



# An Analysis of the impact of the climate crisis on Turkey

Elif Altürk<sup>1,2</sup>, Zeynep Rüya Parlak<sup>2</sup>

<sup>1</sup>.İstanbul Okan University, Tuzla, İstanbul, Turkey

<sup>2</sup>.Warm Technology, Tübitak Teknokent, Gebze, Kocaeli, Turkey

**Abstract-** Climate change happens the volume of greenhouse gases in the atmosphere rises up because of fossil fuel usage, human activities, especially in cities, resulting in a global average temperature increase. That will cause to mount up the frequency and severity of extreme weather events and disasters, such as droughts, floods, and severe storms. The effects of global warming are being felt quite significantly in Turkey, as they are around the world. Abnormal changes in seasonal temperatures, fires, drought, and urbanization have begun to severely affect life in Turkey, accelerating rapidly since 2020. This article attempts to assess how climate change is affecting Turkey using data from the Turkish Statistical Institute (TÜİK) and the Ministry of Forestry with respect to drought, forest fires, etc. The results indicate that sustainable solutions must be urgently proposed, citizens must be informed, and strategic plans must be developed.

**Keywords:** Climate change, Türkiye, forest fires, urbanization, agriculture, drought, food security, sustainability

## I. Introduction

Climate change takes place when the amount of greenhouse gases (GHG) in the atmosphere increases owing to fossil fuel-used automobiles and other human activities, leads to global warming. The number of critical of extreme weather events and natural disasters, such as droughts, floods, and severe storms rises because of climate change - All these global warming and climate change have environmental, economic, and social consequences. Climate change is both a global issue and a crisis requiring visible actions at all over the world. As the dangers and risks caused by climate change led to severity living conditions, urgent solutions are required to provide with the sustainability and resilience of urban areas where population and economic activity are concentrated.

Turkey's Climate Change Strategy and Action Plan (2010-2023) and the Climate Change Action Plan (CCAP) (2011-2023) showed that climate change mitigation actions were emphasized very deeply. To decrease the effect of climate change in the energy, buildings, industry, waste, agriculture, land use, forestry, and transportation sectors are evaluated significantly in these documents. The effects of climate change were not felt in daily life up to 2000's, which delayed public awareness about the issue. In recent years, the number of losses and damages caused by weather events and disasters, both globally and in Turkey, has indicated that adaptation must be addressed with the same importance as mitigation when developing national and local climate policies.

Türkiye, located in the Mediterranean recognized climate change hotspot—has increasingly experienced temperature anomalies, prolonged droughts, intense precipitation events, and forest fires. These developments demonstrate that climate



change is no longer a future projection but a present and measurable phenomenon affecting national stability and sustainability.

As a consequence of these changes, extreme weather events and environmental disasters—such as glacier melting, severe storms, wildfires, tornadoes, floods, sea level rise, erosion, and drought—have become more frequent and more intense worldwide. These climate-related disasters clearly demonstrate the urgent necessity of taking effective measures to mitigate and adapt to climate change. This study examines the impact of climate change on extreme variations in Turkey's average temperatures, extreme temperature events, forest fires, and agricultural crop yields.

## II. Materials and Methods

In this letter, we tried to achieve an analytical research design. Secondary data were collected from:

- National statistical databases (TÜİK)
- Meteorological records
- National forestry fire reports
- Agricultural production statistics

That analysis was surveyed up to 2024 production data to evaluate the climate-related impacts. Temperature anomalies and regional distributions were evaluated using graphical and tabular data provided in the study.

The impacts of climate change have been strongly felt worldwide since the early 2000s. Turkey has followed a similar trend, increasingly experiencing the severe consequences of climate change.

## III. Results and Discussion

In order to better understand the recent trajectory of climate change in Türkiye, it is essential to examine long-term temperature trends within a historical context. Evaluating annual mean temperature rankings provides a clear and measurable indicator of how rapidly warming has progressed over recent decades. Such an analysis allows for the identification of structural shifts rather than short-term variability, offering insight into whether recent climatic conditions represent natural fluctuations or a sustained warming pattern. In this framework, the following graph illustrates the ranking of Türkiye's annual mean temperatures and enables a comprehensive interpretation of the country's recent climate dynamics.

### Turkey climate evaluation

In this section, the annual temperature variations in Türkiye, the number of anomalous climate-related events, and the deviations in average summer temperatures are examined. The analysis aims to identify long-term warming patterns and assess the increasing frequency of abnormal climatic occurrences over time. By evaluating these

indicators together, this section provides a comprehensive understanding of recent climate dynamics and the intensity of climate change impacts in Türkiye.

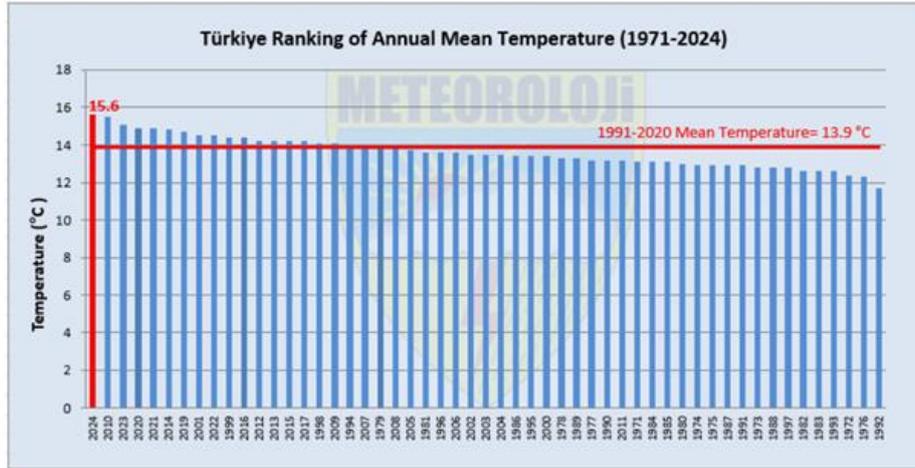


Figure1. Ranking of annual mean temperature

The graph presents the ranking of Türkiye’s annual mean temperatures between 1971 and 2024, clearly demonstrating a long-term warming trend (Figure 1). The highest mean temperature, 15.6°C, is recorded in the most recent years, significantly exceeding the 1991–2020 climatological average of 13.9°C. The ranking of annual mean temperature graph indicated that temperature increases have rises up particularly after the 2000s. However, earlier decades no significant abnormalities were observed in average temperatures reflecting comparatively cooler conditions. This pattern confirms that warming in Türkiye is not episodic but systematic, with recent years consistently surpassing historical averages, highlighting the intensifying impact of climate change at the national level.

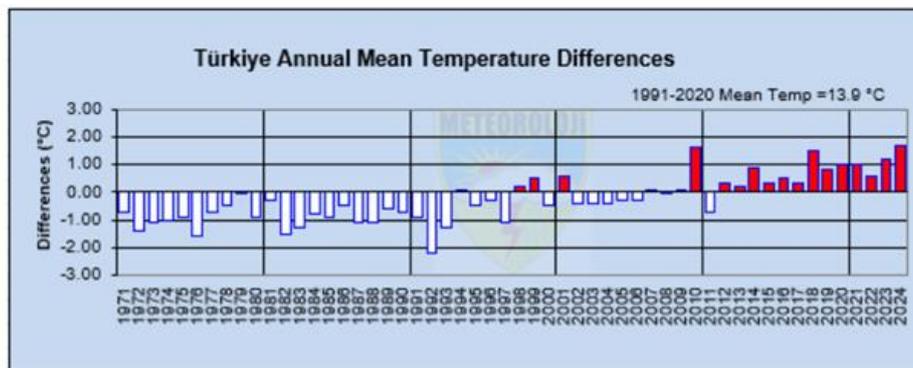


Figure 2. Turkey Annual Mean Temperature differences 4

Turkey Annual Mean Temperature difference plot shows the annual mean temperature differences in Türkiye relative to the 1971–2024 climatological average of 13.9°C (Figure 2 ). The graph clearly shows that prior to the late 1990s, most temperature anomalies were negative, indicating that annual mean temperatures were generally below the long-term average. However, beginning in the early 2000s, a significant shift toward positive anomalies is observed. In particular, the post-2010 period is dominated by above-average temperatures, with several years exceeding +1.0°C anomaly levels. The increasing frequency and magnitude of positive deviations highlight a systematic warming trend rather than short-term variability. This transition from predominantly negative to consistently positive anomalies provide strong evidence of accelerated warming in Türkiye over the past two decades, consistent with broader regional and global climate change patterns.

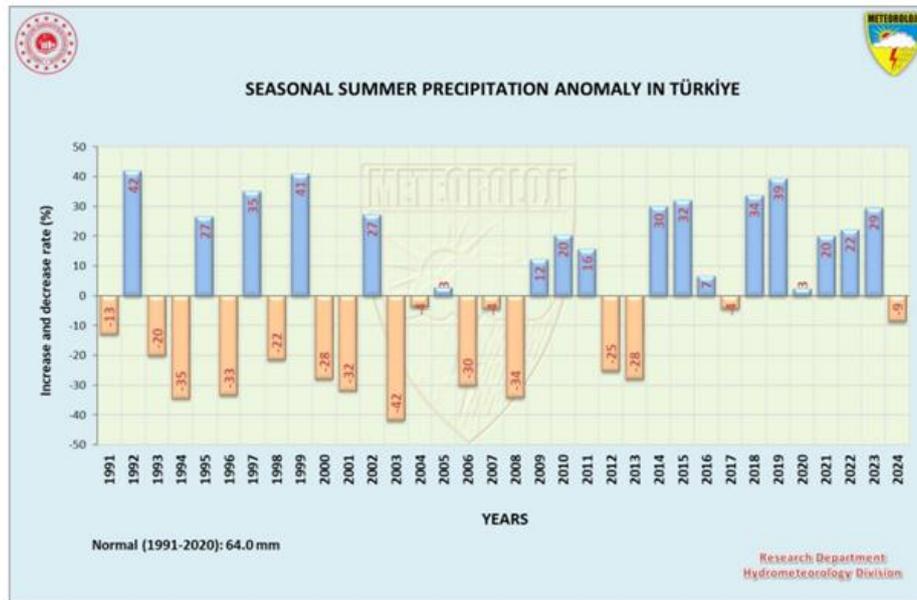


Figure 3. Summer Precipitation Anomaly in Türkiye in 2024

Figure 3 presents the seasonal summer precipitation anomalies in Türkiye relative to the 1991–2024. The data reveal substantial interannual variability, with pronounced negative anomalies in the 1990s and early 2000s indicating severe summer drought conditions. In contrast, several years after 2010 show strong positive anomalies, reflecting periods of above-normal summer rainfall. The alternating pattern of sharp deficits and surpluses highlights increasing precipitation variability, suggesting that climate change is intensifying hydrological extremes rather than producing a uniform trend.

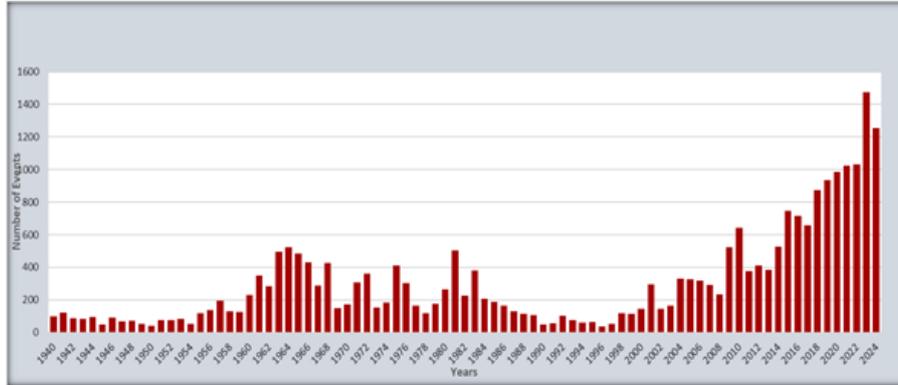


Figure 4. Annual number of extreme events in Türkiye 4

Figure 4 illustrates the annual number of recorded climate-related events between 1940 and 2024. The data reveal a relatively low and stable frequency of events until the late 1970s, followed by noticeable fluctuations during the 1980s and 1990s. However, a marked and sustained upward trend becomes evident after the early 2000s.

In particular, the post-2010 period shows a sharp escalation in the number of recorded events, reaching peak levels in the early 2020s. The highest values are observed in 2023 and 2024, indicating a significant intensification compared to historical averages.

This upward trajectory aligns with global observations linking rising temperatures and increased atmospheric instability to a higher frequency of extreme weather events. The accelerating trend after 2000 suggests that climate change impacts have transitioned from episodic occurrences to a structurally increasing pattern.

Overall, the figure demonstrates a clear long-term growth trend in climate-related events, supporting the argument that extreme weather phenomena are becoming more frequent and more severe over time.

### Forest Fire in Turkey

The fire that broke out in Yamanlar Mountain, Izmir, in 2024 could only be extinguished in three days due to the effect of the wind. The scene after the fire was extinguished was quite alarming; a large part of the Yamanlar forest had been destroyed (Figure 5).



Figure 5. 15-18 August 2024, Forest fire in Izmir (Source: Anadolu Agency)



Figure 6. After fire photo of fire area

That fire leads to a significant environmental, ecological, and social impacts. That fire caused extensive damage to large forested areas, particularly on the southern slopes, affecting the districts of Çiğli, Karşıyaka, Bayraklı, and Bornova in İzmir (Figure 6). That fire also harm on vegetation and wildlife habitats, soil structure was damaged, and the risk of erosion increased. Dangerous gases evolved reduced air quality and negatively impacted public health in nearby residential areas. The people of İzmir fought hard to extinguish the fire using their own resources after fire the ecosystem will take many years to fully recover.



Tablo1. Distribution of the causes of forest fires by years

<b>Causes of Fire Outbreak</b>	<b>Unit</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>
Intentional	Number	72	110	86	92	117
Negligence / Carelessness / Accident	Number	1,156	1,001	830	1,133	1,839
Natural	Number	312	353	358	399	730
Cause Undetermined	Number	1,859	1,329	886	955	1,111
<b>TOTAL</b>	<b>Number</b>	<b>3,399</b>	<b>2,793</b>	<b>2,160</b>	<b>2,579</b>	<b>3,797</b>

When Table 1 is examined, it is seen that the number of forest fires gradually increased between 2020 and 2024. In 2024, approximately 3,797 forest fires occurred, which is considered a significantly high number. When the causes are analyzed, 117 fires were recorded as intentional and 1,111 as having unknown causes. There is a strong possibility that some of the fires with unknown causes may in fact have been intentional. In addition, 1,839 fires in 2024 were caused by negligence and carelessness. Therefore, it is necessary to carry out public awareness campaigns to educate people about preventing forest fires. Forests serve as vital breathing spaces for humanity and act as protective shields against global warming. Scientific research should focus on early detection and rapid extinguishing techniques for forest fires, and innovative products should be developed through entrepreneurial initiatives. These technologies must be actively adopted and utilized by the Ministry of Forestry.

Tablo2. Distribution of the causes of forest fires by areas 3

<b>Causes of Forest Fires</b>	<b>Unit</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>
Intentional	Hectares	718	46.148	4.722	662	218
Negligence / Carelessness / Accident	Hectares	8,285	46.878	5.428	11.260	19.959
Natural	Hectares	197	208	517	365	736
Cause Undetermined	Hectares	11,771	46.269	2.132	3.233	6.572



<b>TOTAL</b>	<b>Hectares</b>	<b>20.971</b>	<b>139.503</b>	<b>12.799</b>	<b>15.520</b>	<b>27.485</b>
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Then the areas lost by Turkey over the years are examined (Table 2), it is seen that in 2021 there was an astronomical increase, reaching 139,503 hectares, which corresponds to 139,503,000,000 m<sup>2</sup> or 139.503 km<sup>2</sup>. When it is compared an area of 1,395,030,000 m<sup>2</sup> to a 100 m<sup>2</sup> house, it amounts to 13.95 million 100 m<sup>2</sup> houses. This explanation is provided to better understand the magnitude of the area lost due to forest fires. It is an enormous area, making the scale of the loss much clearer. These alarming results require urgent measures to be taken. In 2024, the burned forest area amounted to 139,503 hectares; if this area had not burned, it could have absorbed approximately 1.4 million tons of CO<sub>2</sub> annually. This amount is equivalent to the yearly emissions of hundreds of thousands of vehicles.

#### **Effect of climate change on agriculture**

Agriculture is one of the areas most affected by climate change. Global warming and rising temperatures each year cause an increase in insects. These insects are mostly harmful and reduce crop yields. Fighting these insects will make a significant contribution to climate change.

Looking at fruits and vegetables, there were no cherries in Bilecik this year, and apricot yields were very low in Malatya. Apple yields are particularly low this year, and the size of the apples has decreased significantly. Many fruits in our country have been reduced to almost nothing.

The adverse conditions experienced in the agricultural sector this year have led to serious yield losses in many products. Cherry production in Bilecik, in particular, has fallen to almost negligible levels, while the apricot harvest in Malatya was well below expectations. In apple production, both yields fell significantly and a noticeable reduction in fruit size was observed. In addition, losses in terms of quality and quantity were experienced in many fruits such as pears, peaches, plums, and grapes. Walnut and almond production in some regions was also affected by adverse weather conditions, while vegetables such as tomatoes, peppers, and eggplants saw declines in both yield and quality. In short, this year, many agricultural products in our country



In Turkey, fruit production decreased by 30% in 2025 compared to 2024 (Figure 8). The most significant reason for this is the frost that affected the spring of 2025. In parallel, apricot production also showed a serious decline in most regions due to the effects of adverse weather conditions; yields decreased significantly, especially in apricot production centers such as Malatya.

Production declines of up to 40% were reported for other staple fruits such as apples, peaches, nectarines, and grapes; both yield and quality issues were experienced with products such as apples and peaches. In the vegetable group, while a more moderate decline in overall production is expected, production has decreased for products such as tomatoes, cucumbers, and peppers, while small increases have been observed for some products.

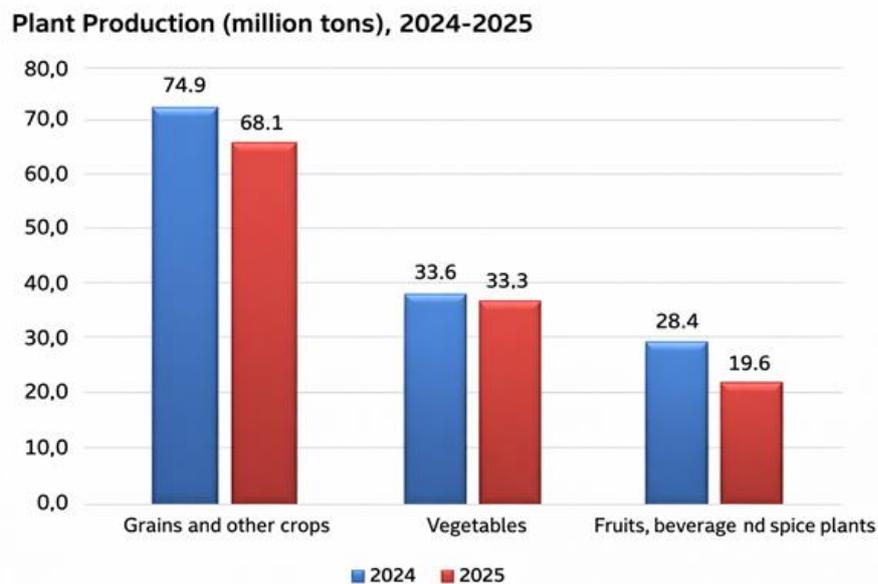


Figure 9. 2024-2025 comparative crop production chart

Total production in the cereals and other plant products group decreased by 9% to 68.1 million tons, with cereals falling by 12.3%. Wheat production decreased by 13.7% to 17.95 million tons, while barley production fell by 25.9% to 6 million tons. There were significant losses in red and green lentils, at 38.3% and 58.1% respectively, while corn production increased by 4.9% to 8.5 million tons (Figure 9).

Production in the potatoes, dry legumes, and tuber crops group decreased by 10.8%, with dry legumes alone falling by 29.2%. Total production in the oilseeds group declined by 11.1%; in contrast, rapeseed (canola) production increased by 35.1%.



Production in the fruits, beverages, and spice plants group decreased by 30.4%. There were sharp declines in apple (48.3%), pear (32.6%), peach (46.1%), and cherry (63.4%) production; while avocado (5.8%), tangerine (5.8%), and grapefruit (14%) production increased.

Vegetable production<sup>11</sup> decreased slightly by 0.9% to 33.3 million tons. Tomato production fell by 7.6%, while increases were seen in squash (snack), broccoli, cauliflower, and leafy vegetables.

According to these results, since food expenditures account for a high proportion of household budgets in Turkey, price increases could have a more severe impact on low-income groups. If real income does not increase, food inflation will directly reduce purchasing power. Access to staple foods such as fruits, vegetables, and lentils will decrease, which will also reduce the quality of people's nutrition.

Global climate change is the most important environmental and socioeconomic issue of the 21st century.

#### **IV. Conclusion**

This study demonstrates that climate change has had a significant and disruptive effects since 2000–2010. Based on data from the Turkish Statistical Institute (TÜİK) and the Ministry of Agriculture, this study is grounded in highly reliable statistical data. The increase in droughts has led to more frequent forest fires, resulting in the destruction of vegetation in the burned areas and the extinction of wildlife living there. Additionally, the continuous rise in temperatures and increased variability across seasons, along with sudden temperature drops, have prevented the production of many of our agricultural products, signaling the potential for famine in the near future. Taking immediate action on climate change is of critical importance.

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