

# IMPACT OF CLIMATE CHANGE OVER MIDDLE EAST'S WATER RESOURCES

**Mehmet Erkin KARA\***

## **Abstract**

*The temperature increases and rainfall decreases resulting from climate change are leading to a reduction in freshwater resources, a decrease in agricultural land, and increased productivity. Naturally, all these factors hinder economic growth and development. Furthermore, the first condition for industrialization and development is access to sufficient and necessary energy. However, water is the most important source of energy production. Water scarcity hinders industrialization, which is one of the most essential elements of social development; industrialization hinders growth; and growth hinders social welfare. The inability to industrialize and develop creates a vicious cycle. When poverty, destitution, and ignorance are combined with population growth, food shortages, and drought, an intractable equation is formed.*

*The Middle East is among the regions in the world most affected by water scarcity due to climate change. The rising temperatures and decreasing rainfall resulting from climate change in the Middle East are leading to a reduction in freshwater resources, a decrease in agricultural land, and lower productivity. Naturally, all these factors hinder economic growth and development. The Middle East is at the forefront of regions that will experience water scarcity due to climate change. It is wrong to assume that this environmental problem in the Middle East is dependent on political borders. Global climate change affects the entire impoverished region and causes serious security problems in Middle Eastern states. Global climate change is like a snowball effect; a snowball thrown from the peak creates an avalanche at the foothills.*

*The water resources of the Middle East—rivers, lakes, groundwater, and rainfall—are decreasing at an accelerating rate each year. This water scarcity is straining the Middle East in its social, economic, and societal dimensions, turning it into a land where human tears are never absent. This article addresses the impact of climate change on water resources in this troubled region of the world under five main headings: “What is climate change?”, the effects of climate change globally, the current water resources of the Middle East and the impact of climate change on Middle Eastern water resources, and other dimensions of the climate change problem in the Middle East, all examined from an International Relations perspective. The conclusion provides an assessment of the situation from the perspective of international relations and humanity, offering an analysis of the issue.*

**Keywords:** Climate, Climate Change, Middle East, Water, Water Resources

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# İKLİM DEĞİŞİKLİĞİNİN ORTADOĞU SU KAYNAKLARINA ETKİSİ

**Mehmet Erkin KARA**

## **Öz**

*İklim değişimi sonucu gerçekleşen sıcaklık artışları ve yağış miktarındaki düşüşler tatlı su kaynaklarında azalmaya ve tarım arazilerinde daralmaya, aynı zamanda da verimsizliğe yol açarken, bu sayılan faktörlerin tamamı doğal olarak ekonomik büyümeyi ve kalkınmayı engellemektedir. Ayrıca sanayileşmenin, kalkınmanın ilk şartı yeterli ve gerekli enerjiye sahip olabilmektir. Oysa su, enerji üretiminin en önemli kaynağıdır. Su kıtlığı toplumsal kalkınmanın en önemli unsurlarından biri sanayileşmeyi, sanayileşme büyümeyi, büyümede toplumsal refahı engellemektedir. Sanayileşememe ve gelişememe sonucunda birbirine ket vuran, bir döngü oluşmaktadır. Yoksulluk, fakirlik ve cehalet etmenlerine nüfus artışı, gıda kıtlığı ve kuraklıkta eklenince içerisinden çıkılmaz, bir denklem oluşmaktadır.*

*Ortadoğu, Dünyada iklim değişikliğine bağlı su kıtlığı yaşayan bölgeler arasında başı çekmektedir. Ortadoğu'da yaşanan iklim değişimi sonucu gerçekleşen sıcaklık artışları ve yağış miktarındaki düşüşler tatlı su kaynaklarında azalmaya ve tarım arazilerinde daralmaya, aynı zamanda da verimsizliğe yol açarken, bu sayılan faktörlerin tamamı doğal olarak ekonomik büyümeyi ve kalkınmayı engellemektedir. Ortadoğu iklim değişikliğine bağlı su kıtlığı yaşayacak bölgeler arasında başı çekmektedir. Ortadoğu açısından yaşanan bu çevresel sorunun, siyasi sınırlara bağımlı olduğunu düşünmek yanlıştır. Küresel iklim değişikliği de yoksul coğrafyanın bütününi etkilemekte, Ortadoğu devletlerinde ciddi güvenlik problemlerine neden olmaktadır. Küresel iklim değişikliği kartopu etkisine benzemekte; zirveden atılan bir kartopu eteklerde çığ yaratmaktadır.*

*Ortadoğu su kaynakları olan nehirler, göller, yeraltı suları, yağışlar, aşağı doğru bir trend ile, her sene artan bir hızda azalmaktadır. Bu su kıtlığı Ortadoğu coğrafyasını sosyal, ekonomik, toplumsal boyutlarında zorlamakta ve insan gözyaşının eksik olmadığı bir toprak parçasına çevirmektedir. Makalede, Dünyanın bu problemlili bölgesinde yaşanan iklim değişikliğinin su kaynaklarına etkisi konusu; beş ana başlık içinde ele alınmıştır. "İklim değişikliği nedir?", dünyada iklim değişikliğinin etkileri, mevcut Ortadoğu'nun su kaynakları ve iklim değişikliğinin Ortadoğu su kaynaklarına etkisi, Ortadoğu'da iklim değişikliği sorununun diğer boyutları Uluslararası İlişkiler disiplini perspektifinde incelenmiştir. Sonuç bölümünde uluslararası ilişkiler ve insanlık anlamında durum tespiti yapılarak, konu analiz edilmiştir.*

**Anahtar Kelimeler:** İklim, İklim Değişikliği, Ortadoğu, Su, Su Kaynakları

## **Introduction**

When Humanity ended hunter gatherer with the Neolithic Age, Humanity began to be agricultural society who lived near of river. First states were built near rivers. First writings were found in these first states. First documents were found in these first states. Civilizations were found near of river areas which were in suitable climate.

This mean water forms humanity civilizations. Water is indispensable for humanity. In other words water is life for humanity. In addition to their importance in humanity's rapid progress towards development and high civilization, water and water resources area so extremely strategic raw materials, which can lead to regional and global wars in case of scarcity. Three-fourths of the Earth is covered with water There are a lot of water resources in world but soft water resources in world are few. In world disturbion of water resources are limited. Furthermore, there is an uneven distribution of water resources worldwide.(WHO,2022) The consequences of human activity are increasing in our century, and environmental dangers are becoming more serious and irreversible.

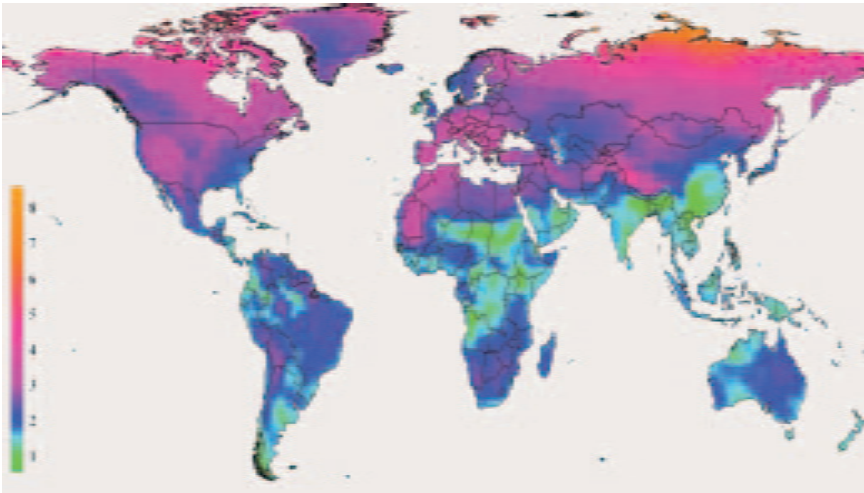
One of the biggest dangers to public opinion worldwide is global climate change. In this regard, freshwater supplies are most affected by global climate change. It is widely accepted that the freshwater resources of the Middle East region are and will continue to be the most vulnerable to this threat.(Freimuth, 2007) There are all so studies that, when added to the fragmentation of the Middle East geography, it will act as a danger multiplier. (Allan, 2001)

This article addresses the impact of global climate change on Middle East water resources under five main headings. These cond heading is "What is climate change?" and the effects of climate change in the world; the third heading examines the current Middle East water resources and the impact of climate change on Middle East water resources; and the fourth heading examines the migration and security dimensions of the climate change problem. In the conclusion, the situation is assessed and the subject is analyzed in the light of proposals regarding Middle East water resources.

## **1. What Is Climate Change?**

Global climate change is the increase in the world's average temperature since the Industrial Revolution. During the period from 1880 to 2015, when the Industrial Revolution began, 1,000 gigatons of human-induced carbone missions increased the world's average temperature by 1.75°C (3.15°F). The reason for this increase is the gren house effect, which results from the intense release of carbondioxide into the atmosphere as a result of the use of fosil fuels. There is a layer of carbondioxide gas in the atmosphere. This layer, like a greenhouse, allows the sun's rays in and prevents the heat frome scaping. In world as the sun's rays hit the "land" and are reflected, the increase in the carbondioxide level strengthens the gren house wall and the heat remains inside.(Türkeş, 2001) The human-induced increases in these gren house gas accumulations cause global warming. The most important source of gren house gases is fosil fuels. Fossil fuels, energy production, industry and deforestation contribute to the increase of gren house gases.

**Figure 1: Climate Change**



Source: (<http://www.dailymail.co.uk/sciencetech/article-3125113/Earth-2100-Nasa-maps-reveal-world-need-adapt-rising-temperatures-caused-climate-change.html>, (11.03.2022).)

As can be seen in the figure above, there is almost no region left in the world that has not experienced temperature change. In this context, explaining the damage done to the world by greenhouse gases with some examples will help to understand the magnitude of the damage. The temperature increase caused by humans emits energy equal to 400,000 Hiroshima Atomic Bombs each day. (Starr, 2013) While the number of disaster related to ground movement such as earthquakes, volcanoes and landslides has remained constant in the last 15 years, the number of hydraulic disasters such as flood and droughts has doubled. (the Guardian, 2014) NASA researcher Eric Rignot found that the amount of ice melting in Greenland has doubled in the last decade. In Bolivia's Chacaltaya, the world's highest ski area at 5,260 metres high in the Andes, as of last year only three ice blocks, the largest of which is a few hundred metres wide, remained. California, the locomotive of the US agricultural sector, is currently experiencing its worst drought since at least 1500. The state has lost 63 trillion gallons of ground water, resulting in an average of 0,4 centimeters of elevation in the Earth's crust. In the mountains, the crust rose about 1.25 centimeters last year and is still rising. (Şahin, 2014)

### **1.1. The Effects of Climate Change on the World**

Drought and global warming, caused by the increase in carbon dioxide and other greenhouse gases in the atmosphere, are issues that will lead to more dangerous outcomes than nuclear war and international terrorism. In recent years, their effects have become more apparent and have begun to be perceived as an international security threat.

According to global climate models, climate changes caused by drought will vary from region to region. Since 1950, the effects of greenhouse gas-based global climate change on human life have become more visible. In this context, while there are increases in weather events such as hurricanes, floods, storms in some parts of the world, in some regions (the Middle East, the Mediterranean Basin, and North Africa) it can show its effects in the form of long-term droughts and desertification. This type

of climate change has unpredictable environmental, social, and economic consequences.

The world has not yet fully experienced the results and effects of global warming and the resulting climate change. We divide these effects of global warming into two main groups: environmental and social effects.

### ***1.1.1.Environmental Effects***

Global warming may cause many environmental effects such as global temperature increase and drought, melting of glaciers, rising sea levels, increase in frequency and intensity of heat waves, tropical storms, floods, changes in the amount and regime of precipitation, decrease in biodiversity. The first effect of global warming will be the increase in global temperatures. According to the Fourth Assessment Report of the UN in 2007, it is estimated that the temperature will increase by 1.8 to 4 degrees Celsius by the end of this century.

Increases in global temperatures are also causing shrinkage in snow cover and glaciersizes. The world is losing glaciers from continental ice fields to high mountain peaks at a rapid pace. According to the report, sea ice in the North Pole will decrease by 22-33% by 2100. Himalayan glaciers, which are currently 500 thousand square kilometers, could shrink to 100 thousand square kilometers by 2030. Glaciers from Greenland to Antarctica are melting at an unpredictable rate. This situation will also leave many people in countries that depend on water released by the melting of mountain glaciers with the problem of thirst.(Mclean, 2001)

The main evidence of other climate change effects can be seen in sea level rise. If global warming does not slow down, sea levels will rise by 28 to 43 centimeters due to melting glaciers, submerging coastal areas. Two-thirds of the world's major cities, including New York, Tokyo and Hong Kong, are located on coastlines where the dangerous effects of global warming will be seen. This will force many people living in coastal areas out of their homes.

Another effect of drought and global warming will be the increase in meteorological disaster ssuch as tropical storms and floods, and unprecedented changes in the precipitation regime. Floods and landslides caused by the intensity of precipitation and sea level rise are one of the direct effects of global warming on human settlements. Coastal settlements in particular are at great risk in this regard. Some urban settlements such as shanty towns, where the population density is high and there is little or no Access to clean drinking water and public health services, will be more exposed to these effects. According to the report of the Inter governmental Panel on Climate Change, 2,5 million more people will be affected by natural events occurring on the coastlines in the 2080s. The parts of river basins with strong and dangerous currents will increase from 19% to 34-36% in 2070. Especially in Western Europe, millions of people will live in poverty, surrounded by wet lands.

Some parts of the world may experience an increase in the number of heat waves. According to the results of a joint study by NASA and NOAA scientists, the temperature in 2014 was 0.04 degrees Celsius warmer than the previous records set in 2005 and 2010 and the average of the last 38 years. In addition, according to the World Meteorological Organization, eastern Japan experienced the highest rainfall rate since records began in August, while the western United States, China, Central America and South America experienced drought. Another report published by NASA announced that 2016 was the hottest year the world has ever experienced.

Another effect of drought and global warming will be on biodiversity. Rapid population growth and developing technology after the Industrial Revolution have rapidly degraded the environment, and the species of living things on earth have also been affected by this deterioration. Indeed, biodiversity is decreasing day by day due to human influence. The effects of the increase in global temperature and drought events will be the change of climate zone sand the decrease in temperature differences between day and night, summer and winter. Thus, the existing climate zones will expand, and plant and animal species in these regions may face the danger

of extinction. In addition, the rise in sea level will cause the extinction of various species living in coastal areas. According to the 2007 Report of the Inter governmental Panel on Climate Change, 30% of all plant and animal species in the world will disappear within a century.(Işık, 1997, .10) Protecting biodiversity and the ecosystem is, at one point, the same as protecting humanity itself. In the context of sustainable development, it is imperative to produce and implement policies necessary for the protection of biodiversity.

### ***1.1.2.Social Impacts***

In addition to the environmental effects of drought and global warming, there are also various social effects such as water problems, decrease in agricultural products, deterioration of human health, related political problems, emergence of climate refugees, and economic problems.

#### ***1.1.2.1. Water Problem***

One of the most important negative results of global warming and climate change will undoubtedly be the water problem. In regions that receive rain fall, there will be more rainfall than before, while in regions that do not receive rainfall, there will be less rainfall. In other words, global warming will cause floods, inundations and hurricanes in some regions, and drought and desertification in others. This situation will put many people in the world, especially in developing countries, at risk of hunger and thirst. Droughts will gradually cause agricultural output to decrease and world agricultural product prices to increase. In countries that are importers of such products, poverty will occur due to world price increases.

When we look at the problem of water shortage, the total amount of water in our world is 1,4 billion cubic kilometers. In order for a country to be considered water rich, it must have an average water potential of 10,000 cubic meters per person per year. Countries with a water potential of less than 1,000 cubic meters are considered water poor countries. (Ata-

lık, 2022)<sup>1</sup> As water resources begin to dry up with global warming, the danger of dehydration and the diseases it will bring will increase.

One billion people in the world do not have enough drinking water. This number will increase to 3,5 billion by 2025, which explains the impact of climate change on humanity. All these developments show that many socio-economic and political problems will be experienced in a chain reaction beyond the environmental dimension. One of the most important results of global warming, the drying up of water resources, is not only an environmental effect but also creates a multiplier effect with environmental effects and reaches dimensions that will prevent sustainable life. It is estimated that 1,8 billion people will live in absolute water scarcity in 2025, two-thirds of the world's population will live in regions experiencing water scarcity, and one in every four people will live in a country with problems in the supply of clean water in 2050. (UN Water, 2022)

#### ***1.1.2.2. Decreasing Productivity and Quality of Agricultural Products***

The main effect of drought on agriculture is the change in the precipitation regime and the decrease in the amount of precipitation. Global warming and the drought it causes reduce the amount of precipitation, reducing productivity and product diversity. In this case, it will affect states and citizens with economies dependent on agriculture. The total arable agricultural land in the world is 3,2 billion hectares. Due to population growth and unconscious agriculture, agricultural land and per capita is decreasing. While this decrease is 14,3% in developed countries, it reaches high rates such as 40% in developing countries. According to the UN Food and Agriculture Organization, agricultural land and per capita is 0.23 hectares, and by 2050, this rate will decrease to 0.15 hectares due to the effects of global warming.

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<sup>1</sup> Water index:

(1) Water poverty: Less than 1000 m<sup>3</sup> of usable water per person per year,

(2) Water scarcity: Less than 2000 m<sup>3</sup> of usable water per person per year,

(3) Water abundance: More than 6000-10000 m<sup>3</sup> of usable water per person per year.

According to the International Agricultural Research Advisory Group, which brings to get the agricultural research institutions, current crops will have difficulty adapting to the changing climate and productivity will decrease. Wheat production, especially in India, which has a large population, could be halved. Another agricultural research organization, the International Maize and Wheat Improvement Center and the International Rice Research Institute, predict that production in the Indo-Gangetic Region, a region that accounts for about 15% of the world's rice production, will be halved within fifty years. They also suggest that millions of developing country citizens will face the risk of starvation.

#### ***1.1.2.3. Human Health***

7 million people die from global warming-related diseases. The size of the number reveals the impact of global warming on human health.<sup>2</sup> In this context, the effects of global warming on human health can be divided into two groups: direct and indirect effects. The occurrence of diseases and deaths due to temperature increase are among the direct effects of global warming. Malaria, encephalitis and various infectious diseases (such as salmonella, cholera, typhoid) are in direct effects. Air pollution and ozone layer depletion, which are among the causes of climate change, also harm human health in various ways. (Erdoğan, 2007) Global warming, as mentioned above, causes great harm to human health. However, there are also situations where it is beneficial to human life and health. For example, the beginning of milder winters will reduce deaths in places where winters used to be very cold. (WHO, 2022)

#### ***1.1.2.4. Economic Problems***

With the increase in global temperature, the number of natural disasters such as hurricanes and floods has also started to increase. This situation

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2 IPCC. (2007) Climate Change 2007 Impacts, Adaptation and Vulnerability. Working Group II Contribution to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Summary for Policy makers and Technical Summary. IPCC, Geneva.

on will cause economic losses in both developed and developing countries. It is estimated that these losses will be even greater with a higher level of temperature increase. The effects of these damages that will be experienced due to global warming will be felt more in developing countries. Although developed and developing countries have a chance to adapt to climate change, it can be said that developing countries have less chance in this regard compared to others. It can be said that the poor in developing countries, who may be exposed to the negative effects of climate change more than others, also have less capacity to adapt to climate change compared to developed countries.(McCarthy, 2001)

## **2. The Impact Of Climate Change On Middle East Water Resources**

The Middle East is the region where the continents of Asia, Africa and Europe meet, connecting the Black Sea to the Mediterranean via the Straits and the Suez Canal to the Indian Ocean. In other words, the region called the Middle East covers an area extending from Egypt to Iraq, with people of different religions and ethnicities on it and almost half of the world's oil under it.(Acar, 2008, p.44)

The term "Middle East" was first used in 1902 by A. T. Mahan, an American naval historian. After Mahan used it to discuss British naval strategy, Russia's activities in Iran, and Germany's Berlin-Baghdad railway relations, the term "Middle East" was used in various articles and texts by V. Chirol, the Tehran representative of The Times, and appeared in the press.(Kıran, 2005)

The fresh water resources of the Middle East Region were already causing water scarcity and sharing problems before they were associated with global climate change. The fact that global climate change is not on the Middle East agenda should be sought in the region's under development and other bleeding problems. In addition, the fact that the Middle East is seen as the starting point of water wars by realist and neo-realist theorists should be considered as evidence of this situation.(Amery, 200)

In this context, some of the factors that cause the water problem in the Middle East can be listed as follows: unbalanced distribution of water in the region, above-average population growth, increasing water demand due to increasing living standards, weakness of political will to transfer water from agricultural to industrial and domestic use, misconception that connects food security to water security, lack of technology and infrastructure required to protect and save water, exploitation of water for political gains, failure to make cooperative agreements on problematic waters, unstable regimes, weak political will and insecurity, and international rules and agreements lacking in enforcement power. When climate change is added to these factors, the problems become unsolvable, and another problem is added every year.

### ***2.1. Middle East Freshwater Resources***

The main fresh water resources of the Middle East Region are; precipitation, rivers (Euphrates, Tigris, Jordan, Asi, Litani, Nile), lakes (Dead Sea, Dead Sea, Urmia, etc.), groundwater (renewable, non-renewable aquifers) and desalinization facilities.

#### ***2.1.1. Precipitation***

A significant part of the Middle East lives in a desert drought. The strip extending North from Israel to Lebanon and Syria creates a different climate on the coasts and high mountains. The temperature in this region is not very high, and the precipitation is generally higher. The precipitation decreases from the coast to the interior. In the Arabian Peninsula, except for the mountainous regions of Hejaz, Yemen and Oman, a desert climate is observed and there is no precipitation. From the Eastern Mediterranean to the Persian Gulf, a hot and dry climate is observed and the precipitation rate is low. (Uluatam, 1998) Generally, the Middle East region receives less than 300 mm of precipitation, except for Eastern Anatolia and a few small regions.

### ***2.1.2. Middle East Rivers***

The common feature of the rivers in the Middle East (Euphrates, Tigris, Jordan, Asi, Litani, Nile) is that the water they have from their sources near them, grows slowly while reaching the sea. These sources, which come from a wet area, pass through hot and dry regions while reaching the sea, and suffer loss of leak age and evaporation. The most obvious characteristic of the sources is that the water flow increases and decreases to the highest and lowest levels depending on the slope and temperature.(Kıran, 2001)

### ***2.1.3. Underground Waters of the Middle East***

When calculating the water resources of the Middle East, like every other region, it is necessary to take into account the fresh water resources lying underground, such as rivers and lakes. Because these have very valuable meanings for some Middle Eastern countries, and can even be the most important “natural” water source for some. Underground resources are divided into two as non-renewable aquifers and renewable aquifers. Examples of both types are encountered in the Middle East.

In general, aquifers with renewed waters are found in regions that receive a lot of rainfall or are located around important rivers. The quality of water in such aquifers depends on the atmospheric characteristics of the environment where the rainfall occurs and the structure of the soil that filters the water. Non-renewed, fossil waters vary according to how the aquifer, which is thousands of years old, was for characteristics of the ground layers where the aquifer is located. Fossil waters can also be found in regions that experience rainy periods in the distant past but are now completely dry. These characteristics provide clues as to what the general characteristics of underground waters in the Middle East region may be.

Considering the main countries in the Middle East will help to reflect the current ground water situation of the whole region. Saudi Arabia, which has a shortage of surface water, is more fortunate in terms of underground aquifers. The fossil aquifer system coming from the Jordanian

border provides Saudi Arabia with 2000 billion m<sup>3</sup> of water reserves. Syrian underground water resources are part of the aquifer system extending towards Jordan and Saudi Arabia. For Lebanon, the high rainfall and snow cover in the mountains not only feed the surface water but also the main source of feeding the aquifers in this mountainous region. The Gulf countries, which have no surface water due to a very low annual rainfall percentage, direct all these countries to underground water resources. The withdrawal of water from the aquifers that provide the used underground water beyond their new capacity leads to decreases in the water surface and deterioration of the quality of the water. The usability of underground water has also decreased due to reasons such as salinization and mixing with seawater. (Kıran, 2025)

#### ***2.1.4. Desalination in the Middle East***

Desalination is the removal of salt from sea water in facilities using various methods. Desalination can be considered an important technology against water scarcity; However, it has various difficulties. The most important of these is that many developing countries that suffer from severe water scarcity cannot benefit from desalination opportunities due to financial difficulties. In recent years, the rapid population growth and significant rise in living standards in the Gulf countries have led to an imbalance between water demand and the limited resources available. In order to provide water for different purposes, most of the Gulf countries rely on desalination of sea water and extraction of deep underground water. Desalination of seawater to meet urban and industrial water needs is a method used in almost all Gulf countries where quality water is not available or is very limited. At this stage, desalination is the most realistic method for the Gulf countries. Especially in the last decade, urban and industrial water demand in many Gulf countries has increased by 20% to 30% annually. While this situation is valid for Gulf countries that can meet their water needs with desalination systems and have capital accumulation thanks to the rich oil wealth, it is not economical for Israel, Jordan, Syria and Egypt.

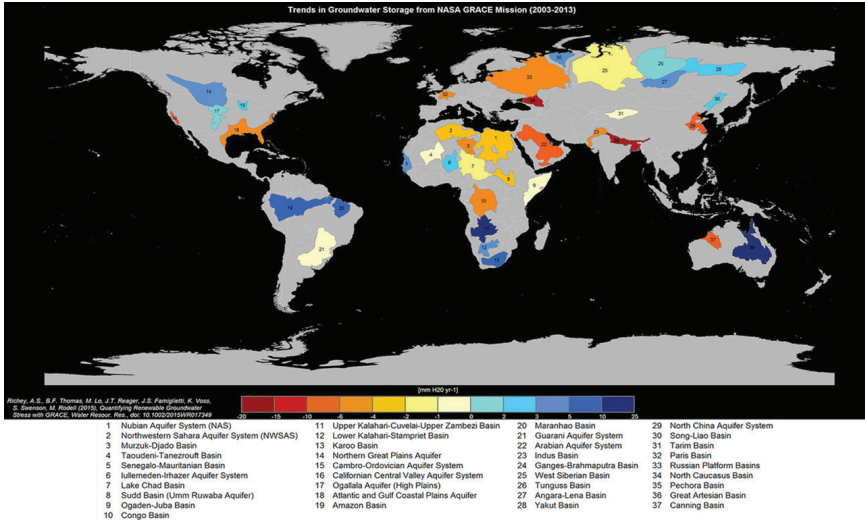
Saudi Arabia, the United States, Japan, Italy, the United Arab Emirates, Iran, Qatar, Israel, Kuwait and Spain are the countries that desalinate sea water in the world. Saudi Arabia produces seventy percent of its drinking water in this way. The Jebel Ali Desalination Plant in the United Arab Emirates is the largest facility with an annual water production of 300 million m<sup>3</sup>.

Purification offers an important option, but the fact that waste water is more concentrated and very salty with current technologies is a concern for environmentalists. Experimental technology conflicts regarding desalination Technologies that are less costly and less damaging to the environment continue. The International Desalination Association and the European Desalination Association are the institutions that work on the subject. Studies are being conducted on topics such as desalination with resources such as geotherma land solar energy.

## ***2.2. Impact of Global Climate Change on Middle East Fresh water Resources***

The total amount of water in the world is 1,4 billion cubic kilometers. 97.5% of this amount consists of salt water and 2,5% of fresh water resources. This situation shows that the amount of fresh water resources used in the world is quite small compared to the whole. When the impact of climate change on water resources is evaluated in the context of the Middle East, which is already water poor, the result is not encouraging at all.

**Figure 2: Status of the World's Major Aquifers as of 2015**



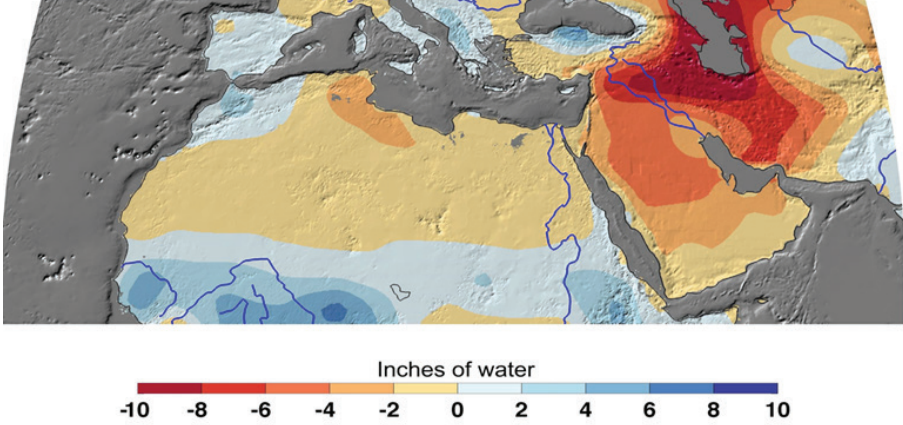
Source: (<http://www.npr.org/sections/thetwo-way/2015/06/17/415206378/nasa-satellites-show-worlds-thirst-for-groundwater>, (10.06.2022).)

The figure above shows the trends of the world's 37 largest aquifers. In this NASA study, aquifers that are on a declining trend are shown in red and yellow tones on the map. According to the results, 7 aquifers are extremely stressed, 3 are highly stressed, 5 are moderate, 7 are unbalanced, and only 15 aquifers show sustainable usable rates. Unstressed aquifers are those located in forested and rain-fed areas. According to the study, highly stressed aquifers cannot replenish water resources and directly or indirectly cause socioeconomic and political tensions.(Voss, 2013)

The Arabian Aquifer System, numbered 22 in the figure 2 and serving more than 60 million people in Saudi Arabia, Yemen, Qatar, Oman, the United Arab Emirates, Jordan, Iraq and Syria, is currently considered one of the most stressed ground water resources in the world. The ground water in Yemen's Sanaa basin is decreasing by 6 meters per year, causing Sanaa to be described as the world's first waterless capital.(Glas, 2010)

### Figure 3: Ground water Changes in the Middle East and North Africa Region Between 2002 and 2015

GRACE TWS trends: increases & decreases over 13 years (2002-2015)

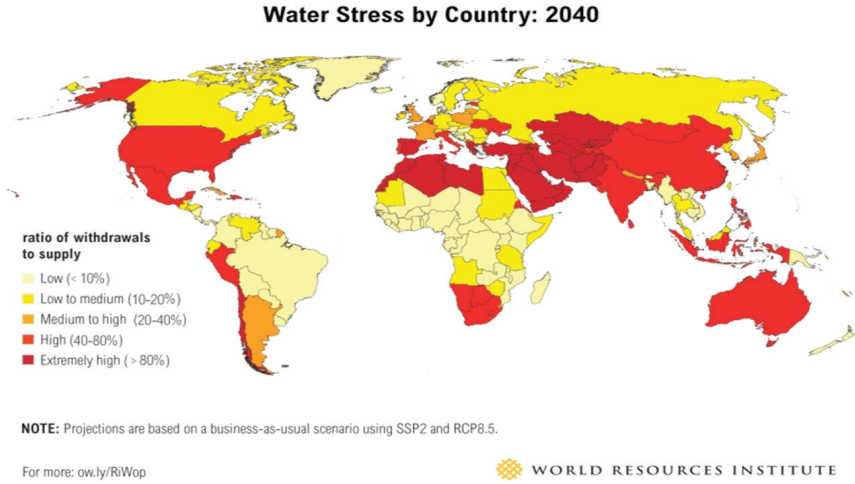


Source: (<http://www.desertsun.com/story/news/environment/2015/12/10/morocco-groundwater-depletion-africa/76788024/>, (11.01.2022).)

Again in the same study; with the photographs taken by NASA's Grace satellite, the Jet Propulsion Laboratory created a map of the changes in the underground water of the Middle East between 2002-2015. There are 8-10 inches of underground water losses in the region seen as southeast of Turkey, Iraq, Iran, Syria and south of the Caspian Sea. They appear to be the region with the highest loss in the Middle East. This region is followed by the Central and Northern Arabian Peninsula with a loss of 6-8 inches, while the remaining regions have a loss of 0-6 inches of groundwater. According to the map above, which can be considered a summary of the study, there is no country in the Middle East whose groundwater has not decreased. As can be understood from this, the ground water of the Middle East is running out.(Rivhey, 2013) In addition, the water situation of rivers and lakes is not encouraging at all. It is estimated that the Jordan River will dry up by 80% by 2100. There is a high level of decrease in the waters of the Euphrates-Tigris basin, which is very important for the region. According to NASA satellites, there has been a great loss of water in the basins of the Euphrates-Tigris rivers since 2003. According

to the article published in the Journal Water Resources Research on February 15, the total amount of fresh water decrease in the common basin of these two rivers, which is located within the borders of Turkey, Syria, Iraq and Iran, has been 144 km<sup>3</sup> since 2003. The reason for the decrease in the water resources in question (90 km<sup>3</sup>) is the excessive consumption of underground water and dry seasons due to climate change. According to the study prepared with data from two NASA satellites and covering the years 2003-2010; the Euphrates-Tigris Basin is the basin with the highest decrease in waters in the world after the Indus basin. The Dead Sea, an important fresh water source in the Middle East, is decreasing by about one meter every year. (Brown, 2009)

**Figure 4: Countries That Will Experience Water Stress in 2040**



Source: (<http://www.wri.org/resources/charts-graphs/water-stress-country>, (11.01.2022)).

The World Resource Institute has determined that the countries at risk of experiencing water shortages in 2025 and 2040 will experience water shortages in the Middle East in the future. The study, which was conducted by considering the water usage, rainfall, climate change and populati-

on growth of 167 countries, concluded that 33 countries will experience serious water shortages in the near future. Bahrain is at the top of the list of countries that will experience severe water shortages. Bahrain is followed by Kuwait, Qatar, San Marino, Singapore, the United Arab Emirates, Palestine, Israel, Saudi Arabia and Oman. The fact that 14 of the countries likely to experience extreme water shortages are in the Middle East indicates that climate change threatens the Middle East the most. It is also noteworthy that Turkey is among the countries that will experience extreme water shortages in 2040. There are also studies that suggest that a large part of the Middle East will become a desert by 2100.(Trondalen, 2008) In terms of the effects of global climate change; when the information in previous studies is combined with human factors, it is concluded that temperature change will be negative for the water resources of the Middle East Region.

### **3. Other Dimensions Of The Climate Change Problem**

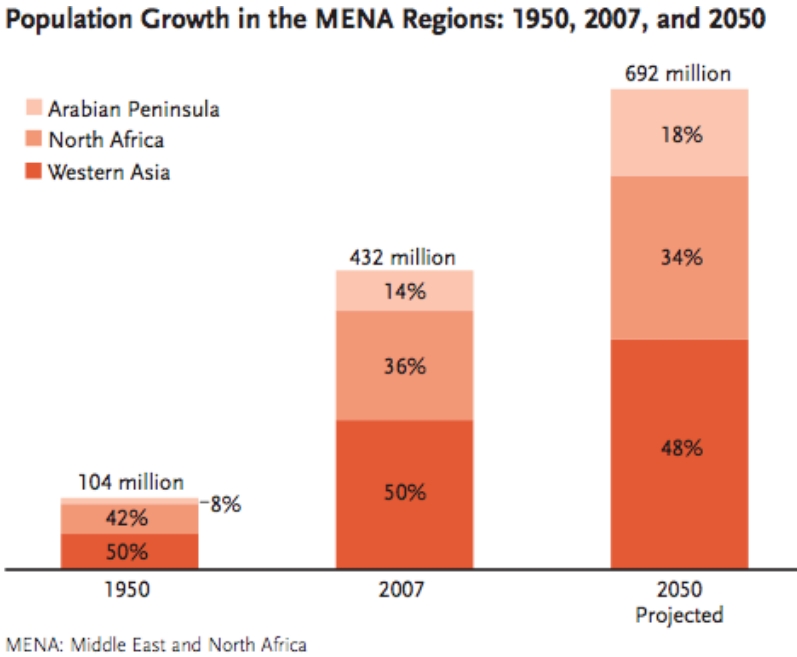
#### ***3.1.The Relationship Between Growing Population and Decreasing Water Resources***

The rapid increase in the global population has caused a dramatic increase in water use. The increase in water consumption due to the development of industry and increasing prosperity worldwide has caused a dramatic increase in water use<sup>3</sup> which is why it has tripled since 1950. As of 2015, the population of the Middle East is 300 million. It is expected to exceed 500 million by 2025. The Middle East is experiencing a population explosion in line with the global trend.

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3 Between 1900 and 1940, water consumption worldwide increased from 95 to 215 cubic miles, more than two hundred percent. However, the world population growth rate between these years was only forty percent. In 1950, world water consumption climbed to 325 cubic miles, and by 1990 it had jumped to 988 cubic miles.

**Figure5: Population Growth in Middle East and North African Countries in 1950, 2007 and 2050**



Source: UN Population Division, *World Population Prospects: The 2006 Revision* (2007; <http://esa.un.org>, accessed April 7, 2007).

Source: ([https://blogs.harvard.edu/mesh/2008/03/mena\\_population/](https://blogs.harvard.edu/mesh/2008/03/mena_population/), (11.01.2022)).

The borderless circulation of global capital after the cold war provided a partial recovery. Following this recovery, the relative welfare environment provided in the cities made the cities a center of attraction for the segment that was interested in agriculture but was increasingly struggling. (Tamimi, 2022) This situation caused migration from village stocities, the growth of cities, and the increase in population. As a result, Middle Eastern cities were filled with migration from rural areas.(Pappe, 2009)

### ***3.1.1. Water Per Capita in the Middle East According to the Falkenmark Index***

In 1989, Malin Falkenmark prepared an index showing the impact of population on water resources by correlating the total population of

countries with the total amount of water resources, taking into account the needs of the natural system. It is a frequently used index that defines the pressure on water resources, called the “Falkenmark Index”.<sup>4</sup> According to this index, the minimum domestic water requirement per person is determined as 100 liters per day, and the water requirement for agricultural and industrial purposes is determined as 500-2000 (l/day) per day. The threshold value is calculated as 1700 m<sup>3</sup> per person per year. It has been stated that if this value is dropped below, water shortage will begin, if it is below 1000 m<sup>3</sup>, the country will face water scarcity, and if this figure drops below 500 m<sup>3</sup> per year, the country will experience absolute water scarcity that can cause major problems. The use of the Falkenmark water stress index in various reports of the United Nations shows the international validity of the index.

**Table 1. Falkenmark Water Scarcity Index**

|   | Renewable fresh water per person (m <sup>3</sup> /year) | Water Status/Impact   |
|---|---------------------------------------------------------|-----------------------|
| 1 | 10000 +                                                 | Water rich            |
| 2 | 2500 – 10000                                            | Sufficient water      |
| 3 | 1700 – 2500                                             | Vulnerable/vulnerable |
| 4 | 1000 – 1700                                             | Water stress/scarcity |
| 5 | 1000 – 500                                              | Water scarcity        |
| 6 | < 500                                                   | Absolute scarcity     |

When evaluated with the Falkenmark Index, the amount of drinkable fresh water per person in the world is 7,600 m<sup>3</sup>/year. In the Asian continent, there is 3,000 m<sup>3</sup>/year of water per person. According to the index,

<sup>4</sup> Water Scarcity Determination Indexes consist of four separate indexes reflecting four variables. These indexes are;  
 - The ratio of water demand to water supply,  
 - The amount of water per person in relation to population growth,  
 - Having more than 1000m<sup>3</sup> of fresh water per person,  
 - The ratio of water supply from abroad to domestic water supply.

the Middle East is the region with the most severe, absolute water scarcity in the world.

**Table 2: Annual Per Capita Water Rate in Middle East and North African Countries in 1955, 1990, 2000, 2010, 2025, 2050 (m<sup>3</sup> / year)**

| TABLE 1 FRESH WATER AVAILABILITY PER CAPITA PER YEAR IN DIFFERENT ARAB COUNTRIES FROM 1955-2050 |                                                   |       |       |       |       |       |       |       |
|-------------------------------------------------------------------------------------------------|---------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|
| Country                                                                                         | Water availability m <sup>3</sup> / capita / year |       |       |       |       |       |       |       |
|                                                                                                 | 1955*                                             | 1990* | 2000* | 2003* | 2010* | 2015* | 2025* | 2050* |
| Algeria                                                                                         | 1,770                                             | 689   |       |       |       |       | 332   | 300   |
| Bahrain                                                                                         | 672                                               | 179   | 170   | 153   | 139   | 120   | 89    |       |
| Egypt                                                                                           | 2,561                                             | 1,123 | 800   | 770   | 750   | 600   | 550   | 510   |
| Iraq                                                                                            | 18,441                                            | 6,029 | 3,100 | 2,800 | 2,400 | 2,100 | 1,700 |       |
| Jordan                                                                                          | 906                                               | 327   | <500  | 150   | <500  | 130   | 121   | 100   |
| Kuwait                                                                                          |                                                   |       |       | <100  | <100  | <100  | <100  |       |
| Lebanon                                                                                         | 3,088                                             | 1,818 | 900   | 900   | 800   | 800   | 867   | 800   |
| Libya                                                                                           | 4,105                                             | 1,017 |       |       |       |       | 359   | 250   |
| Morocco                                                                                         | 2,763                                             | 1,117 |       |       |       |       | 590   | 600   |
| Oman                                                                                            | 4,240                                             | 1,266 | 500   | 500   | 450   | 450   | 410   |       |
| Qatar                                                                                           | 1,427                                             | 117   | <100  | <100  | <100  | <100  | 68    |       |
| Saudi Arabia                                                                                    | 1,266                                             | 306   | <500  | 400   | 320   | 250   | 113   |       |
| Syria                                                                                           | 6,500                                             | 2,087 | 1,250 | 1,250 | 900   | 850   | 732   | 600   |
| Tunisia                                                                                         | 1,127                                             | 540   |       |       |       |       | 324   | 400   |
| United Arab Emirates                                                                            | 6,195                                             | 308   | <500  | <400  | <300  | <200  | 176   |       |
| West Bank and Gaza                                                                              | 1,229                                             | 461   | <500  |       | <500  |       | 264   |       |
| Yemen                                                                                           | 1,098                                             | 445   | <500  | 300   | 250   | 200   | 152   |       |

Sources:  
a. Policies and institutions for coping with environmental aspects of water scarcity in western Asia, by Hani Khondaga Ph.D., Lebanon  
<http://www.unwater.org/downloads/www/khondaga.pdf>  
b. ITT industries guidebook to global water issues [http://itt.com/waterbook/per\\_cap\\_country.asp](http://itt.com/waterbook/per_cap_country.asp)  
c. Economic and Social commission for Western Asia, UN, 2003 - <http://www.dawnet.org/ny/information/publications/edit/upload/edp03.13.pdf>  
d. Water demand management in the Mediterranean, Hardy A., [http://www.kirc.org.es/rev/rev-42818-201.1.DD\\_TOPIC.html](http://www.kirc.org.es/rev/rev-42818-201.1.DD_TOPIC.html)

Source: ([http://www.fao.org/fileadmin/user\\_upload/rome2007/docs/Arab\\_Environment\\_Future\\_Challenges.pdf](http://www.fao.org/fileadmin/user_upload/rome2007/docs/Arab_Environment_Future_Challenges.pdf), (11.01.2022).)

The above chart shows the fresh water resource availability rates of the main countries in the Middle East from 1955 to 2050 in m<sup>3</sup>/year. As of 2015, according to the Falkenmark index, there are no countries with fresh water resources over 10,000 m<sup>3</sup>/year or 2,500 m<sup>3</sup>/year. As can be understood, there are no countries in the Middle East that have sufficient water resources or can be described as water-rich.

As of 2025, when compared to other countries, Iraq has relatively more water (1700 m<sup>3</sup> / year). Gulf countries; Saudi Arabia, Qatar, Bahrain, Oman, United Arab Emirates, Kuwait, Yemen, Qatar's index value is below the absolute scarcity rate of 500 m<sup>3</sup> / year as of 2015. (Chenoweth,

2011) In this context, it is said that there is insufficient water in the Gulf countries and the Arabian Peninsula.

The common features that can be seen in the table are as follows. In the Middle Eastern countries, there was a steady decrease in the rate of fresh water resources per capita between 1955, 1990 and 2000. Other years estimated by the projection show that this decrease will continue in 2015, 2025 and 2050, that it will fall below 500 m<sup>3</sup> / year, and that absolute famine will occur except in Syria, Iraq, Morocco, Egypt and Lebanon. Although Syria does not experience absolute water scarcity with 600 m<sup>3</sup> / year, Egypt with 600 m<sup>3</sup> / year and Lebanon with 800 m<sup>3</sup> / year in 2050, the fact that they do not have enough water (water scarcity) is another interesting situation.

According to the population growth simulation in the Middle East and North Africa countries in 1950, 1990, 2000 and 2025, the population growth rate in the Middle East exceeds 3% in many countries and is above the world average. As a result; the growing population is closely related to the depletion of Middle Eastern fresh water resources. Research shows that the exponential increase in the Middle Eastern population reduces the amount of accessible fresh water, and accordingly increases the need for fresh water. Therefore, the fact that there is an inverse proportion between population density and fresh water resources per capita emerges as an important fact. The proposition that by 2050; “6,3 of the world’s population will live in the Middle East. In contrast to this high rate, the Middle East will have 1,4 of the world’s fresh water resources” shows the difficult situation the Middle East has fallen into.

### ***3.2. Climate Change in the Middle East-Growing Population Declining Food Relationship***

The area where water is consumed the most in the world is agricultural use. In many countries, 65% to 80% of the total water consumed is used for irrigation. Although it is difficult to give an exact figure, it can be said

that an average of 10,000 m<sup>3</sup> of water is needed annually for 1 hectare of land for efficient irrigation. The water used for irrigation is generally used for the production of food stuffs. To give a few examples of the amount of water needed in agriculture, for example, 77 m<sup>3</sup> (20,000 gallons) of water is needed to produce 36 liters of wheat, and 1,1 m<sup>3</sup> (300 gallons) of water is needed to produce one kilogram of bread. An adult needs 6,5 cubic meters of water to provide one day's food.

Another fact is that 83% of the available water in the Middle East is used in agriculture, 90% of water consumption in Egypt is spent on agriculture, and farmers use 70% more water than necessary. In addition, the negative effects of agricultural irrigation reduce productivity. Continuous repeated irrigation increases the underground water table, keeps plant roots in water, and kills plants over a period of time. Another negative effect is soil and water salinization. The salt solutions behind as a result of evaporation of irrigation water in the field cause plants to die over time. Another reason for such excessive agricultural water use in the Middle East is the lack of water management by states. (Pamukçu, 2027) In addition to this waste, costly agricultural projects undertaken by some of the oil-rich countries in the region (Iraq, Saudi Arabia, Kuwait and the United Arab Emirates) in an effort to become self-sufficient in agriculture so causing a decrease in water resources.

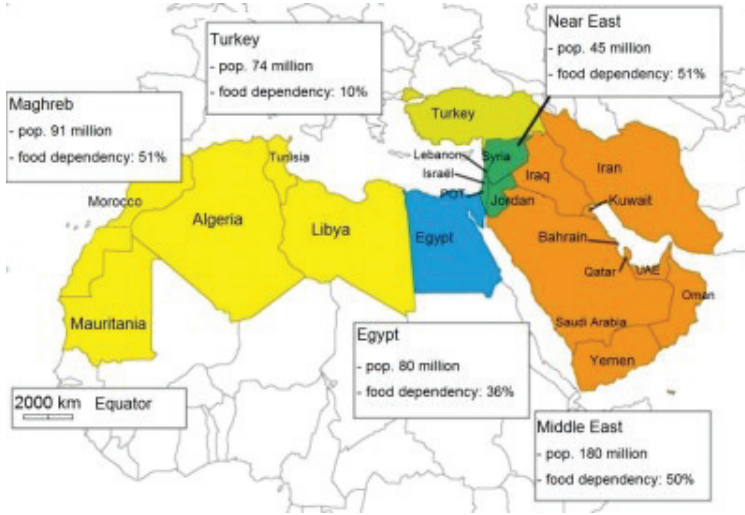
Drought is a phenomenon that occurs due to a decrease in precipitation in a certain period of time or due to climatic factors (high temperature, high humidity, high humidity, etc.) and usually lasts for a season or longer. It is considered one of the normal climatic events experienced in the world. However, in the Middle East region, due to the effect of climate change, drought manifests itself as desertification.

Desertification and increasing evaporation are in a position to threaten agriculture in the Middle East. In fact, increasing food prices are causing economic hardship for states. It has been assessed that in the Middle East Region, the dependency on agricultural imports may increase in the co-

ming years due to demographic growth, changes in dietary habits and also climate change; low agricultural productivity in rural areas, and significant income inequality between rural and urban populations.

According to the analysis results, mitigating climate change has been assessed as the most effective way to reduce agricultural product import dependency. It is assessed that agricultural import dependency will increase even more in parallel with the strong effects of climate change felt in the region.

**Figure 6: Import Dependency Degree in the Agricultural Sector of the Middle East and North Africa Region, Domestic Coverage Rate of the Agricultural Sector**



Source: (<https://inra-dam-front-resources.cdn.brainsonic.com/ressources/afile/308329-e5409-resource-addressing-agricultural-import-dependence-in-the-middle-east-north-africa-region-through-to-the-year-2050.html/>, (11.01.2022).)

A study conducted by the French National Institute of Agricultural Research (INRA) in October 2015 is a good example of the level of import dependency in the agricultural and food sector in the Middle East Region. The region in question is currently considered a “climatic hot spot” with a

high level of food dependency. 50% of agricultural products consumed are supplied through imports.

## **Conclusion**

The Middle East is at the fore front of regions that will experience water scarcity due to climate change. It is wrong to think that this environmental problem experienced in the Middle East is dependent on political borders. Global climate change all so affects the entirety of the poor geography and causes serious security problems in Middle Eastern states. Global climate change is similar to the snow ball effect; a snowball thrown from the summit creates an avalanche on the skirts. The Syrian Civil War, which began with the Arab Spring, has lasted for 13 years. One of the reasons for the Syrian Civil War, in which millions of people left their homeland and became refugees in other countries, and hundreds of thousands of Syrians lost their lives in the conflict, is climate change. In the years before the Syrian Civil War, the agricultural economy was severely affected by the worst drought in at least 500 years. This drought caused more than a million people in rural areas to migrate to the cities. Clearly, climate change has triggered the Syrian Civil War and created social, political and environmental problems that led to the war.

While the temperature increases and decreases in precipitation resulting from climate change lead to a decrease in fresh water resources, a decrease in agricultural lands, and also inefficiency, all of these factors naturally hinder economic growth and development. In addition, the first condition for industrialization and development is to have sufficient and necessary energy. However, water is the most important source of energy production. Water scarcity is one of the most important elements of social development, industrialization hinders growth, and growth hinders social welfare.

The Middle East's water resources, rivers, lakes, underground water, and rainfall, are decreasing at an increasing rate every year with a downward trend. This

water scarcity challenges the Middle East geography in social, economic, and societal dimensions and turns it into a land where human tears are never lacking. In this context, it is a discourse that should be considered that global climate change has directly or indirectly caused the collapse of its states and led to the rise of radicalism for the Middle East. As a result, global climate change will cause new understandings and policies to emerge in the context of security perceptions and threats in the entire international system. As a result of this new understanding, new alliances will emerge in the international arena to combat global climate change and new sanctions may develop. Middle Eastern States will also have to adapt to the new order.

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## Geniřletilmiř zet

İklim deęiřimi sonucu gerekleřen sıcaklık artıřları ve yaęıř miktarındaki dūřuřlar tatlı su kaynaklarında azalmaya ve tarım arazilerinde daralmaya, aynı zamanda da verimsizlięe yol aarken, bu sayılan faktrlerin tamamı doęal olarak ekonomik bymeyi ve kalkınmayı engellemektedir. Ayrıca sanayileřmenin, kalkınmanın ilk řartı yeterli ve gerekli enerjiye sahip olabilmektir. Oysa su, enerji retiminin en nemli kaynaęıdır. Su kıtlıęı toplumsal kalkınmanın en nemli unsurlarından biri sanayileřmeyi, sanayileřme bymeyi, bymede toplumsal refahı engellemektedir. İlerleyemeyen geriler sznden hareketle, sanayileřememe ve geliřememe sonucunda birbirine ket vuran, bir dng oluřmaktadır. Yoksulluk, fakirlik ve cehalet etmenlerine nfus artıřı, gıda kıtlıęı ve kuraklıkta eklenince ierisinden ıkılmaz, bir denklem oluřmaktadır.

İklim deęiřiklięi ve dięer faktrler olan; evresel tahribat, kuraklık, susuzluk, alık, lm, g, askeri nlemler ve savařın, birbirlerini etkileyen iliřkisi mevcuttur. rnek vermek gerekirse; Kresel ısınmadan kaynaklanan kuraklık, kuraklıktan kaynaklanan kıtlık ve alık, alıktan kaynaklanan lmler ve gler, glerden kaynaklanan askeri nlemler ve savařlar, savařlardan kaynaklanan daha ok lm, dūřmanlık ve evresel tahribat, daha yoęun evresel tahribattan kaynaklanan daha byk ekonomik sorunlar ve daha ok savař řeklinde uzatılabilecek olan bir zincir oluřturmaktadır. Bu da iklim deęiřiklięinin ne lkte byk sorunlara yol aabileceęine anlatmaktadır.

Ortadoęu su kaynakları olan nehirler, gller, yeraltı suları, yaęıřlar, ařaęı doęru bir trend ile, her sene artan bir hızda azalmaktadır. Bu su kıtlıęı Ortadoęu coęrafyasını sosyal, ekonomik, toplumsal boyutlarında zorlamakta ve insan gz-yaşının eksik olmadığı bir toprak parasına evirmektedir.

Ortadoęu'daki su sorununun kaynaklık eden bazı etkenler řyle sıralanabilir: suyun blgede dengesiz daęılımı, ortalamanın zerindeki nfus artıřı, gittike ykselen hayat standartlarına baęlı olarak artan su ihtiyaı suyu tarımsal alandan endstriyel alana ve i kullanıma evirebilecek politik iradenin zayıflıęı, gıda gvenlięini su gvenlięine baęlayan yanlış anlayıř, suyu korumak ve tasarruf iin gerekli teknoloji ve altyapının eksiklięi, suyun politik kazanımlar iin istismar

edilmesi sorunlu sular üzerinde işbirliğine dayalı antlaşmaların yapılamaması, istikrarsız rejimler, zayıf politik irade ve güvensizlik yaptırım gücünden yoksun uluslararası kurallar ve antlaşmalardır. Bu etmenlerin yanına iklim değişikliğinde eklendiğinde sorunlar çözülemez olmakta, her sene yanına başka bir sorun eklenmektedir.

1950, 1990, 2000 ve 2025 yıllarındaki Ortadoğu ve Kuzey Afrika ülkelerindeki nüfus artışı simülasyonuna göre Ortadoğu'da, nüfusun büyüme oranı birçok ülkede % 3'ü aşmakta ve Dünya ortalamasının üzerinde seyretmektedir. Sonuç olarak; büyüyen nüfusun Ortadoğu tatlı su kaynaklarının tükenmesi ile yakın ilişkisi vardır. Ortadoğu nüfusunun katlanarak artmasının, ulaşılabilir tatlı su miktarını düşürdüğü, buna bağlı olarak ihtiyaç duyulan tatlı su ihtiyacını artırdığı gerçeğini araştırmalar göstermektedir. Dolayısıyla nüfus yoğunluğu, kişi başına düşen tatlı su kaynakları arasında, ters orantı olduğu gerçeği, önemli bir olgu olarak karşımıza çıkmaktadır. 2050 itibarıyla; "Dünya nüfusunun 6,3'ü Ortadoğu'da yaşayacaktır. Bu yüksek oranın tersinde Ortadoğu, Dünya tatlı su kaynaklarının 1,4 üne sahip olacaktır."önermesi Ortadoğu'nun içine düştüğü sıkıntılı durumu göstermektedir.

Orta Doğu'daki mevcut suyun %83'ünün tarımda kullanılmakta olduğu, su tüketiminin % 90'ının tarıma harcandığı ve çiftçilerin gereğinden % 70 daha fazla su kullandıkları da diğer bir gerçeği yansıtmaktadır. Ayrıca tarımsal sulamanın olumsuzlukları da verimi düşürmektedir. Sürekli tekrarlanan sulama, yeraltı su tabakasını yükselterek bitki köklerinin su içinde kalmasını, belirli bir süre içinde bitkileri öldürmektedir. Başka bir olumsuzluğu da toprak ve su tuzlanmasıdır. Sulama suyunun tarlada buharlaşması sonucu geride kalan tuz çözeltileri zamanla bitkilerin ölmesine yol açmaktadır. Ortadoğu'da tarımsal su kullanımının bu şekilde aşırıya kaçmasının bir nedeni de, devletlerin su yönetimi eksiklikleridir. Bu israfa petrol zengini bölge ülkelerinden bazılarının ( Irak, Suudi Arabistan, Kuveyt ve Birleşik Arap Emirlikleri ) tarımda kendi kendilerine yeterli olma çabasıyla yaptıkları masraflı tarım projeleri de su kaynaklarının azalmasına neden olmaktadır.

Kuraklık belirli zaman periyodunda yağış oranında azalma ya da iklimsel faktörlerle (yüksek sıcaklık, yüksek nem, yüksek nem vb.) nedeniyle kaynaklanan çoğunlukla bir mevsim ya da daha uzun süre yaşanan olaydır. Dünyada yaşanan normal iklim olaylarından biri sayılır. Fakat Ortadoğu bölgesinde, iklim değişikliğinin etkisiyle, susuzluk kendini çölleşme olarak göstermektedir. Çölleşme ve buharlaşmanın yükselmesi Ortadoğu'da tarımı tehdit eder bir konumdadır. Zaten ekonomik olarak devletleri, artan gıda fiyatları sıkıntıya sokmaktadır.

Önümüzdeki yıllarda Orta Doğu Bölgesinde tarımsal ithalata olan bağımlılığın, demografik büyüme, beslenme alışkanlıklarındaki değişiklik ve aynı zamanda iklim değişiklikleriyle birlikte; kırsal alandaki düşük tarımsal verimlilik, kır ve şehir nüfusu arasında belirgin gelir eşitsizliği nedenleriyle artış kaydedebileceği değerlendirilmektedir. Yapılan analiz sonuçlarına göre, iklim değişikliğinin hafifletilmesi tarımsal ürünler ithalat bağımlılığının azaltılmasının en etkili yolu olarak değerlendirilmiştir. Bölgede özellikle, iklim değişikliğinin etkileri güçlü şekilde hissedilmesine paralel, tarımsal ithalata bağımlılığın daha da artacağı değerlendirilmektedir.

Bu kapsamda: Ortadoğu iklim değişikliğine bağlı su kıtlığı yaşayacak bölgeler arasında başı çekmektedir. Ortadoğu açısında yaşanan bu çevresel sorunun, siyasi sınırlara bağımlı olduğunu düşünmek yanlıştır. Küresel iklim değişikliği de yoksul coğrafyanın bütününe etkilemekte, Ortadoğu devletlerinde ciddi güvenlik problemlerine neden olmaktadır. Küresel iklim değişikliği kartopu etkisine benzemekte; zirveden atılan bir kartopu eteklerde çığ yaratmaktadır.

Bu bağlamda Ortadoğu için, küresel iklim değişimi dolaylı ya da dolaysız devletlerinin çöküşlerine neden olduğu ve radikalizmin yükselmesine yol açtığı düşünülmesi gereken bir söylemdir. Sonuç olarak, küresel iklim değişikliği tüm uluslararası sistemde güvenlik algılamaları ve tehditler bağlamında yeni anlayış ve politikaların oluşmasına neden olacaktır. Bu yeni anlayış neticesinde, küresel iklim değişikliği ile mücadele için uluslararası alanda yeni ittifaklar doğacak ve yeni yaptırımlar gelişebilecektir. Ortadoğu Devletleri de yeni düzene uyum sağlamak zorunda kalacaklardır.