape Accordingly: Taşkışla Courtyard Case

Fatma Sultan Bozkurt<sup>1,\*</sup>, *Conceptualization*; Fatma Ayçim Türer Başkaya<sup>2</sup>, *Conceptualization*;

<sup>1</sup> Istanbul Technical University, Faculty of Architecture, Landscape Architecture Department, 34367, Turkey;

E-Mail: [yamanfat@itu.edu.tr](mailto:yamanfat@itu.edu.tr), <https://orcid.org/0000-0002-5926-4997>

<sup>2</sup> Istanbul Technical University, Faculty of Architecture, Landscape Architecture Department, 34367, Turkey;

E-Mail: [turerfat@itu.edu.tr](mailto:turerfat@itu.edu.tr), <https://orcid.org/0000-0002-2324-0731>

\* Corresponding author

### Abstract

Climate change's effects on the environment have detrimental effects on human health as well as the health of many other biological species. Climate change is having a negative impact on humanity by changing the quality of the air, water, and food supply. Human health is suffering greatly as a result of the climate crisis, both physically and psychologically. Storms, floods, and shortages of food and water can all have a direct impact on mental health, increasing the risk of anxiety, sadness, and post-traumatic stress disorder. These problems are additionally exacerbated by disaster scenarios and uncertainties. Anxiety among younger adults is on the rise due to climate change. The studies showed how vulnerable developing nations are to the growing effects of the climate catastrophe, and it was shown that young people are particularly vulnerable to the psychological harm that the issue is causing to individuals. Landscape is essential for enhancing environmental conditions, reducing the impact of climate change-related disasters, and promoting the physical and mental wellbeing of all living things.

Clarifying how green areas affect the psychological effects of climate change is the main goal of this study. In light of this, the study aims to determine the degree of climate change anxiety among university students in Istanbul, the most populous city in developing Turkey and the location where the secondary effects of the climate crisis are most noticeable, as well as the impact of campus landscape—a type of green space that is an essential component of students' everyday lives—on their eco-anxiety. In order to make an assessment, a questionnaire study following a comprehensive literature review was determined as a method. ITU Taşkışla Campus in Istanbul, Turkey, and the students who pursue their studies there have been highlighted as the case in this context. The research revealed that the courtyard of Taşkışla does not effectively address worries about the climate catastrophe, even though it may be said to improve students' well-being in terms of reducing the environmental stresses related to living in Istanbul.

**Keywords:** eco-anxiety; climate change anxiety; well-being; campus landscape; young adults; courtyard.

### 1. Introduction

The term "climate change" is used to describe substantial shifts in global temperatures and weather patterns over time. According to the UNDP Climate Dictionary (n.d.); climate change is defined as the long-term alterations

in the Earth's climate that are causing an increase in atmospheric, oceanic and terrestrial temperatures. Although climate change is a natural phenomenon, research has demonstrated that human activities, including the burning of fossil fuels, deforestation and

industrialisation, are accelerating the progression of climate change at an unnatural rate (Solomon et al., 2009; White et al., 2021; Saltzman et al., 2023). The accelerated alteration of the climate is precipitating a series of extreme climatic events, including floods, wildfires, glacial melting, droughts. These changes are having a detrimental impact on ecosystems and endangering numerous species. Despite being the primary cause of climate catastrophe, humans as a biological species are also affected by this crisis in a variety of ways, with significant impacts on the health and well-being of the human species. The studies have revealed that the possible damage the climate crisis will cause on the mental health of individuals cannot be neglected. Individuals, especially in underdeveloped or developing countries, and mostly young age groups demonstrate vulnerability; they feel anxiety, worry and fear about the uncertainty of the disasters that will be caused by the climate crisis which is named as “eco-anxiety”. The environments that surround individuals, with which they are connected and which are a part of their daily experiences, have an impact on their perceptions and sensitivities. In other words, the impact of the climate crisis reaches the living environment both directly and indirectly. Besides the fact that habitat deteriorates, humans, being a living constituent of the habitat, suffer physically and psychologically. In this context, landscapes not only improve the environmental conditions but also support the physical and mental well-being of individuals, they play an instrumental role in mitigating both the direct and indirect impacts of the climate catastrophe. Therefore, it can be considered that the landscape quality of campuses, which are among the daily landscapes of young people, also may have an impact on the feelings they will develop regarding the climate crisis.

## 2. Aim and Scope

The primary aim of this research endeavour is to elucidate the impact of green spaces on the psychological impacts of climate change. In this context, the study seeks to ascertain the climate change anxiety levels of university students in Istanbul, the most populated city in developing Turkey, where the secondary effects of the

climate crisis are particularly evident, and to assess the well-being effect of the campus landscape, defined as a type of green space that is an integral part of students' daily lives, on their eco-anxiety. The sample of the study consists of students from the Faculty of Architecture at Istanbul Technical University (ITU) and the ITU Taşkışla campus courtyard, which is situated within a dense urban environment and serves as a hub for ITU Faculty of Architecture students. The fundamental questions of the research are as follows;

What is the relationship between the level of eco-anxiety in university students and the well-being effect of campus landscapes?

What is climate change anxiety or eco-anxiety?

What is the effect of living in Istanbul on the level of anxiety about the climate crisis?

What is the level of climate crisis anxiety in university students?

What is the perceived well-being score of Taşkışla courtyard landscape?

What is the relationship between eco-anxiety levels of university students studying in Taşkışla, courtyard usage habits and the well-being effect of courtyard?

In Istanbul, a city particularly affected by climate change, can we consider whether the campus courtyard landscape has an impact on reducing the anxiety caused by the climate crisis? Which features of the courtyard are more influential?

## 3. Methodology

In order to establish the general theoretical framework and to understand the current literature, the study commenced with a literature review in main and related areas: (1) impact of climate change on the physical and mental health, more specifically (2) eco-anxiety, and (3) the well-being effects of green spaces on mental health and well-being and (4) how can the criteria for measuring the effects of spatial organisations on health and well-being be defined.

The research is structured around a case study based on a survey. The current survey aims to measure (1) the level of climate change anxiety among university

students in Istanbul, (2) the perceived well-being impacts of the Taşkişla courtyard, and (3) the potential role of the courtyard in mitigating eco-anxiety.

The questionnaire consists of four parts: the first part contains demographic data such as age, gender, department, frequency of use of the courtyard and main reasons for its use. These questions provide a framework for the profile of the participants and their interaction with the courtyard. The second section explores the extent of eco-anxiety among students, using questions from a study by Clayton and Karazsia (2020) on climate change anxiety, adapted to the specific conditions in Istanbul. The third section explores the impact of the courtyard on perceived well-being, drawing on existing literature and WELL v2 certification criteria adapted for an enclosed space such as the courtyard in Taşkişla. The last section examines the relationship between eco-anxiety levels, courtyard use habits and the well-being effects of the courtyard.

Data was collected through an online survey using Google Forms and the data was disseminated through student communication channels, and direct by sending a link directly to the students inside the campus and in the courtyard. Likert scale responses were analysed using descriptive statistics, means and frequencies, and correlation analysis to identify relationships between eco-anxiety levels, courtyard use and well-being effects. This approach provided a comprehensive understanding of the potential role of campus landscapes in mitigating eco-anxiety among university students in urban environments.

#### 4. Literature Review

##### 4.1 - The impact of climate change on the physical and mental health of the human species

Environmental impacts brought by climate change have serious negative consequences on human health together with numerous other biological species. Human life is being adversely affected by climate change, which is altering the quality of the air, water, and food supply (Sweileh, 2020). In a recent report, the World Health Organisation (WHO) (2023), which identified climate

change one of the top ten global health hazards in 2019, has stated that approximately 250,000 additional deaths per year are expected between 2030 and 2050 as a consequence of the effects of climate change. The effects of climate change on human health are both direct and indirect, and are significantly influenced by a range of environmental, social and public health factors (WHO, 2023). Climate change's effects on the spread and distribution of infectious illnesses are among its most significant biological effects. Significant public health risks might arise from changes in precipitation patterns, high temperatures, and other climate-related factors that could affect the frequency and geographic spread of vector-borne infectious illnesses (Ostfeld and Brunner, 2015; Naish et al., 2014). Furthermore, by affecting elements like food security, water availability, and air quality, climate change can affect the frequency and severity of non-communicable illnesses, such as respiratory and cardiovascular conditions. Extreme weather events, such as heat waves, floods, and droughts, can have a direct effect on people's health by raising rates of illnesses and fatalities (Saltzman et al., 2023).

A growing body of evidence shows that the climate crisis is having a detrimental impact on human health, encompassing psychological as well as physical dimensions. The impact of climate change on physical and social infrastructure, along with the effects of climate change on physical health, food and water shortages, floods, storms, and other related factors, can have a direct detrimental effect on mental health. Such occurrences have the potential to precipitate the onset of post-traumatic stress disorder, anxiety, depression and other mental health issues, particularly among those who are particularly vulnerable (Hayes et al., 2018; Clemens et al., 2020). In addition to the direct effects on mental health, the occurrence of disaster scenarios and uncertainties caused by the climate crisis has been linked to the onset of mental disorders such as depression, and anxiety (Tomlin, 2020). Moreover, research has demonstrated that younger adults exhibit heightened levels of anxiety regarding climate change (Whitmarsh et al., 2022; Searle and Gow, 2010).

To summarise, the studies have shown that due to the climate crisis, not only physical but also the mental and psychological health of human beings is at great risk.

#### 4.2 - What is climate change anxiety / eco-anxiety?

Mental health and well-being are anticipated to suffer greatly as a result of global climate change. The localised and/or immediate effects of climate change may be perceived as direct and personal, manifesting as stress or injury caused by increasingly extreme weather events or the degradation of landscapes (Doherty and Clayton, 2011). Post-traumatic stress disorder, anxiety, and depression have been linked to exposure to such stressors, according to research (Hayes et al., 2018; Gunasiri et al., 2022). For example, it has been demonstrated that extreme weather events, such as hurricanes and floods, worsen mental health issues, especially in vulnerable groups who are displaced or lose their means of subsistence (Gunasiri et al., 2022). Climate change psychological distress (CCPD) or climate anxiety is a phrase used to describe the psychological anguish that these occurrences cause, which is frequently exacerbated by the ongoing stress of living in an environment that is being impacted by climate change (De Jarnette, 2024). In this context, the “eco-anxiety” term is generally defined as a response to the deterioration of global ecosystems. According to the Clayton et al. (2017, p.68), it was defined as “*a chronic fear of environmental doom*”, while Glenn Albrecht (2012, p.250, p.283) termed it as “*the generalized sense that the ecological foundations of existence are in the process of collapse*” or “*non-specific worry about our relationship to support environments*”. The concept of eco-anxiety is defined as the intersection of feelings of worry, fear and anxiety about environmental disasters and the uncertain situations that may arise from them.

Additionally, it is clear that even the environmental effects of the climate crisis are not felt across different social groups uniformly or universally; therefore, not also the psychological impact of climate change is homogenous and thus it varies depending on a situation that comprises socio-economic contexts and demographics. Due to a confluence of political, environmental, and socioeconomic variables, developing nations are more

vulnerable to the effects of climate change. Many of these countries lack the funding necessary to make investments in catastrophe preparedness, infrastructure, and climate adaptation plans. Climate change has the potential to worsen already-existing social injustices and intensify systemic challenges in development, resulting in notable socioeconomic regressions (Ogunbode et al., 2022; Heeren et al., 2022; Reyes et al., 2021). A global survey conducted by Pew Research Center in 2013, reported that respondents in underdeveloped nations are more concerned about climate change than those in developed nations (Stoknes, 2015).

Besides, research evidence has indicated that younger age brackets, particularly adolescence and early adulthood, are more vulnerable to eco-anxiety than older age brackets. According to Vergunst and Berry (2021), children, adolescents, and young adults are most vulnerable to eco-anxiety because of their stage of development and also because they are more exposed to the risks of climate change as their lifetimes play out. With that said, Zacher and Rudolph (2023) also demonstrated how results clearly indicated that the probability of the age group being young is higher for feeling anxiety because of climate change; thus, one can relate high magnitudes of eco-anxiety with younger age. Searle & Gow (2010) conducted a systematic review in which females and younger age groups below 35 years were found to report higher levels of distress over climate change as compared to males and individuals above 35 years.

According to the studies, this situation can be explained by the increased awareness and personal investment in the future, adding to the developmental vulnerabilities threatened by environmental degradation.

Developmental vulnerabilities and the increased prospect of exposure to threats from climate change during their lifetime make younger individuals more at risk for eco-anxiety. Findings suggest that targeted assessment and support of eco-anxiety in younger groups would not be unwarranted.

#### 4.3 - The role of the landscape on mental well-being

Green spaces have been demonstrated to offer numerous benefits for both human health and the environment. These advantages include lower rates of chronic illnesses like anxiety, obesity, and heart disease; better air quality; lower risks of flooding; and a reduced heat island effect. The effects of climate change on the environment and human health are included in these co-benefits. Green areas are therefore seen as an essential instrument for tackling these issues. Costanza et al. (1998) refer to the value of ecosystem services whereby natural capital-which also includes urban green space-is very important in human well-being for provision of essential services such as air purification and climate regulation. According to Maas et al. (2006), there is a positive relationship between the perceived health of inhabitants and the existence of green spaces in urban settings. According to their research, green spaces may improve health outcomes, especially in metropolitan regions where environmental stressors are prevalent. In addition to supporting physical health in a positive sense, it has been revealed through research that it has a healing effect on mental health and supports well-being. Those studies that have conducted green space exposure and mental health linked a fact that regardless of activity intensity, even the shortest time periods spent in green space (5 minutes), have the most positive effects on state of mind and self-worth. People who stay in a greener environment are presented with more opportunity to experience stress-relieving advantages on a regular basis, research shows. (Thompson et al., 2012; Barton & Pretty, 2010). It is believed that many minor but significant interactions with the natural environment may contribute to the correlation between high levels of green space in the living area and low levels of stress.

In addition, research shows that green spaces in university campuses, which are the type of green spaces with a high density of young users, contribute positively to students' mental health. Holt et al. (2019) reported that university students expressed positive opinions about nature and green spaces in campus environments. It is also revealed that these spaces support a variety of positive emotions that can enhance overall well-being.

Furthermore, Lu and Fu (2019) emphasise that campus landscapes should support both physical and mental health, suggesting that healing landscapes are essential to enhance student experiences. The psychological benefits of green spaces are also supported by Hipp et al. (2016), who show that there is a relationship between the perceived green character of university campuses and their perceived restorativeness, which in turn correlates with students' reported quality of life. Access to green spaces supports student well-being, helping to reduce stress and anxiety levels common among university students. It is thought that the presence of green spaces on campuses also supports academic performance. Studies have shown that campus landscapes are an integral part of students' daily life and positively affect their mental health and academic achievement (Liu et al., 2022; Dadvand et al., 2015; Matsuoka, 2010).

Similarly, research by Ghorbanzadeh (2019) shows that the quality of the campus landscape can affect students' attendance and sense of belonging, which are critical for academic success. Campus landscapes foster a sense of community and belonging by promoting social connections among students (Thompson et al., 2023). A literature review was conducted specifically on courtyard buildings among campus landscapes, and findings were obtained that courtyard buildings provide the necessary areas for relaxation and relief from stress. This is because by design, courtyards provide refuge from disruptive environmental elements. In this regard, courtyards may significantly decrease the perceived level of disturbance due to urban noise and create a healthier sound environment that promotes well-being (Gidlöf-Gunnarsson & Öhrström, 2010). They could also provide climatic comfort for air temperature because they will create a microclimate, Hao et al., 2019. Besides, they improve the quality of air. It also helps in supporting biodiversity and provides shelter for many species.

Besides, Ming and Fu (2019) highlighted that students prefer the courtyard design with vegetation and open lawns because such courtyards are perceived as a restorative environment to reduce stress and anxiety. A courtyard garden can enhance these restorative qualities by incorporating natural elements into courtyard design

and can make courtyards a great amenity on campus for mental health because the courtyard form allows use of an open space in the center of the building.

Considering all these, the landscapes, which are a part of everyday life, are extremely effective tools in terms of positively affecting physical and mental health and well-being, especially as a result of the climate crisis.

#### 4.4 - WELL certification system

In the contemporary context of heightened environmental consciousness, certification practices have emerged that aim at promoting adherence to the principles of sustainable design within built environments. Various systems for different areas of construction exist from building-specific to landscape-focused certifications. These certification systems such as LEEDS, BREEAM, WELL, SITES, Green Star provide the frameworks through which rating and accreditation of sustainability and environmental performance of the built environment may be carried out with a focus on various aspects that include, but are not limited to ecological performance, social equity, and economic viability etc. The WELL Building Standard differs from other certification systems in its unique focus on human health and well-being. This focus includes metrics related to factors that directly affect mental and physical health, such as air quality, lighting, acoustics (Kent et al., 2024). According to the website (WELL V2 Introduction, n.d.) the WELL Building Standard is a tool that enables organizations and buildings to create more intentional and considerate environments in support of people's health and well-being. WELL v2 provides tactics through design interventions, operational protocols, and policies informed by the most recent scientific research that aim to advance human health and foster a culture of health and well-being. The WELL Building Standard was developed by a diverse community of varied WELL users, practitioners, public health specialists, and building scientists from around the world. The evaluation criteria are composed of 10 concepts with 24 precondition and 102 optimisations. These 10 concepts consist of air, water, nourishment, light, movement, thermal comfort, sound, materials, mind, community, and innovation. These concepts and their sub-items, which some of

them have been developed with reference to the 17 key goals of sustainable development, are oriented towards improving human health and well-being as well as environmental health. This certification system offers a number of parameters to improve the impact of spaces on health and well-being. It seems possible to provide a basic level of guidance for creating healthy environments or measuring the impact of an open space on health and well-being.

Since this certification system is hinged on an appraisal plan that is mostly dependent on the interior space characteristics of the building, there should be an inevitability in the developing similar methods for open spaces, it can be possible that criteria developed for architectural spaces can also be adapted for open spaces. In view of the growing concern, fear and anxiety about the climate crisis, in addition to the physical damages caused by the climate crisis on habitats and various biological species, including humankind, the existence of spatial characters that will support mental well-being in the surrounding built environment is also crucial.

#### 5. Case: Courtyard of the ITU Taşkışla Campus

Istanbul, which has a unique geographical location and historical background, is the most populated city in Turkey, which is defined as a developing country, and a metropolis that continues to urbanise rapidly. In Istanbul, according to the Municipality data the amount of green space per capita is 7.20 square metres (*yaysis.istanbul*, 2022). Recent studies have shown that the green space of Istanbul is remarkably low compared to international standards. Kılınç and Türk (2021) emphasize that the green space standards of Istanbul are inadequate in this respect, which negatively affects the urban quality. Besides, according to Toros et al. (2017), the study has found that megacity Istanbul is facing climate change directly with a rise in average temperatures and precipitations, increasingly from the beginning of the 20th century until 2016, which might be related to the increase in sea levels, evapotranspiration, and heavy rainfall.

In recent years, Istanbul has been witnessing many extreme weather events such as heavy rains, floods, heat waves and snowstorms, which are reflections of climate change. Among the news published on the 'İklim Haber (Climate News)' page, which is a news page that aims to address climate change from scientific,

economic and political perspectives and aims to share the most up-to-date developments on climate, the news published according to the search made with the keyword 'Istanbul' for the last 5 years can be listed as follows (Figure 1):

Extreme Rainfalls	"2 People Died in Flood in Istanbul (September 6, 2023) Due to the strong rainstorm in the northern region of Istanbul, 2 people lost their lives. 12 people were injured and many houses, workplaces, metro stations and city hospitals were flooded." (URL 1)
	"Istanbul Once Again Experienced the Consequences of the Climate Crisis (June 24, 2020) One person died in Esenyurt due to the heavy rainfall in Istanbul. The highest rainfall per square metre fell in Ümraniye (28.9 kg) and Üsküdar (24.8 kg). Hail accompanied the heavy rain in many districts of Istanbul. Hail, which was the size of a walnut in places, damaged many vehicles. Tornadoes occurred in Çatalca and Hadımköy." (URL 2)
	"'The Projected Date for the Water Crisis in Istanbul is 2030' More than one billion people still cannot access the limited clean water resources in the world. The 'water stress' that emerges with the ever-increasing population will affect the whole world in 2050. The projected date for the water crisis that may occur in Istanbul is 2030." (URL 3)
Extreme Heats	"Istanbul Hotter Due to Urban Heat Island Effect (August 19, 2024) Urban areas in Istanbul, Europe's most densely populated city, are 1°C warmer on an annual basis than rural and forested areas, according to a new study examining how dense urbanisation affects temperatures." (URL 4)
	"Heatwaves caused 4,281 extra deaths in Istanbul alone (June 22, 2023) A study analysing the heat waves experienced in Istanbul during the summer months of 2004-2017 revealed that two-thirds of the heat waves caused deaths. According to the study, an extra 4,281 people died during 20 heat waves." (URL 5)
	"Temperature Record of 109 Years in Istanbul (May 18, 2020) The average temperature taken in Istanbul from January to 13 May broke a record by exceeding the measurements made since 1911." (URL 6)
Drought	"Prof. Dr. Kurnaz: 'If no rain falls in Istanbul, blackout is inevitable' (November 15, 2023) Climate scientist Prof. Dr. Levent Kurnaz said that Istanbul should receive rainfall for a long time in order to breathe a sigh of relief against the threat of drought, otherwise the water cut measure could be implemented. After the effective rainfall in Istanbul, the dam occupancy rate was measured as 17.08 yesterday according to ISKI data." (URL 7)
	"Drought Warning Required for Istanbul and Marmara (October 9, 2023) Drawing attention to the prevailing drought in the Marmara Region, especially in the European Side of Istanbul, Prof. Dr. Murat Türkeş emphasised that national and provincial drought management strategies should switch to dynamic systems." (URL 8)
	"Filling Rate of Dams in Istanbul dropped to 19.91 per cent (January 4, 2021) In Istanbul, which had no precipitation, the filling rate of the dams fell to 19.91% yesterday, and experts drew attention to the issue of using water efficiently." (URL 9)
	"WWF Major Cities, Including Istanbul, Will Face Water Problems (November 4, 2020) WWF has announced that a major water shortage awaits the world if resources are not used properly. Istanbul is among the cities that will experience problems." (URL 10)
Air Pollution	"Invisible Killer: Air Pollution Threatens Istanbul (April 26, 2024) Data collected for seven years from 37 air quality monitoring stations in different parts of Istanbul show that fine particulate matter (PM2.5), which has been declared carcinogenic, is above the WHO limit value both in urban centres and rural areas." (URL 11)
	"New Report: Air Pollution in School Zones in Istanbul 2 Times Above the Limit (May 3, 2021) The results of the air quality measurements carried out by Greenpeace Mediterranean in four different school districts in Istanbul revealed that the extent of air pollution in school districts threatens the health of children." (URL 12)

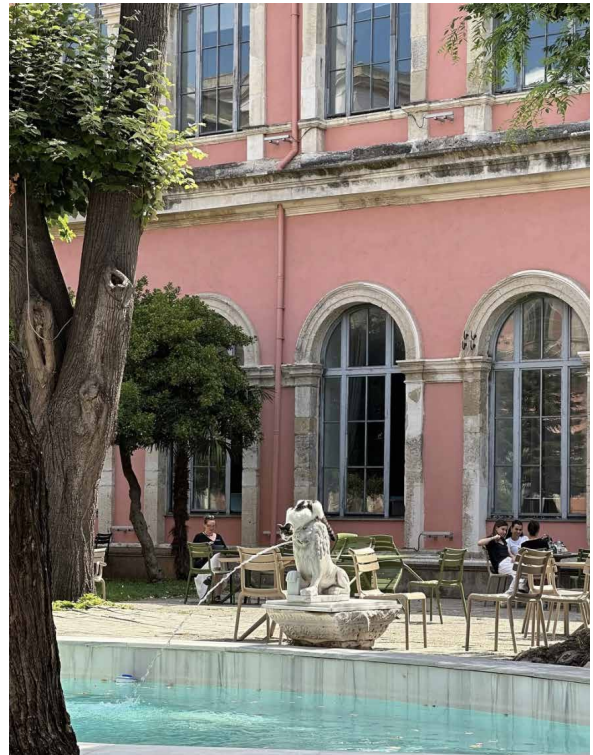
Figure 1: Climate news about Istanbul classified and listed by writer, data from iklimhaber.org (URL 13).

When the climate news of the last five years are listed on the *İklim Haber* website for Istanbul, drought news is frequently repeated, and the public is warned about water scarcity and dam occupancy. In addition to news on temperature increases and extreme heat waves, news on extreme precipitation with fatal consequences follow drought in number. Air pollution is at the bottom of the list, but the data presented is highly critical. In order to describe the situation of the case area of the research, the table is limited to news reports from one news source, but the news is not limited to these. The inhabitants of Istanbul have experienced a wide range of other disasters that can be considered as the consequences of global warming, such as deadly snowstorms, mucilage, and the COVID19 pandemic. It has been revealed that underdeveloped and developing countries are more vulnerable to environmental disasters caused by climate change. Istanbul, with its dense and unplanned urban texture, can also be described as a vulnerable region against the impacts of climate change.

Istanbul Technical University (ITU) Taşkışla Campus is located in Şişli district on the European side of Istanbul, at a point neighboring Beyoğlu and Beşiktaş districts. Taşkışla was built as a masonry structure with modern technology for the Faculty of Medicine, designed by British architect William James Smith. The historical structure that has been used as a military barracks, military hospital and educational building throughout its history dating back to 1847, is currently being used as the Faculty of Architecture of the university. A spacious courtyard situated in the middle of the rectangular structure whose façade and architectural features are dominated by Neo-Renaissance design. There is an oval pool in the middle of the courtyard, encircled by linden trees. The building is currently set up so that the academic staff can utilize the areas on the east and west sides, while design studios can use the areas facing the courtyard. The north and south façades have big lecture halls. The faculty, where approximately 3000 students are presently enrolled, hosts undergraduate programmes in Architecture, Landscape Architecture, Interior Architecture, Urban and Regional Planning, Industrial Design. Additionally, the campus offers

space for graduate students and researchers as well as undergraduate students with its classes, studios, laboratories and libraries. (Taşkışla: *Our Building*, n.d.).

There is a quadrangular courtyard in the centre of the building. The courtyard plan scheme is as shown in Figure 3 and the façades surrounding the courtyard walls are light pastel pink in colour and consist of windows facing the courtyard of the classrooms in the form of studios. The long side of the courtyard is approximately 71 metres long and the short side is 41 metres long; this courtyard has an area of about 2900 square metres and more than 145 square metres of this area is green space. Access to the courtyard is through 4 corridors and there is a pool in the centre. The green areas are divided by defined hard surfaced pedestrian paths to provide circulation. In the direction of the short side of the rectangular form, there is a large hard surface with mobile chairs, which forms the main circulation axis surrounding the pool. The parapet walls that surround the half of the courtyard are also used as seating surfaces.



**Figure 2:** Taşkışla Courtyard (source: URL13).

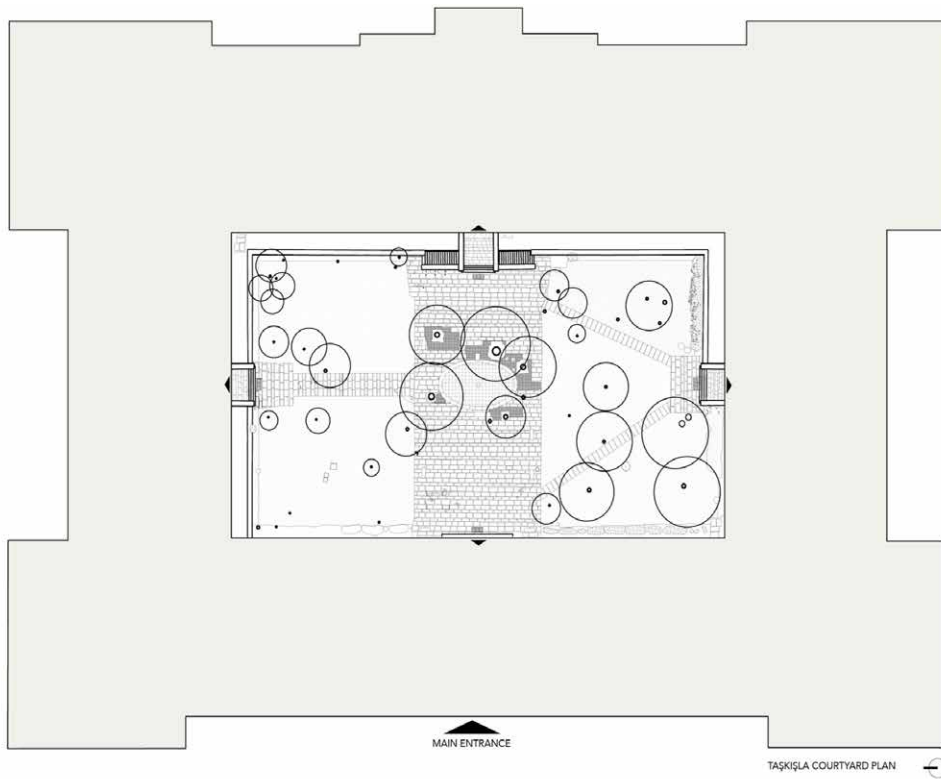


Figure 3: Plan of Taşkılla Courtyard.



Figure 4: Location of Taşkılla in the urban context. (Google Earth Pro)

### 6. Results

In order to assess the climate crisis anxiety in young individuals, to evaluate the perceived well-being effect of the courtyard and to determine the role of the courtyard in mitigating climate crisis anxiety, a questionnaire was conducted on the students of ITU Taşkışla campus, which is located in Istanbul and situated in one of the most central points of the city. This questionnaire, which was created using Google Forms, was accessed by students at campus via link and qr code.

#### 6.1. General Information on Participants and Their Courtyard Usage Habits

The number of finalised participants eligible for the evaluation of the questionnaire is 151; 79.9% of the participants are female, 19.5% are male and 0.6% did not want to specify. Although the age range of the participants varies between 19 and 35, more than 80% of the participants are between the ages of 19-25. Half of the participants were students of Landscape

Architecture department, 35,7% were students of Urban and Regional Planning department, 11,7% were students of Architecture department and the remaining 2,6% were students of other departments. Among the courtyard users, graduate students participated at a rate of 15.5%, and the majority of the students were from different class groups at the undergraduate level.

Those who visit the courtyard more than 2 times a day constitute the largest group, followed by those who visit 1-2 times a day and a few times a week. It is possible to say that 73.3% of the participants actively use the courtyard. In addition, the primary reason for using the courtyard was determined as relaxation and then socialising. Some users reported that they also use it for passing, and 8.4% of the group noted smoking as their primary reason for using the courtyard. In this section, questions about users' access to the campus were also included. The vast majority use public transport to reach the campus from their accommodation, and the duration

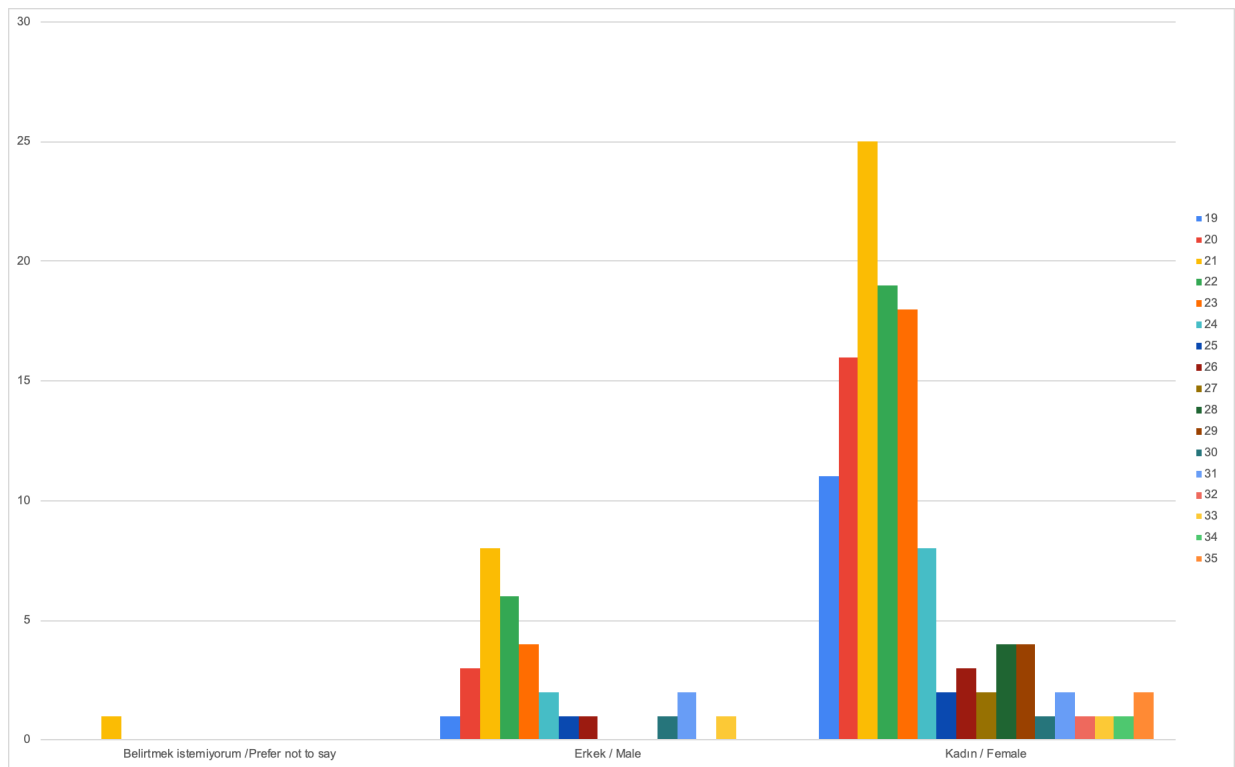


Figure 5: Demographic structure.

of this journey often exceeds 30 minutes, and for almost 10% it takes more than an hour and a half.

### 6.2. Identifying the level of climate change anxiety (Localised for Istanbul)

Participants stated that they are worried about the future due to climate change. They shared their opinions that the climate-related news in Istanbul in recent years have increased their concerns about the climate crisis. While the extreme rises in the heat level and the reports on drought and dam levels, which are frequently published in the summer months, are the factors that triggered their concerns the most, the risk of sea level rise in Istanbul due to climate crisis was determined as the reason that affected the level of concern the least. More than half of the participants stated that their concern about climate change is related to being in Istanbul and that living in Istanbul makes them feel helpless in tackling the climate crisis. Almost all participants think that open green spaces in Istanbul are insufficient and this situation increases their stress towards the climate crisis. Users who think that there is a correlation between the size of the green area and well-being have given more ambiguous answers about the effect of being in a surrounded and enclosed green area in the form of a courtyard on well-being. Finally, almost 70% of the participants stated that spending time in green spaces such as the courtyard of Taşkışla helps to cope with the environmental challenges of living in Istanbul.

### 6.3. Well-being Performance of the Taşkışla Courtyard

In order to evaluate the well-being performance of Taşkışla courtyard, WELL Certification criteria and restorative landscape design approaches were adopted and users were asked their opinions about the performance of the courtyard in terms of these criteria. In line with the answers to the questions about the reachability of the area, the survey shows that Taşkışla is easily reachable by various public transport means due to its location in the city and also has a location that encourages walking for more than half of the participants. According to the answers to the questions directed to determine the air quality, the participants stated that they feel refreshed and more energetic after spending time in the courtyard, and they think that the

air of the courtyard feels clean and fresh at a high rate and that the green areas of the courtyard support this situation. They also stated that there were no significant odours or pollutants affecting the comfort level in the courtyard. While almost all participants agree that the natural light performance of the courtyard is sufficient, this level of determination decreases slightly regarding the adequacy of shaded areas for those who are sensitive to sunlight. In addition, there is an undecided stance on the adequacy of the lighting conditions in the courtyard for activities such as reading, resting and studying in the courtyard. In the performance of the courtyard for movement, while the participants were on average positive about the courtyard's encouragement of walking, circulation and movement, this rate tended to approach negative views with undecided opinions about the courtyard having a structure that supports physical activities. In the area of thermal comfort, there is an undecided favourable opinion and the courtyard is largely considered to have good air flow and coolness.

In addition to all these, they reported that it is not possible to spend time in the courtyard for a long time and comfortably regardless of the weather conditions. It was revealed that the courtyard is free from disturbing noises such as traffic, construction and its performance in terms of providing protection against urban noise and sound pollution is dominated by positive opinions. There is also a common view that natural sounds such as birdsong, water sounds and wind enrich the courtyard experience. In addition to the positive views on the courtyard's ability to support quiet, calm relaxation or focus, there are also a considerable number of undecided views. Spending time in the courtyard helps to reduce stress and relax, promotes mindfulness and self-reflection, supports mental well-being with its green character, and users tend to feel focused and productive after spending time there. It is possible to say that the courtyard has a positive effect on fostering a sense of community and belonging. According to not much more than half of the participants, the seating arrangement in the courtyard encouraged social interaction, while more than  $\frac{1}{3}$  remained undecided. Almost all participants reported feeling safe and comfortable in the courtyard, and this confident opinion on the inclusiveness

performance of the courtyard was again positive, but with slightly more ambiguous limits. The view that the courtyard provides a sense of protection against external environmental factors and that the courtyard provides a much-needed connection to the natural environment in urban environments is dominant. Among the physical characteristics of the courtyard, the presence of the pool has the most positive effect on well-being, the ability to dialogue between indoors and outdoors through the windows opening to the courtyard is a factor that follows it, and the pink colour of the walls is a factor that positively affects well-being for  $\frac{2}{3}$  of the respondents.

#### 6.4. Linking Eco-Anxiety and Well-being Effect of the Courtyard

This part, in which the opinions on the effects of the courtyard on the anxiety against climate change are tried to be taken, is the last stage of the questionnaire. The participants are highly undecided and 1.3% closer to being negative about the fact that spending time in the courtyard reduces their concerns about climate change and its secondary effects. On the other hand, the fact that the courtyard features natural elements was thought to make them feel hopeful about Istanbul's adaptation to climate change, and positive opinions prevailed that the natural protection it offers in the city helps to balance their climate-related stresses. The courtyard form was also seen to have a positive effect on making users feel more peaceful. Almost  $\frac{2}{3}$  of the respondents agreed with the statement that their perception of the well-being benefits of the courtyard is independent of their concerns about climate change, and about  $\frac{1}{3}$  of the respondents were undecided. Finally, it was observed that spending time in a historical building such as Taşkışla increased the participants' awareness of natural and cultural heritage.

### 7. Discussion

The research was developed in the form of a questionnaire survey with a group of active university students between the ages of 19-35, residing in Istanbul, the densest and most populous city in a developing country, and located in the centre of Istanbul, within the intense urban environment of the ITU Taşkışla campus. This study presented highly complicated relationships

between the level of climate crisis anxiety in university students residing in Istanbul, the performance of the Taşkışla courtyard landscape towards mental well-being, and whether a relationship can be established between the two.

Since the female population is predominant in the faculty, this situation was also observed in the questionnaire, so the results of the questionnaire did not provide any data sufficient to make a gender-based evaluation. Students from different departments and various grade levels participated in the survey, among which the 19-23 age group and the Landscape Architecture department students were the most prominent. Regarding the students' habits of using the courtyard, almost half of the participants had the daily habit of visiting the courtyard and the primary reasons for using the courtyard were identified as relaxation, socialising and passing, respectively. Only those who visited the courtyard more than twice a day added smoking to their primary reasons for using the courtyard.

Almost all of the students stated that they are concerned about the future due to climate change. They stated that they think about the effects of climate change on the environment mostly, if not frequently, and that they are concerned about the consequences that the climate crisis has caused in Istanbul and may cause in the future. In line with the questions directed specifically to Istanbul, the secondary effects that most concern university students are drought, extreme heat waves, air pollution and damage/diseases to the respiratory tract, destruction of habitats and natural species, flash rains and flood risk, epidemic risk and finally sea level rise. Drought, the possibility of running out of water, heat waves at a level that will affect daily life, and inadequate breathing air are the problems that the students stated that they are concerned about in the first three places. Considering the scenarios expected for Istanbul, it is possible to foresee that sea level rise, which is ranked last, will not directly affect the lives of every citizen. It can be inferred that students are more concerned about the problems that they believe they will be directly affected by the consequences and have a higher probability of realisation. Dense urbanisation and insufficient green

areas in Istanbul were also pointed out as another source of stress. The results obtained from this part of the survey indicate that climate crisis anxiety is observed in university students. Students are concerned about the challenges of living in Istanbul with its low urban quality and its vulnerability to the consequences of the climate crisis. In this context, spending time in the courtyard helps to alleviate the feelings towards the environmental problems of living in Istanbul.

Considering the data on transportation in the evaluation of the impact of the courtyard on well-being, it was revealed that the students mostly spent more than half an hour on the roads and reached the campus by public transport and also thought that the campus was easily accessible by public transport. It can be assessed that the perceived air quality of the courtyard is good, helps students to refresh and provides an air-conditioned atmosphere away from pollutants, which can be perceived as clean. While it performs well in terms of receiving natural light, it is thought that it does not have a lighting infrastructure to support the actions/activities that can be carried out in the courtyard. The inadequate illumination of the courtyard may limit the active use of the space during extracurricular hours, especially after sunset. While the students found the shade and sun balance in the courtyard sufficient, they expressed an opinion on the lack of sheltered areas for individuals with sensitivity to sun rays. In addition, the use of the courtyard depending on weather conditions can also be associated with the possibility of unprotected environments against precipitation. The courtyard of Taşkışla does not contain any structural shade elements or top cover; it offers protection from the sun and precipitation entirely with plants. Therefore, this situation may vary due to the seasonal leaves falling or pruning of the plants in the courtyard.

The general structure of the courtyard has a structure that adheres to defined geometric forms rather than directly identifying continuous circulation axes. The students' reluctance to say that the courtyard has a walkable and circulation-supportive structure may be due to this rigid plan scheme. At this point, it is also possible to evaluate that the courtyard, which is an

extremely small green area compared to the campus population, is insufficient to support various physical activities. Nevertheless, this small habitat is home to various living creatures and creates the opportunity to connect with the natural environment with bird sounds, plant cover, and with these sounds, it offers a kind of calmness, serenity and supports well-being additionally thanks to the wind and the water sound of the pool in the centre.

While the portable chairs in the centre of the courtyard allow various groups to come together and redefine the space according to their needs, the parapet walls surrounding part of the courtyard, which are mostly used for seating, can be considered as an element that weakens the possibilities of social interaction due to its linear form that restricts reciprocity. It can be said that its performance in terms of being inclusive and supporting the community needs to be improved.

Although the courtyard in the centre of this historical building was not planned in line with well-being or restorative landscape standards, it is possible to make an assessment that the Taşkışla courtyard offers conditions that support the mental well-being of the students. At this point, while there is a majority of more than  $\frac{2}{3}$  that spending time in areas such as Taşkışla courtyard in daily life helps to cope with the environmental challenges of living in Istanbul and helps to escape from the stress of the crowded city, those who expressed a positive opinion that spending time in the courtyard reduces their concerns about climate change and its secondary effects could not even reach a rate of  $\frac{1}{3}$ , and almost half of the participants reported that they were undecided. The results revealed that the students had a great deal of anxiety about climate change and that the courtyard of Taşkışla had a good performance to support their mental well-being, while the students stated that they did not find the anxiety they felt against the climate crisis and the healing effect of the courtyard to be related. This situation revealed that the protected atmosphere created by Taşkışla courtyard, as an area within the city but largely isolated from the negative effects of the city, which has created its own microclimate, helps to reduce the stress caused by the conditions in Istanbul and to

cope with the feelings of environmental challenges in Istanbul, but it does not have a sufficient effect on mitigating concerns about the climate crisis directly.

## 8. Conclusion

The research, which started with a comprehensive literature review, revealed the vulnerability levels of developing countries against the increasing effects of the climate crisis, and it was determined that young age groups are under threat in terms of mental damage caused by the climate crisis on people. Landscape plays a key role in improving environmental conditions, minimising the effects of disasters arising from the climate change, and supporting the health and mental well-being of living species. In this context, ITU Taşkışla Campus in Istanbul, Turkey and the students who continue their education in the campus have been identified as the case. This questionnaire study, which was aimed to determine the climate change anxiety status of university students aged 19-35, to assess the well-being effect of the Taşkışla courtyard and to determine the well-being effect of this space on the eco-anxiety of the students. The research revealed that university students are anxious about the environmental disasters caused by the climate crisis that are possible to occur in the future. Although the courtyard landscape of Taşkışla, a historical building, was not planned based on any well-being or restorative landscape design criteria, as an area where it is accessible due to its central location, it is home to old linden trees and different plant species, thus creating a habitat for various species and seeing various bird species, the sounds of nature replace urban noise, where the air quality is relatively good in a dense urban texture, and which performs not badly in receiving sunlight and providing a light-shadow balance, it is extremely effective in supporting well-being.

To sum up, although it is understood that the courtyard serves to reduce the stress of living in a city like Istanbul for the students and to alleviate their thoughts about Istanbul's vulnerability to the climate crisis with its isolated structure, it is striking that they report that there is no connection between their eco-anxiety levels and the healing aspect of the courtyard. In this context, although it is possible to say that the courtyard of

Taşkışla, which does not have a particular claim, has a performance that supports well-being, it is revealed that it cannot perform adequately in terms of concerns about the climate crisis.

It would have been more effective to conduct the questionnaire with a larger number of participants in order to obtain more reliable results on the subject. Apart from the perceived well-being effect of Taşkışla courtyard, a quantitative evaluation with measurements and restorative landscape design parameters would take this study one step further. It would also be useful to carry out a comparative study to understand whether the performance of a landscape in the form of an enclosed courtyard and an open landscape area on the subject differs. Beyond this, conducting the research in a green space that claims to be a restorative landscape may provide more relevant data to understand the performance of landscapes that support well-being against eco-anxiety. This research has shown that a campus landscape in the form of a courtyard was perceived by students to promote well-being but had almost no effect on reducing their anxiety about the climate crisis. Anxiety about the climate crisis should be a parameter that needs to be addressed separately when creating such landscapes. It is critical that interdisciplinary studies with various focus groups are carried out to identify landscape characters that help to reduce eco-anxiety.

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