son5

Yazar Aysun Özşen

Gönderim Tarihi: 28-Eki-2022 12:01PM (UTC+0300)
Gönderim Numarası: 1937696402
Dosya adı: TARAMA_28.10.2022.docx (26.6K)
Kelime sayısı: 4177
Karakter sayısı: 23257

EFFECTS OF CLIMATE CHANGE ON FOOD SUSTAINABILITY

ABSTRACT

In the face of rapid increase in the world population day by day, urbanization and industrialization, it is important that food production and consumption cover all humanity, that safe food is sufficient for the world population and that it is accessible. However, climate change, which is one of the most important factors threatening today's world, threatens people's access to safe and sufficient food. Because the sector most affected by the effects of the climate crisis, such as extreme weather events and temperature increases, is food production.

The relationship between food production and consumption and the climate crisis is bidirectional. While the food sector causes the climate crisis with its contribution to greenhouse gas emissions, on the other hand, it has problems in food production and efficiency due to climate change.

In this study, the effects of global climate change on food sustainability and the measures that are being taken and that can be taken are compiled.

1. INTRODUCTION

Global warming and climate change have been one of the most discussed issues especially in recent years. The natural process that regulates the heat balance of our world and develops by keeping the rays coming from the sun in the atmosphere is called the greenhouse effect and global warming is seen as the first symptom of the natural problem experienced. However, there are natural causes such as the sun or volcanic activities in the world as the causes of temperature changes in the world, as well as human-induced factors (Doğan and Tüzer, 2011). Therefore, the factors causing climate change are handled under two headings, natural factors (latitude, general circulation of the atmosphere, general circulation of the oceans, landforms and altitude, storms, movement) and human-induced factors (greenhouse gases from industry, energy and transportation sector, deforestation, wastes from agricultural production) (Kahraman and Şenol, 2018).

Since ancient times, human actions have had an impact on the environment. Initially, this influence was very little, and the environment naturally counteracted it. However, now, it is evident that the fast expanding human population is having a negative impact on the environment. The environment is more negatively impacted by the new issues brought about by developing technology, which outweigh the environment's ability to defend itself naturally (Çelik et al., 2008, Demirbaş and Aydın, 2020).

Since the last quarter of the 20th century, the dominant energy source has been fossil fuels (coal, oil, and natural gas), which has raised concerns about climate change due to the incapacity of the global system to absorb the greenhouse gases discharged into the atmosphere. Although what was once known as “Global Warming” has increasingly replaced the phrase “Global Climate Change”, today's climate activists refer to the current situation as “Climate Crisis” or “Climate Emergency” and They state that the terms “Global Heating” should be used instead of “Global Warming” (Akyüz, 2019).

Global climate change has some uncertainties in terms of the details of the situations it will cause. Some of the uncertainties that will occur in this sense are due to the complexity of the related processes; some of it is due to the fact that we do not know with certainty how individuals, governments and companies will change their greenhouse gas emissions over time (despite the commitments made). Despite the uncertainties, the situation that is certain is that the changes; nations and international relations will affect all political, economic, social and societal units (Vural, 2018).

Agriculture, forests and vegetation, clean water resources, sea level, energy, human health, and biodiversity will all be significantly impacted by global climate change (Doğan and Tüzer, 2011).

In addition, these changes in climate cause changes that will affect people's health and quality of life, such as places where people can live, suitable living environments of plants, development environments of new types of enterprises, the condition of buildings and infrastructure (Kahraman and Şenol, 2018).

The complicated cause-and-effect relationship that exists between the climate issue and food production and consumption is bidirectional (Akyüz, 2019, Agovino et al., 2019). Although food systems and diets are very climate-sensitive, they are also a key contributor to climate change (Fanzo et al., 2018). Firstly, the single largest human impact on our finite planet comes from producing food (Clay, 2011). Numerous studies have shown that the functioning of these systems is in jeopardy due to the food supply chain, which is a major source of greenhouse gas emissions (GHG), unsustainable water extraction and pollution, deforestation, and biodiversity loss (Garnett, 2013). Around 30% of the world's greenhouse gas (GHG) emissions are related to the food industry, and 70% of all human water use is related to it, too (Hoek et al., 2017). 80-86% of GHG emissions from the food system originate from agricultural production, while the remainder originates from pre-production (predominantly fertilizer production) and post-production activities processing, packaging, refrigeration, transportation, retail, catering, home food management, and waste disposal (Vermeulen et al., 2012). Global, regional and local environmental problems (such as climate change, water and land use, pollution directly or indirectly connected with food production, processing, preparation, consumption, and waste treatment are serious and urgent (Vagnoni et al., 2015).

Secondly, The increase in greenhouse gas concentration in the atmosphere, the rise in temperatures, and changes in the precipitation regime all have an effect on the quantity, quality, and stability of agricultural and zoo technical production as well as the natural environment in which agriculture is practiced (Agovino et al., 2019). One of a number of connected trends and dangers that affect agriculture and food systems is climate change (Vermeulen et al., 2012). Other rapidly changing areas of global environmental change that are affecting the future of food security include the nitrogen and phosphorus cycles, sea acidification, land cover, biodiversity, and the availability of freshwater (Vermeulen et al., 2012).

The impact of rising temperatures on agricultural outputs could be either good or detrimental, depending on a country's features (Agovino et al., 2019). Some aspects of climate change, such increased temperatures in cold climate countries, may be advantageous to some regions, but they may also have large negative consequences on other nations (e.g. water stress, increasing in the variability of yield, reduced crop yields etc.) (Agovino et al., 2019). While some areas and crops might benefit from more CO2, many won't. Although heatwaves, droughts, and flooding may reduce these potential yield increases, increases in atmospheric CO2 are likely to enhance organic matter in soil, promote growth, and improve the efficiency of some crops' use of water. Increased atmospheric CO2 may not have as much of an impact on plant productivity as previously believed, according to recent studies (Corwin, 2021).

2. FOOD SUSTAINABILITY

The concept of sustainability, used in economic fields such as production, consumption, trade and growth, and in cultural, political, social and environmental fieldswhich is defined as "to maintain the ability of future generations to have the same opportunities in this regard while continuing to live by using today's resources", entered our lives with the report titled "Our Common Future" presented to the United Nations General Assembly in 1987 (Candogan ve Ozdemir, 2021). Sustainability has multiple dimensions and is becoming increasingly relevant in contemporary food provisioning (Oosterveer and Sonnenfeld, 2012, Eryılmaz and Kılıç, 2018).

The world population, which is approaching 8 billion today, is expected to reach 9 billion by 2050 (UNFPA, 18.08.2022, Sghier and Hocquette, 2020). It is stated that urgent measures are needed in accessing healthy nutrition from sustainable food systems for the increasing global

population (Pekcan, 2019). In order to provide safe and affordable food to 9 billion people, agricultural industry, which is largely responsible ecological polution, production needs to increase between 70% and 100% (Bonny et al. 2017, Garnett, 2013). The food industry, which is expanding globally in response to the growing demand for food, is to blame for practices that harm the environment, including pollution, soil infertility, ecological issues brought on by poor transportation practices to far-off places, and excessive water use. It is also the leading contributor to climate change (Pekcan, 2019, Taş and Olum, 2020). Many of the situations mentioned affect food production in various ways. A 2°C increase in global warming will push the limits of today's food systems and it is predicted that there will be a radical revision in agriculture and food-related policies (Gökırmaklı and Bayram, 2018). This is why it's crucial to use natural resources in a sustainable and effective manner, especially in the food and beverage industry, in order to prevent the sector's detrimental environmental effects (Taş and Olum, 2020).

Agriculture, food production, fisheries, livestock, forestry, foreign trade, tourism, health, air conditioning, construction, logistics and finance-insurance are a few of the major industries impacted by climate change (Bayraç and Doğan, 2016). Agriculture has a wider enviromental footprint than any other human activity with a majör impact on water, air, land and biodiversity (Garnett, 2013).

Agriculture and the climate have a long history of interaction. Climate conditions heavily influence agricultural production, which is a key factor in determining the availability of food. The impact of climate changes on each of these factors—access to food, its use, and general stability—is less well known. These consequences come about as a result of how the climate affects activities related to the global food system, such as food production, packaging, transportation, storage, waste, and consumption (Browm et al., 2015).

Food products required for nutrition are produced by agricultural production, and there is a direct connection between human nutrition and the agricultural sector. The most important function of agriculture is to produce food products necessary for the continuation of humanity(Yalçın et al., 2016).

Meeting the rising demand for food is hampered by the effects of climate change. As a result, the countries' reliance on food imports is growing. Due to drought and heat-related floods, product losses have significantly increased. By 2080, it is anticipated that developing nations will see 15% on average production losses. Although productivity declined by 1% between 1990 and 2080 relative to global averages, this rate is expected to be 22% in South Asian nations, which produce the majority of the world's output (Gürlük and Turan, 2008).

To maintain a steady supply of food, many measures have been made to minimize the potential climate change impacts on agriculture productivity. According to a study on the sensitivity of world crop yields to climate change, yields could reduce by 3-12% by the middle of the century and by 11-25% by the end (Wang et al., 2022) . Depending on the product groups, climate change has different effects. It has been noted that Africa's wheat-growing areas have drastically shrunk. Africa's arid regions are predicted to grow by 8% by 2080. In rich countries, this rate is thought to be 6%, whereas it lowers by 20% in emerging nations' agricultural output levels (Gürlük and Turan, 2008).

In recent years, sustainability has become an important indicator that affects the decision-making mechanisms of companies all over the world and in all sectors. While the importance given to sustainability studies in the food sector has increased especially in the European Union countries, the construction sector has been at the forefront when it comes to sustainability in our country. Unfortunately, there is no visible sustainability study in the food sector in our country yet. Although some companies have started to develop greenhouse gas reduction studies with carbon footprint calculations or local projects, there is currently no initiative in terms of examining and documenting their production in a fully transparent manner and delivering it to the consumer (SEMTRİO, 18.09.2022).

In EU countries, sustainable production has been started in the food sector with Enviromental Product Declaration (EPD) certifications for food products such as bread, water, soda, meat and dairy products, eggs, fruits, vegetables, fruit juices, olive oil, pasta, ready-made food and rice (SEMTRİO, 18.09.2022).

3. A CONCEPT CLOSE TO FOOD SUSTAİNABİLİTY : FOOD SECURİTY

Food security and food sustainability; are broad and complex concepts that have many common features and used by various scientific disciplines and organizations. Sustainability can be considered a precondition for long-term food security (Berry et al., 2015).

When evaluated historically, the concept of food security, whose emergence dates back to the great depression of 1929, was used in the World Food Conference in 1974 with an approach based on food supply, as 'to ensure the availability of basic foodstuffs and price stability at the national and international level'. And then In the definition made by the World Agriculture and Food Organization in 1983, emphasis was placed on access to food and food security was defined as "all people's access to basic foodstuffs they always need, both physically and economically". The notion was later revised to include individual and household levels, as well as regional and national levels. At the World Food Summit held in Rome in 1996 by the United Nations Agriculture and Food Organization, food security defined as "it is the physical, social and economic access of everyone, at all times, to adequate, safe and nutritious food that meets their nutritional needs and food preferences for an active and healthy life". This definition has gained strong acceptance as it addresses the concept of food security in terms of both coverage and processes (Karaman, 2018).

With this definition, four basic dimensions of food security emerge:

1. Availability of food : It refers to the supply dimension of food security and is determined by the level of production, storage and net trade (produced locally and imported from abroad). It indicates the availability of food of suitable quality and in sufficient quantity supplied through domestic production or import. This dimension can be particularly associated with the capacity of agricultural systems to meet demanded foodstuffs.

2. Accessibility of food: It is concerned with individuals' access to resources that will enable them to obtain suitable foods for an adequate diet. Food security at the household level is not a function of adequate food supply at the national and international levels. If the consumer can obtain the food (transportation infrastructure) and has the financial means to buy it, then it is accessible. Sociocultural access is added to such physical and financial accessibility to ensure that food is culturally acceptable and social safety nets are in place to assist the less fortunate. Insufficient food access leads to the need for policies that concentrate on income, spending, markets, and prices in order to fulfill food security objectives.

3. Usage of food : A person has to be able to eat enough food, both in terms of quantity and quality, in order to live a healthy, complete life and reach his potential. Adequate water and sanitation are therefore also covered at this level because food and water must be secure and clean. In order to be able to digest and utilize the food they consume, a person must also be physically healthy. Individuals' eating habits, food preparation methods, and diet variety all affect how much food they consume in an adequate amount.

4. Three-dimensional stability : Stability refers to a country's, community's, or household's capacity to endure shocks to the food chain system brought on by either natural (earthquakes, climate change), or artificial, calamities (wars, economic crises). Because although there is one-day food transportation and access, there are times when there is insufficient access to food, this is referred to as food insecurity.

So, it is clear that there are various levels of food security. A time dimension that influences all the levels is stability, household accessibility, individual utilization, and national availability. For complete food security, all four of these aspects must be present (Haspolat, 2015, Karaman, 2018, Peng and Berry, 2019).

Despite a sharp rise in food production and supply, levels of undernourishment and food insecurity continue to be intolerably high (Premanandh, 2011).The world food balance is heavily impacted on the demand side (Cohen, 2006). Establishing food security has an important place in ensuring the balance of food supply and demand globally (Koca and Somuncu, 2021). High economic growth, particularly in developing nations like China and India, leads to higher-than-expected rises in consumption. The demographic shift between rural and urban areas is another factor. Changes in consumer patterns and spending have resulted from this (Cohen 2006).

Food insecurity is affected by climate change, decrease in grain production, decrease in livestock numbers and price increases (Koca and Somuncu, 2021). One of the important reasons for the recent increase in food prices is seen as bioenergy (biofuel). In particular, the USA, which realizes more than half of the world's corn export, is constantly increasing its food production for the use of ethanol. In 1997 America used 5% of corn production for ethanol production, today this has increased to 25% (Gürlük and Turan, 2008).

Food policy planning and evaluation now place an ever-increasing emphasis on both food security and sustainability. The political economic aspects of ensuring food security and sustainability have gotten more complicated precisely because they have been the subject of so much recent discussion. Food policy used to be largely focused on food prices, but as the importance of ideas like food security and sustainability has grown, a larger range of people and groups have been interested in participating in the discussion (Swinnen and Vandevelde, 2019).

4. THINGS TO DO FOR FOOD SUSTAINABILITY

The proposed remedies heavily depend on how the issue is framed, and there appear to be three basic perspectives on the problems and how they interact (Garnett, 2013).

The first viewpoint focuses on the negative effects of food production; as a result, it's important to address these effects by developing farming and postharvest supply chain tactics that don't hurt the environment. (Garnett, 2013).

Increasing resilience to climate change-related challenges in the agricultural sector, reducing its impacts and at the same time maintaining the sustainability of agricultural activity requires the adoption of innovative practices. This group of practices has been extensively labeled by the FAO as climate-smart agriculture (CSA). FAO considers CSA to be “a set of agricultural practices that sustainably increase agricultural productivity, increase the adaptability of agriculture and food systems to climate change at multiple levels, reduce/eliminate greenhouse gases where possible, and achieve national food security and development goals” (Demirbaş, 2022).

The main goal of CSA is to support initiatives at all scales—local, national, and international—to sustainably use agricultural systems to ensure food and nutrition security for all people at all times, while also incorporating essential adaptation and capturing potential mitigation. For the purpose of achieving this goal, three goals are identified: (1) sustainably raising agricultural productivity to support equitable income growth, food security, and development; (2) preparing for and coping with climate change at all scales, from the farm to the national level; and (3) creating opportunities to lower agricultural GHG emissions compared to historical trends (Lipper et al., 2014).

The terms "local food" and "food miles" have evolved into potent political tools in policy discourses centered on sustainable agriculture and alternative food systems as the environmental effects of global agro-food systems have come to light (Coley et al., 2009). Since a 1995 UK research first used the term, the problem of "food-miles," or roughly the distance food travels between its production and the final consumer, has been a recurring theme in the discussion of food sustainability (Weber and Matthews, 2008). When the entire upstream food supply chain is taken into account, global food miles correspond to around 3.0 $GtCO_2e$ (3.5-7.5 times more than previously predicted), demonstrating that transportation accounts for roughly 19% of all food-

system emissions (stemming from transport, production and land-use change). 36% of food miles emissions are attributable to freight movement for the consumption of vegetables and fruits, which is nearly twice as much as the quantity of greenhouse gases emitted during their production. (Li et al., 2022). Many environmentalists, merchants, and others are calling for the "localization" of the world's food supply network due to the focus on rising food miles as a result of increased international food trade (Weber and Matthews, 2008).

According to second perspective , it is important to try and change the consumption habits that fuel the production of high-impact commodities like meat and dairy products (Garnett, 2013).

Food production and consumption require a lot of resources and have been proved to have negative effects on the environment (Collins and Fairchild, 2007). High levels of meat intake in diets demand a lot of energy, water, and land resources. It will take more area and resources to produce animals on a worldwide scale going forward. It is advised to convert from high-calorie diets to low-calorie ones and from meat-based diets that are resource-dense to plant-based diets in order to create a more fair distribution of food-related environmental effect (El Bilali et al., 2019).

"A dietary shift in high-income countries—through consuming less animal protein—and minimizing waste along the food chain can considerably contribute to producing adequate food within the limitations of one planet," according to World Wide Fund for Nature (WWF). Changing to more sustainable food habits can protect future production by reducing climate change, the exploitation of resources (such as energy, water, land use, and biodiversity), and by fostering equitable wealth distribution (El Bilali et al., 2019).

The significant socioeconomic consequences of food loss and waste, as well as its connection to issues with waste management and climate change, make it an essential concern. According to research, food supply chains around the world experience losses at 24, 24, and 35% of the manufacturing, postharvest, and consuming stages, respectively (Chauhan et al., 2021). At every stage of the food chain, edible foods are lost or wasted for various reasons. With the emergence of the need for food and the need to be healthier, food losses have started to gain more importance. While foods suitable for consumption in middle and high-income countries are wasted at a significant level, consumer waste is low in low-income countries and losses in the production process are significant. According to FAO data, consumer waste is between 31-39% in middle and high-income countries, while it is between 4-16% in low-income countries. (Dölekoğlu, 2017). At various scales, FW is one of the aims of environmental and food security policies. By 2030, per-capita FW at the retail and consumer levels should be cut in half, and FW along the entire food supply chain should be decreased, according to Sustainable Development Goals 12.3 of the United Nations (Corrado and Sala, 2018).

The third highlights the issue of inequality, the coexistence of excess and inadequacy, which is indicative of both the environmental harm brought on by industry and the health issues associated with it (Garnett, 2013).

While the world currently produces enough food for its citizens, there are hundreds of millions of undernourished people, while more than one billion is overweight or obese (El Bilali et al., 2019). Despite the fact that there is enough food produced worldwide to feed everyone, the reality that there are close to one billion hungry people indicates that the issue of food security is more complex than a basic nutritional shortage. The political and societal justifications for distribution of food and ignoring the fact that it is a right are at the heart of the issue (Karaman, 2018).

5. CONCLUSION

Hunger, which is more deadly than the epidemics in today's world and affects many people, is still discussed as the main problem of the world. Although many projects and programs have been

carried out at both national and international levels in order to ensure food security and prevent hunger, a permanent solution to the problem has not been found yet.

Sustainability studies for the continuity of food security should be supported by both national and international policies, and government institutions, private sector, non-governmental organizations and society in general should act together with a long-term determination. In this context, everyone has different duties.

Sustainability and food security should be the primary objective of food and agricultural policies. Due to the strategic importance of food, measures to increase agricultural production and productivity and to encourage agricultural production are important for the future of food security. In order to ensure the sustainability of food supply, agricultural land productivity should be increased by protecting soil and water resources, ensuring biodiversity, and using appropriate cultivation techniques in agriculture. In this sense, agricultural supports should be increased by governments, producer cooperatives should be supported, farmers should be trained and brought together with technology. Governments should set an example with a stronger emphasis on identifying and mitigating the environmental impacts of the activities of public institutions and their sustainability efforts.

In this context, individuals also have responsibilities in society. While the world is facing supply and price fluctuations for many reasons, especially climate change, it is essential to use existing resources effectively. While the fight against hunger continues on the one hand, the waste of food for various reasons both in the production and consumption stages further reduces the effectiveness. Individuals can contribute to sustainability studies in food by making small changes in their lifestyles and preferences.

As a result, it is important to act together on an individual, national and global scale, to increase measures and to support exemplary studies for food security and sustainability.

son5

ORİJİNALLİK RAPORU

%20	%10	%14	%11
BENZERLİK ENDEKSİ	İNTERNET KAYNAKLARI	YAYINLAR	ÖĞRENCİ ÖDEVLERİ

BİRİNCİL KAYNAKLAR

1	dokumen.pub İnternet Kaynağı	%2
2	"Zero Hunger", Springer Science and Business Media LLC, 2020 Yayın	%2
3	onlinelibrary.wiley.com İnternet Kaynağı	%2
4	Submitted to University of California, Merced Öğrenci Ödevi	%2
5	Submitted to London School of Economics and Political Science Öğrenci Ödevi	%1
6	Submitted to The Scientific & Technological Research Council of Turkey (TUBITAK) Öğrenci Ödevi	%1
7	iksadyayinevi.com İnternet Kaynağı	%1
8	Submitted to Universiti Sains Malaysia Öğrenci Ödevi	%1

9	www.researchgate.net İnternet Kaynağı	%1
10	Submitted to Politecnico di Milano Öğrenci Ödevi	%1
11	Submitted to Universitas Mulawarman Öğrenci Ödevi	%1
12	Sara Corrado, Serenella Sala. "Food waste accounting along global and European food supply chains: State of the art and outlook", Waste Management, 2018 Yayın	%1
13	Sonja J. Vermeulen, Bruce M. Campbell, John S.I. Ingram. "Climate Change and Food Systems", Annual Review of Environment and Resources, 2012 Yayın	%1
14	www.ncbi.nlm.nih.gov İnternet Kaynağı	%1
15	Coley, D.. "Local food, food miles and carbon emissions: A comparison of farm shop and mass distribution approaches", Food Policy, 200904 Yayın	%1
16	Submitted to University of Bradford Öğrenci Ödevi	%1
	www.pressacademia.org	

17	İnternet Kaynağı	%1
18	Submitted to Middle East Technical University Öğrenci Ödevi	%1

Alıntıları çıkart	Kapat	Eşleşmeleri çıkar	< %1
Bibliyografyayı Çıkart	Kapat		