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MANİSA CELAL BAYAR UNIVERSITY GRADUATE SCHOOL OF EDUCATION DEPARTMENT

MASTER OF ARTS THESIS DEPARTMENT OF POLITICAL SCIENCE AND INTERNATIONAL RELATIONS

THE EFFECT OF CLIMATE CHANGE ON MIGRATION: A STUDY OF SUB-SAHARAN AFRICA

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TAAHHÜTNAME

Bu tezin Manisa Celal Bayar Üniversitesi Lisansüstü Eğitim Enstitüsü Siyaset Bilimi ve Uluslararası İlişkiler Ana Bilim Dalında akademik ve etik kurallara uygun olarak yazıldığını ve kullanılan tüm literatür bilgilerinin referans gösterilerek tezde yer aldığını, tamamen kendi çalışmam olduğunu, her alıntıya kaynak gösterdiğimi, tezin yazımında akademik ve etik kurallara aykırı herhangi bir yapay zeka ve program kullanmadığımı beyan ederim.

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İKLİM DEĞİŞİKLİĞİNİN GÖÇE ETKİSİ: SAHRA ALTI AFRİKA ÜZERİNE BİR İNCELEME

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Yaşam boyunca temel faktörlerden olan iklim, 21. yy'da dünyayı tehdit eden unsurlardan biri haline gelmiştir. Tarih boyunca insanlar bu fenomeni esas alarak yaşamlarını şekillendirmişlerdir ancak küreselleşen dünyada yaşanan bazı gelişmeler havanın kontrol dışı ısınmasına, beraberinde ise iklimde değişiklikler olmasına neden olmuştur. İklim değişikliğinin gezegen üzerinde oluşturduğu etkileri birçok farklı alanda görmek mümkündür. En az iklim değişikliği kadar eski bir kavram olan göç, birçok sebep ve sürece istinaden meydana gelir. Canlı yaşamı üzerinde belirleyici olan bu iki faktörün birbirleriyle olan ilişkisi hakkında son zamanlarda çalışmalar yapılmış olsa da, konu hakkındaki veri eksikliği dikkat çekicidir. Bu sebeple çalışma insan kaynaklı iklim değişikliği ve göç arasında genel bir çerçeve çizmeyi, sonraki çalışmalara kaynak oluşturmayı, literatürdeki bu eksikliğe katkı da bulunmayı hedeflemektedir. İklim değişikliğinin doğal afetlerin sıklığını ve yoğunluğunu artırması, çevresel bozulmaya sebep olması sonucunda göç bir seçenektir. İklim değişikliğinin etkilerini özellikle az gelişmiş ve gelişmekte olan ülkeler üzerinde etkisini açıkça görmek mümkündür. Geniş bir bölgeyi kapsayan Sahra Altı Afrika'nın bazı ülkeleri, sosyoekonomik, coğrafi şartlar sebebiyle oldukça kırılgandır. Çalışmada iklim değişikliğinin göçe etkisi noktasında bölge hakkında genel bir bilgi verildikten sonra, kaynaklık etmesi amacıyla on ülke seçilmiştir. Ülkelerde kuraklık ve sel felaketlerinin sık görülmesi tercih sebeplerindendir. Çalışmada nitel analiz yöntemlerinden durum çalışması desenin en elverişli yöntem olduğu düşünülmüş, raporlar, dokümanlar aracılığıyla ana tema desteklenmiştir. Çalışmada iklim değişikliğinin harekete sebebiyet verdiği, ancak bu değişkenler arasındaki ilişkinin daha net belirlenmesi için hukuki, akademik, politik alanlarda etkili adımlar atılması gerektiği sonucuna varılmıştır.

Anahtar Kelimeler: İklim Değişikliği, Göç, Sahra Altı Afrika, Çevresel Bozulma, Yerinden Edilme

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ABSTRACT

THE EFFECT OF CLIMATE CHANGE ON MIGRATION: A STUDY OF SUB-SAHARAN AFRICA

Master of Arts Thesis

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Climate, which is one of the basic factors for throughout life, has become one of the factors that threaten the world in the 21st century. Throughout history, people have lived their lives based on this phenomenon, but some developments in the globalizing world have led to uncontrolled warming of the weather and associated changes in the climate. The effects of climate change on the planet are visible in many different areas. Migration, a concept at least as old as climate change, has many causes and processes. Although recent studies have been conducted on the connection between these two life-determining factors, the lack of data on this topic is striking. For this reason, the study aims to draw a general framework between human-caused climate change and migration, provide a resource for future studies and contribute to this lack in the literature. Migration is an option as climate change increases the frequency and intensity of natural disasters and causes environmental degradation. The impact of climate change on underdeveloped and developing countries is clear, especially those whose economies depend on agriculture and animal husbandry. Some countries in sub-Saharan Africa, which covers a wide region, are quite fragile due to socio-economic and geographical conditions. The study selected ten countries as sources after providing general information about the region regarding the impact of climate change on migration. The frequent occurrence of drought and flood disasters in countries is one of the reasons for the preference. In the study, case study design, one of the qualitative analysis methods, was considered the most appropriate method and the main theme was supported by reports and documents. The study concluded that climate change cause movement, but

effective steps should be taken in the legal, academic and policy fields to more clearly determine the relationship between these variables.

Key Words: Climate Change, Migration, Sub-Saharan Africa, Environmental Degradation, Displacement.

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LIST OF ABBREVIATIONS

AFIS	Automated Fingerprint Identification System
AGW	Anthropogenic Global Warming
CEAS	Common European Asylum System
COP	Conferences of the Parties
CRED	The Centre for Research on the Epidemiology of Disasters
EGD	European Green Deal
EMDAT	Emergency Events Database
ERHS	Ethiopian Rural Household Survey
EU	European Union
EUAA	European Union Asylum Agency
EURODAC	EU Asylum Fingerprint Database
EUROSUR	European External Border Surveillance System
FAO	Food and Agriculture Organization
FAR	First Assessment Report
FRONTEX	European Border and Coast Guard Agency
GDP	Gross Domestic Product
IASFM	International Association for the Study of Forced Migration
ICEM	Intergovernmental Committee on European Migration
ICM	Intergovernmental Committee on Migration
ICSU	International Council for Climate Change Science
IDMC	Internal Displacement Monitorning Center
IDPs	Internally Displaced Person
IOM	International Migration Organization
IPCC	Intergovernmental Panel on Climate Change
LDCs	Least Developed Countries

LIFDCs Low-Income Food-Deficit Countries

NAPAs National Adaptation Programs of Action

ND-GAIN **Notre Dame Global Adaptation Initiative**

NELM New Economics of Labor Migration

OCHA The United Nations Office for the Coordination of Humanitarian Affairs

OXFAM Oxford Committee for Famine Relief

PICMME Provisional Intergovernmental Committee for the Movement of Migrants from Europe

REA Research Executive Agency

SIS Schengen Information System

SLR Sea Level Rise

SSA Sub-Saharan Africa

UNCTAD United Nations Conference on Trade and Development

UNEP United Nations Environment Program

UNESCO United Nations Educational, Scientific and Cultural Organization

UNFCCC United Nations Framework Convention on Climate Change

UNHCR United Nations Refugee Agency

UNISDR United Nations International Strategy for Disaster Risk Reduction

UN-REDD Reducing Emissions from Deforestation and Forest Degradation in Developing Countries

USAID United States Agency for International Development

VIS Visa Information System

WHO World Health Organization

WMO World Meteorological Organization

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INTRODUCTION

Climate has been very important to humanity since the world existed. So much so that the first communities patterned their lives based on the climate, determined their food sources and migrated based on the climate. Today, changes in the climate, which are still of great importance to humanity, are occurring partly due to natural or human-made causes. The term climate change used throughout the study refers to human-caused (anthropogenic) climate change.

Climate change, a consequence of the warming of the air caused by greenhouse gases that have been used intensively since the Industrial Revolution, stands before us as a reality that threatens the entire world. In order to show how effective climate change is affecting daily life, the world order and its future, the first part of the study attempted to show the reality of climate change based on its impact on eight selected areas. Attention was paid to the fact that these areas, such as changes in the ocean, melting glaciers, rising sea levels, impacts on energy systems, changing ecosystems, are the determining factors for the future of people and the world. The further course of the thesis examined the measures taken to combat climate change, addressing the cooperation and international agreements that have been made to reduce changes in the climate that is vital for life and to demonstrate a common stance on this issue.

Migration due to climate change, which forms the main structure of the study, is a newer factor compared to the reasons for migration studied so far in the literature. So much so that there are ongoing debates about the international definition of people migrating due to climate change. The term “environmental refugee”, used in 1980s, has no legal definition and is not included in the refugee definition of the 1951 Geneva Refugee Convention. The legal gaps caused by this situation lead to uncertainty regarding determining the status of climate refugees and defining their rights. In the further course of the chapter, an attempt is made to complete the framework that is to be drawn with the concepts of migration, migration types and climate refugees by detailing the prominent migration theories in the literature.

There are many examples around the world thatF migration as a result of climate change, causing natural disasters to increase, some countries facing extinction due to rising sea levels, and people's livelihoods being damaged by disrupted agriculture and livestock farming. Reports published by the Internal Displacement

MonitorningCenter (IDMC) and frequently included in this study indicate that millions of people have been displaced due to droughts, floods and storms that have increased in intensity due to climate change. Migrations caused by climate change are, in all their examples, an undeniable fact. However, it would not be correct to reduce the connection between climate change and migration to a direct, simple and single cause. The third part of the study looks in detail at examples of migrations that occur worldwide as a result of sudden and slow natural disasters. While climate change poses a threat to almost all countries in the world, it is particularly significant for underdeveloped and developing countries. Climate change is also causing conflict in countries that already have migration memories and rely primarily on the agricultural and livestock sectors.

Most countries in sub-Saharan Africa are quite vulnerable due to socioeconomic, political and geographical conditions. The effects and consequences of climate change are clearly visible in such countries. In the final chapter of the thesis, hunger crises, deaths and migrations that occurred as a result of natural disasters caused by climate change were explained using data from 10 selected countries in the Sub-Saharan Africa region.

CHAPTER ONE

METHODOLOGY

In order to ground the study the definition and historical background of the problem will be mentioned in this chapter. After mentioning the problem, the purpose and scope of the study will be detailed. The research method which is thought to be most appropriate throughout the study will be defined and the international reports used will be explained.

1.1 Background and Definition of Problem

Climate and migration have been linked throughout history as part of the cycle of life. Due to the increased use of greenhouse gases, especially after the Industrial Revolution, warming increased of 0.9°C between 2011 and 2020 compared to the years 1850 to 1900 .[1]. It is possible to observe the effects of climate change in the oceans, melting glaciers, rising sea levels, changing ecosystems and negative impacts on human health. According to the IPCC's fifth Synthesis Report, the upper 75 m ocean warmed by 0.11 degrees every 10 years between 1971 and 2010[2]. The amount of Arctic ice mass fell by 9.4% to 13.6%, especially in the summer months. The IPCC's 5th Synthesis Report states that average sea levels in the 21st century will be greater than the rise between 1971 and 2010. The worst-case scenario, estimated between 2081 and 2100, is between 0.45 and 0.82 m. 95% of ocean levels are predicted to rise by the end of the 21st century. It finds that most plants on Earth are unable to adapt to climate change, many freshwater and marine species are at risk of extinction, and coral reefs and polar ecosystems are particularly vulnerable[3]. Increasing warming in the 21st century is expected to increase the problem of water scarcity and the risk of flooding. According to reports from the Food and Agriculture Organization (FAO), the drought and flood between 2005 and 2007 had a negative impact on grain producers around the world. In 2006, grain production in these countries fell by 3.6% compared to the previous year[4]. The IPCC's first report in 1990 found that the biggest consequence of climate change would be migration. In fact, its last report emphasized that climatic

[1] IPCC, **AR6 Climate Change 2023 Synthesis Report**, 2023, p.42.
[2] IPCC, **AR5 Climate Change 2014 Synthesis Report**, 2014, p.40.
[3] IPCC AR5 Climate Change 2014 Synthesis Report, p.12.
[4] FAO, **The State of Food Insecurity In the World- High Food Prices and Food Security – Threats and Opportunities**, 2008, p.10.

conditions in many parts of the world were effective. Asia, Africa, North America and the small island states in the South Pacific are under the influence of climate change[5].

IDMC's 2023 report announced that the number of people displaced due to climate change in 2022 was 31,845,000. Of these, 19,219,000 were caused by floods, 2,215,000 by drought, 9,980,000 by storms and 12,000 by high temperatures[6]. In 2022, 482,000 people were displaced by monsoon flooding in Bangladesh[7]. According to the IOM study, at least 2 million people are expected to be displaced and 1,800 square meters of land will be flooded as a result of the expected rise in the Nile Delta. As a result of the drought in Somalia in 2011, a total of 12.4 million people from Ethiopia, Kenya, Uganda and Somalia faced a food crisis[8].

In some sub-Saharan African countries, which cover a wide geographical area, drought and floods cause food access problems and also hunger problems. More than 31.5 million people are affected by famine in Ethiopia, Kenya and Somalia[9]. According to the 2023 OXFAM report, floods and droughts caused by climate change triggered large numbers of migrations in East Africa. In line with this information, after mentioning migration that occurred in sub-Saharan Africa as a result of climate change, the study detailed the issue for ten Sub-Saharan countries.

1.2 Purpose and Scope of the Study

Although the concepts of climate and migration are quite old, climate change moved onto the international agenda as early as the 1980s. The aim of the study is to draw an overall framework between climate change and migration, which pose a threat to our world, and to draw attention through international reports to the increasing number of people migrating and being displaced due to the consequences of climate change. Migrations caused by climate change are an undeniable fact, of which there are many examples around the world. However, the fact that there is still a debate in the literature about whether climate change causes migration directly or indirectly, the

[5] IPCC, **First Assessment Report (FAR)**, 1990, p.103.
[6] IDMC, **2023 GRID Global Report on Internal Displacement**, 2023, p.9 https://api.internal-displacement.org/sites/default/files/publications/documents/IDMC_GRID_2023_Global_Report_on_Internal_Displacement_LR.pdf (14.01.2024)
[7] IDMC, p.61.
[8] IOM, **Compendium of IOM'S Activities in Migration, Climate Change and The Environment**, 2009, p.81
[9] OXFAM, **Unfair Share Unequal Climate Finance to East Africa's Hunger Crisis**, 2023, p.2.

legal gaps in the concept of climate refugee and the multidimensionality of the concepts themselves limit the understanding of the topic. In this sense, the study aims to contribute to the literature with a sample from sub-Saharan Africa. Sub-Saharan Africa was selected as the sample for this study due to its underdevelopment, current economic problems and fragility. Since the environmental degradation caused by climate change shows its effects regardless of time, the study is not limited to one period. However, the data's timeliness is limited to the day that the study ends April 30, 2024.

Objectives of the study are:

-Mention that climate change not only affects underdeveloped and developing countries, but also poses a threat to the entire world,

-Draw attention to the lack of studies and data in the field of climate change and migration,

-To draw a framework of the connection between climate change and migration,

-To highlight the human consequences that will occur if climate change is not prevented.

1.3 Research Method

The study considered that case studies, one of the qualitative research methods, would be the most appropriate method to demonstrate and frame mobility caused by climate change through reports, documents and statistics. According to Creswell, case studies are a method in which the researcher examines one or more situations using multiple sources (observations, reports, documents, interviews) and identifies themes associated with the situation[10]. According to Lynn Davey, a case study is a way to learn about a complex example through rich descriptions and contextual analysis. With the results obtained, it draws attention to why the event occurred in this way and what should be investigated in a similar situation[11].

[10] John W Creswell and Cheryl N. Poth, **Qualitative Inquiry and Research Design: Choosing Among Five Approaches,** Sage Publications, 2016, p.73.
[11] Lynn Davey, **The Application of Case Study Evaluations**, 2019, Vol.2, p.2.

The study used official statistics and reports from international development organizations. For this reason, IPCC synthesis reports, data from IDMC (Internal Displacement Monitorning Center), documents from the IOM (International Migration Organization), FAO (Food and Agriculture Organization), OXFAM (Oxford Committee for Famine Relief), EMDAT (Emergency Events Database), OCHA (The United Nations Office for the Coordination of Humanitarian Affairs) reports, World Bank and UNHCR (United Nations Refugee Agency) statistics are among the sources of the study. The data obtained from the reports are presented from a descriptive perspective.

CHAPTER TWO

CLIMATE CHANGE

In the second chapter, in which climate change and its consequences are discussed, after general information on climate change, greenhouse gases, one of the most important causes of anthropogenic climate change, are also mentioned. The consequences of climate change are assessed in eight selected areas and international measures to combat climate change are mentioned at the end of the chapter

2.1 Anthropogenic Climate Change

Climate has been the primary factor affecting the vital activities of humanity. In order to continue their lives, people arranged their place of residence and their agricultural activities according to the climate. In parallel to this situation, climate changes may lead to major changes in people, animals, ecosystems and the world order. Although climate change represents a significant threat and also plays a triggering role in other environmental problems, it received little attention on the international agenda until the 1980s and was the subject of only some research. Due to some conference initiatives during the Cold War, the increasing number of natural disasters, and the increasing impact on human life over time, climate change has attracted more attention worldwide[12]. Although most countries threatened by climate change, especially countries that are economically and socio-economically vulnerable, are more affected by the negative impacts of climate change.

Global climate change is defined as in Article 1 of the United Nations Framework Convention on Climate Change (UNFCC): *"Climate change means a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods"*[13]. UNFCC definition of global climate change has also drawn attention to human activities in climate change.

[12] Esra Deniz Güner and Emine Su Turan, **Yenilenebilir Enerji Kaynaklarının Küresel İklim Değişikliği Üzerine Etkisi**, Artvin Çoruh University Natural Hazards Application and Research Center, Journal of Natural Hazards and Environment, 2017, Vol.3, No.1, p.48.

[13] United Nations Framework Convention on Climate Change, Article 1, 1992, https://unfccc.int/resource/ccsites/zimbab/conven/text/art01.htm (15.01.2024).

Svante Arrhenius (1896) was one of the first people to draw attention to the problem of anthropogenic climate change. However, Svante's ideas did not attract much attention. In the 1950s, the problem was revived by humanity's increasing influence on the environment. Numerous scientific studies have shown a connection between global warming and emissions of greenhouse gases. In the 1980s, the World Meteorological Organization (WMO) and the United Nations Environment Program (UNEP) began studying the role of carbon dioxide. These studies led to the creation of the Intergovernmental Panel on Climate Change (IPCC) in 1988.[14].

2.2 Greenhouse Effect

Some gases, especially those that increased after the Industrial Revolution, prevent the return of the sun's rays from the Earth and preserve heat. As a result, the planet is gradually warming up. This situation is called the greenhouse effect. Greenhouse gases consist mainly of carbon dioxide (CO^2) and methane (CH^4). Anthropogenic climate change is the result of net greenhouse gas emissions, influenced by factors such as energy consumption, land use and lifestyle[15]. It has been observed that the amounts of carbon dioxide, methane and nitrogen oxides (N2O), which have remained constant for more than 2000 years, have increased due to human activities. Direct atmospheric measurements also confirmed this information. While until the first half of the 19th century it was clear that deforestation was the main reason for the increase in carbon dioxide, today 80% of the increase can be attributed to the use of fossil fuels[16] .

Greenhouse gas emissions will continue to cause global warming. Continued global warming will cause many problems [17]. It is a fact that increasing greenhouse gas emissions are a major contributor to climate change in the world. According to the IPCC theory of anthropogenic global warming (AGW), continued increases in CO^2 emissions are leading to the inevitable end of the climate. Governments, media and many environmental activists agree with this IPCC theory[18].

[14] Mikael Höök and Tang Xu, **Depletion of Fossil Fuels and Anthropogenic Climate Change – A Review**, Energy Policy, 2013, p.2.
[15] IPCC AR6 Synthesis Report, p. 44.
[16] Stephen E Schwartz, **The Greenhouse Effect and Climate Change**, Authorea Preprints, 2022, p.38.
[17] IPCC, **Climate Change 2023 Synthesis Report Summary for Policymakers**, 2023, p.12.
[18] Martin Hertzberg, Alan Siddons and Hans Schreuder, **Role of Greenhouse Gases in Climate Change**, Energy&Environment, 2017, p.531.

The causes of the greenhouse effect include the use of minerals such as coal and oil, which release a lot of carbon dioxide when burned. However, the climate is not only warming because of the carbon dioxide produced by the use of fossil fuels. In addition to carbon dioxide, other greenhouse gases also cause global warming. Compared to pre-industrial times, the concentrations of carbon dioxide (C^2O), methane (CH_4) and nitrogen oxides (N2O) in the atmosphere have increased significantly. These increases of 40%, 150% and 20%, respectively, have resulted in concentrations unprecedented in 800,000 years. This increase came directly from the energy (47%), industrial (30%), transport (11%) and construction (3%) sectors.[19].

Methane is the second largest greenhouse gas caused by human activity after carbon dioxide. After the Industrial Revolution, fossil fuel consumption increased and agricultural activities doubled methane emissions[20] . Swamps, rice cultivation and livestock farming also influence the amount of methane. Because activities that produce methane are very common in the world, it is important to know how much methane is being emitted. On a molecular basis, methane is 23 times more potent than carbon dioxide. Methane concentrations caused by human activities have more than doubled in the last 150 years[21]. N2O caused less change than carbon dioxide and nitrogen. In the 1950s, the use of chemical fertilizers, soil degradation and biomass burning increased N2O consumption by 10% compared to before the Industrial Revolution[22].

According to the IPCC's fifth synthesis report, half of the carbon dioxide produced between 1750 and 2011 was created in the last 40 years. Greenhouse gas emissions continued to rise between 1970 and 2010. There were major increases between 2000 and 2010. At this point, the increased measures to curb climate change were not very effective[23].

In the globalized world, the use of some greenhouse gases is integrated into everyday life. Reducing the use of greenhouse gases, which can indirectly or directly

[19] IPCC Fifth Synthesis Report, p.44.
[20] Donald J. Wuebbles, Katharine Hayhoe, **Atmospheric Methane and Global Change**, Earth-Science Reviews, 2002, p.177.
[21] Frank Keppler and Thomas Röckmann, **Methane, Plants and Climate Change**, Scientific American, 2007, p.54.
[22] Richard Warrick and Graham Farmer, **The Greenhouse Effect, Climatic Change and Rising Sea Level: Implications for Development**, Transactions of the Institute of British Geographers, 1990, p.7.
[23] IPCC Fifth Synthesis Report, p.45

influence the climate and lifestyle, is of great importance for the world and the future. One of the solutions is to reduce emissions of gases such as methane and nitrous oxide, which have a shorter lifespan than carbon dioxide [24]. In addition, population growth triggers industrial production to meet demand in the food and clothing sectors[25]. To meet the demands of population growth, it is important to use renewable energy sources instead of fossil fuels. This is another solution to reduce greenhouse gas consumption. In order to understand the causes of climate change and take action, it is therefore important to clarify the connection between greenhouse gases and climate change.

2.3 Climate Change Indicators

As human activities continue to produce greenhouse gases in the atmosphere, this is expected to lead to a direct increase in global temperatures and subsequently climate change. The impact of these climate changes on our planet is far-reaching. Climate changes affect rainfall patterns, agriculture and people's lives[26].

Since the IPCC's fourth synthesis report, there is more evidence of human influence on melting glaciers and warming of the atmosphere and ocean [27]. Human-caused climate change is the cause of extreme weather and climate events in most parts of the world. Thus, climate change leads to food and water shortages, hunger and negative impacts on human health and the country's economy[28]. Climate changes have also had an impact on ecosystems in recent years. It affects biodiversity by causing changes in the habitats of animal and plant species.

2.3.1 Changes in Oceans

Oceans, which cover more than half of our planet, are of great importance to both humanity and our planet. As climate protectors, oceans provide services in the

[24] S.A. Montzka, E.J. Dlugokencky and J.H Butler, **Non-CO2 Greenhouse Gases and Climate Change**, Nature, 2011, p.43.
[25] Alexey Mikhaylov, Nikita Moiseev, Kirill Aleshin, Thomas Burkhardt, **Global Climate Change and Greenhouse Effect**, Entrepreneurship and Sustainability Issues, 2020, p.2900.
[26] Daniel P. Shepardson, Dev Niyogi, Soyoung Choi, Umarporn Charusombat, **Students' Conceptions About the Greenhouse Effect, Global Warming, and Climate Change**, Climatic Change, 2011, p.482.
[27] IPCC, **Climate Change 2014 Synthesis Report**, 2015, p.47.
[28] IPCC AR6 Climate Change 2023 Synthesis Report, p.42.

food and economic sectors [29]. Additionally, it provides a 63% financial benefit to global ecosystem services. Oceans, which remove 40% of anthropogenic carbon dioxide from the atmosphere, are also carbon dioxide reservoirs. Oceans absorb more than 90% of the energy caused by anthropogenic greenhouse gases. At this point should draw attention the connection between oceans and climate change. The density of sea water is 850 times greater than the density of atmospheric air. This shows that the oceans are more conservative than the atmosphere. In addition, the heat capacity of the oceans is about four times greater than the heat capacity of the air. This shows that the temperature change of the oceans takes much longer than that of the atmosphere[30]. In recent years, negative changes have been observed in the oceans, protecting nature by absorbing anthropological carbon dioxide. Increasing greenhouse gas emissions are leading to changes in ocean temperatures. It was found that the warming of seawater occurs predominantly near the surface. Between 1971 and 2010, the upper 75 m warmed by 0.11 (0.09 to 0.13) °C per decade. The 0-700 m, defined as the upper ocean, experienced warming between 1971 and 2010. This upper ocean warming also occurred between 1870 and 1971. It is likely that the ocean warmed from 700 m to 2000 m in 52 years between 1957 and 2009. Likewise, it is estimated that warming also occurred from 3000 m to the bottom in the 13 years between 1992 and 2005[31]. Between 1982 and 2017, the Arctic and Southern oceans has warmed by 0.5 every 10 years[32].

2.3.2 Melting of Glaciers

The cryosphere refers to all places where water is in solid form, such as snow, river and lake ice, glaciers and ice sheets. With warming, changes in all of these components of the cryosphere have also been observed[33].

One of these components is glaciers, which serve as natural reservoirs for irrigation. Glaciers are not only water resources but also play an important role in the

[29] Andrew S. Brierley, and Michael J. Kingsford, **Impacts of Climate Change on Marine Organisms and Ecosystems**, Current Biology, 2009, p.603.
[30] S. K. Gulev, **Global Climate Change and the Oceans**, Studies on Russian Economic Development, p.739.
[31] IPCC Fifth Synthesis Report, p.40.
[32] Helen S. Findlay, Carol Turley, **Ocean Acidification and Climate Change**, In Climate Change,2021, p.253.
[33] Yongjian Ding, Shiqiang Zhang, Lin Zhao, Zhongqin Li, Shichang Kang, **Global Warming Weakening the Inherent Stability of Glaciers and Permafrost**, Science Bulletin, 2018, p.245.

lifestyle and culture of human societies living near glaciers[34]. The changes in glaciers over the years clearly show the effects of climate change. Glaciers can be observed retreating in most parts of the world. There are a total of 216,000 glaciers worldwide, almost 80% of them in the polar regions and more than half in the subarctic regions. In this case, 706,000 km of our Earth is covered with glaciers[35].

Glaciers which cover much area in our world and are very important for our ecosystem, started to melt in the mid-19th century[36]. The 33 years between 1979 and 2012 saw a decline in the average extent of Arctic sea ice. The declines in the summer and winter months vary seasonally. The greatest decline can be observed in the summer months. In summer, sea ice extent has decreased by an average of 9.4% to 13.6% over the decades[37]. In addition, the average temperature in the Arctic increased by 2°C from the late 1970s to early 2012. Severe melting of glaciers and a shortening of the snow season are some signs that the Arctic is warming[38]. If average temperature increases continue in the coming years, the consequences of this situation will greatly affect our world[39].

The melting of glaciers, which are very important for animals, ecosystems, people and our world, is leading to some negative situations. Glaciers are the source of life for many animals. Many rivers are fed by glaciers, so glaciers promote biodiversity. However, the lives of fish living in cold waters are at risk as the temperature increases. Melting glaciers can also disrupt weather patterns. The melting of famous glaciers leads to both loss of natural beauty and financial losses. Glaciers are also a source of fresh water for many people. Although the melting of glaciers is leading to an increase in freshwater resources, it will lead to water shortages in the

[34] Pierre Chevallier, Bernard Pouyaud, Wilson Suarez and Thomas Condom, **Climate Change Threats to Environment in the Tropical Andes: Glaciers and Water Resources**, Regional Environmental Change, 2011, p. 179.
[35] Regine Hock, Matthias Huss, **Glaciers and Climate Change**, In Climate Change, 2021, p.157.
[36] Mark B. Dyurgerov and Mark F. Meier, **Twentieth Century Climate Change: Evidence from Small Glaciers,** Proceedings of the National Academy of Sciences, 2000, p.1410.
[37] IPCC Fifth Synthesis Report, p.42.
[38] Robert W. Corell, **Challenges of Climate Change: An Arctic Perspective**, Journal of the Human Environment, 2006, p. 149.
[39] Yury Morozov, **Arctic 2030: What Are the Consequences of Climate Change?**, Bulletin of the Atomic Scientists, 2015, p.22.

long term if these continue to decline. This situation also negatively impacts people who use water in agriculture and their basic life functions[40].

In addition to these consequences of melting glaciers, there are other possible consequences that could occur if warming continues. Shorter and warmer winters as well as a reduction in snow masses are other possible consequences [41].

2.3.3 Rising Sea Level

Sea level rise is one of the main consequences of anthropogenic climate change [42]. Sea level rise (SLR) is of particular concern for people living in low-lying coastal areas. About a quarter of humanity could face negative impacts such as flooding, erosion and loss of wetlands. Ice loss, primarily from glaciers and ice caps, causes sea levels to rise[43]. Thinning and retreat of glaciers have also caused sea levels to rise. In addition to the melting of glaciers in the 20th and 21st centuries, thermal expansion of the oceans also affected sea level rise [44].

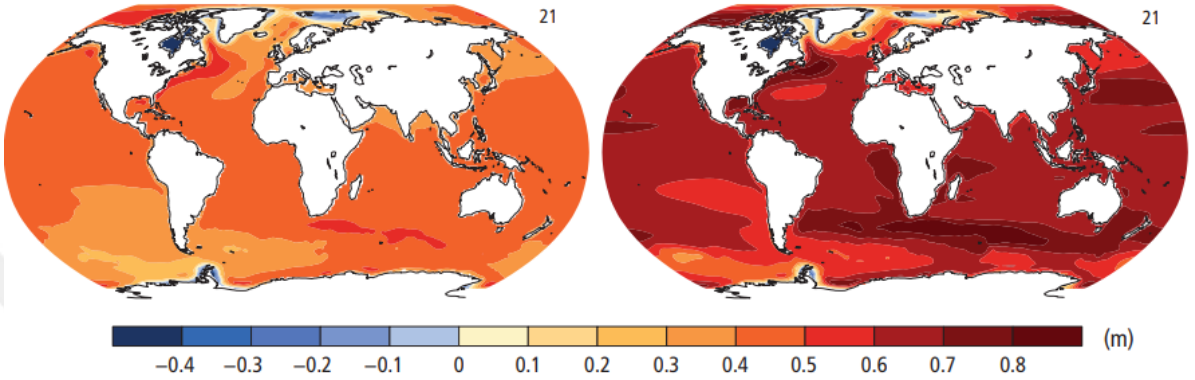
Sea levels are rising above the limits predicted by the IPCC in its third assessment report[45]. Sea level rise since the mid-19th century has been greater than the average rise over the past two thousand years. It is estimated that the global average sea level rise over a century was 1.7 between 1901 and 2010 and 3.2 between 1993 and 2010 [46]. It is estimated that the global average sea level rise in the 21st century will be greater than the increase between 1971 and 2010. Considering the increase between 1981 and 2001, it is estimated that the sea level rise will be between 0.26 - 0.55 m at best and 0.45 - 0.82 meters at worst between 2081 and 2100. By the end of

[40] Meliev Muzaffar Saidakbarovich, Murodova Odina Fayzullah's Qizi and Rakhmonaliev Behruzbek Dilmurodjon's Ogli, **Glacier Melting Control and Mitigation Strategies**, Western European Journal of Linguistics and Education, 2023, p.27.
[41] Robert W. Corell, p. 149
[42] Thomas Stocker, Qin Dahe, Gian-Kasper Plattner, Melinda Tignor, Simon Allen, Pauline Midgley, **IPCC Workshop on Sea Level Rise and Ice Sheet Instabilities**, 2010, p.7.
[43] Anny Cazenave, Frederique Remy, **Sea Level and Climate: Measurements and Causes of Changes**, Wiley Interdisciplinary Reviews: Climate Change, 2011, p.657.
[44] John A. Church, Neil J. White, Thorkild Aarup,W. Stanley Wilson,Philip L. Woodworth, Catia M. Domingues, John R. Hunter and Kurt Lambeck, **Understanding Global Sea Levels: Past, Present and Future**, Sustainability Science, 2008, p.9.
[45] Mark F. Meier, Mark B. Dyurgerov, Ursula K. Rick, Shad O'Neel, W. Tad Pfeffer, Robert S. Anderson, Suzanne P. Anderson and Andrey F. Glazovsky, **Glaciers Dominate Eustatic Sea-Level Rise in the 21st Century**, Science, 2007, p.1064.
[46] IPCC Fifth Synthesis Report, p.42.

the 21st century, it is predicted that sea level will rise in almost all of the ocean area (95%)[47].

Greenhouse gases are one of the main causes of sea level rise. There are geological records that show the connection between carbon dioxide concentrations and sea level rise [48]. The effects of large ice sheets on sea level rise are worrying if greenhouse gas emissions continue to increase[49].

Figure 1: Change in Average Sea Level (1986-2005 to 2081-2100)[50]



Source: https://www.ipcc.ch/site/assets/uploads/2018/02/SYR_AR5_FINAL_full.pdf

It is estimated that nearly two-thirds of the world's coastlines will experience sea level rise. However, these changes will not be the same in all regions of the world. Significant sea level rise is expected in some regions by the year 2100[51].

Sea level rise poses a major threat to coastal countries. Countries are affected by sea level rise to different extents, depending on their economy, lifestyle, local people's wealth levels and population ratios. For example, a large country like the United States and small islands in the South Pacific are affected by sea level to varying degrees. While coastal communities in the United States can be relocated inland through government intervention, this will not be the case for small islands in the South

[47] The Core Writing Team, p.12.
[48] Roland Gehrels, **Rising Sea Levels as an Indicator of Global Change**, School of Geography, 2021, p.334.
[49] John A. Church et al, p.9.
[50] IPCC Fifth Synthesis Report, p.61.
[51] IPCC Fifth Synthesis Report, p.62.

Pacific. In countries such as Egypt, Bangladesh and Vietnam, where a large proportion of the population lives in low deltas, sea level rise will have major negative impacts[52].

A rise in mean sea level of 0.3 and 1 m on Togatapu Island in Tonga would result in a loss of 3.1 and 10.3 km or 1.1 and 3.9% of the island's total area. The average number of people living in these areas is approximately 2700 and 9000 respectively. This represents 4.3% and 14.2% of Tongatapu's total population respectively. In the event of a hurricane such as Hurricane Isaac in 1982, 11% of the island and 37% of the population (23,470) are at risk from a possible 0.3 meter sea level rise[53].

Another coastal area that is negatively affected by sea level rise is the Nile Delta in Egypt. Sea level rise in Egypt puts 28,498 km of agricultural land, 24,953 km of urban areas and 24,015 km of wetlands at risk. These rates correspond to 13.08%, 5.52% and 6.55% of the country, respectively. As a result, 6.44% of the country's gross domestic product (GDP) is lost[54].

2.3.4 Effects of Renewable Energy System

As in many areas, the effects of climate change are also evident on energy systems. The existence of renewable resources such as wind and water goes paralell with climate change. Correctly assessing climate change and tracking the change in renewable energy sources is important for the sustainability of energy systems[55]. The hydroelectric energy sector is one of the energy sources most affected by climate change due to its structure. Precipitation pattern and amount have a direct impact on the energy source[56].

Likewise, many climatic variables can play an active role in energy production from wind. Wind speed, direction and air temperature are important variables. Climate change can affect wind energy in two different ways. Any change in wind speed has a

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[52] Sujatha Byravan and Sudhir Chella Rajan, **The Ethical Implications of Sea-Level Rise Due to Climate Change**, Ethics & International Affairs, 2010, p.240

[53] Nobuo Mimura, **Vulnerability of Island Countries in the South Pacific to Sea Level Rise and Climate Change**, Center for Water Environment Studies, 1999, p.139

[54] Susmita Dasgupta, Benoit Laplante, Craig Meisner, David Wheeler, Jianping Yan, **The Impact of Sea Level Rise on Developing Countries:** Philosophical Transactions of the Royal Society B, 2020, p.1.**A Comparative Analysis**, Climatic change, 2009, p.387.

[55] M.A. Russo, D. Carvalho, N. Martins and A. Monteiro, **Forecasting the Inevitable: A Review on the Impacts of Climate Change on Renewable Energy Resources,** Sustainable Energy Technologies and Assessments, 2022, p. 1

[56] Zekâi Şen, **İklim Değişikliği ve Türkiye**, Journal of Environment, City and Climate, 2022, Vol.1, No.1, p.13.

direct impact on electricity production. Another option is to increase the maximum wind speed. This situation is also crucial for security reasons [57].

2.3.5 Changes on Ecosystems

One of the areas that climate change impacts is ecosystems. All ecosystems are affected by the consequences of increasing carbon dioxide emissions. Polar ecosystems and tropical regions are among the areas most sensitive to change due to their sensitivity to temperature [58].

Changes in the atmosphere and oceans lead to changes in the biosphere in which living things on Earth live. The healthy functioning of the biosphere is closely linked to the extent of ocean acidification and carbon dioxide emissions. Human-induced greenhouse gas emissions that cause climate change and acidification have profound impacts on ecosystems[59].

Compared to the period 1950–1969, the entire Indian Ocean and the western, southern Pacific were found to be warmer. In contrast to the fact that there is no increase in temperature in the Eastern and Northen Pacific, cooling has occurred in some regions. However, this cooling does not change the general assumption. Almost all of the tropical ocean area is warming, only 2% is cooling[60].

Rising carbon dioxide emissions are affecting the biodiversity and functioning of the oceans. Direct temperature and chemical interventions change the physiology and population size of organisms. In addition to the consequences of climate change (such as species extinction, migration and invasion), direct human-caused interventions also lead to changes in biodiversity. Grazing, competition and diseases are some of them[61].

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[57] Robert Pasicko, Cedo Brankovic and Zdenko Simic, **Assessment of Climate Change Impacts on Energy Generation from Renewable Sources in Croatia**, Renewable Energy, 2012, Vol. 46, p.227.
[58] Scott C. Doney, Mary Ruckelshaus, J. Emmett Duffy, James P. Barry, Francis Chan, Chad A. English, Heather M. Galindo, Jacqueline M. Grebmeier, Anne B. Hollowed et al**, Climate Change Impacts on Marine Ecosystems**, Annual Review of Marine Science, 2012, p.29.
[59] Yadvinder Malhi, Janet Franklin, Nathalie Seddon, Martin Solan, Monica G. Turner, Christopher B. Field and Nancy Knowlton, **Climate Change and Ecosystems: Threats, Opportunities and Solutions**, Philosophical Transactions of the Royal Society B, 2020, p.1.
[60] P. L. Munday, J. M. Leis, J. M. Lough et al**., Climate Change and Coral Reef Connectivity**, Coral Reefs, 2009, p.381.
[61] Scott C. Doney et al. p.28.

Air pollution, especially after the Industrial Revolution, had a major impact on terrestrial ecosystems. In addition to industrialization, deforestation and urbanization have also caused damage to the terrestrial ecosystem [62]. When overfishing is accompanied by an increase in invasive species populations, the impacts of climate change on ecosystems become even more significant [63].

According to the IPCC's fifth assessment report, most plant and animal species on Earth will not be able to adapt to the climate changes of the 21st century. A large number of freshwater and marine species are at risk of extinction due to changes caused by climate change. Coral reefs and polar ecosystems are particularly vulnerable to climate change. Various climate-related factors will lead to species extinction. These factors are warming, ocean acidification, changes in precipitation and a decline in oxygen levels in the oceans. The decline in marine biodiversity due to climate change will negatively impact fisheries production and the sustainability of other ecosystem services, particularly at low latitudes. Combined with other changes in ocean acidification such as warming, declining oxygen levels and pollution, the impact on ecosystems will become even greater[64].

The heavy absorption of carbon dioxide from the atmosphere has led to some decline in the pH of water. The drop in water pH also led to acidification [65]. Ocean acidification has been called the “evil twin” of climate change [66]. Acidification is a natural consequence of increasing amounts of carbon dioxide. Acidification has many direct and indirect effects on fish species. In addition to the risk of extinction for many species that live on coral reefs, the tourism industry they support is also at risk[67].

Due to the negative impacts of climate change and associated changes, species face two choices: adaptation or migration. It is not easy for some species to adapt to

[62] Banwari Dandotiya and Harendra K. Sharma, **Climate Change and Its Impact on Terrestrial Ecosystems**, In Research Anthology on Environmental and Societal Impacts of Climate Change, 2022, p.143.
[63] Yadvinder Malhi, Janet Franklin, Nathalie Seddon et al, p.5
[64] IPCC The Core Writing Team, p.67.
[65] Pauline M. Ross, Laura Parker, Wayne A. O’Connor and Elizabeth A. Bailey, **The Impact of Ocean Acidification on Reproduction, Early Development and Settlement of Marine Organisms**, Water, 2011, p.1006.
[66] Füsun Özerdem and Burhan Barlas, **Kopenhag Okulu Çerçevesinde 2020 ve Sonrası Dünya Politikasının Yeni Sorunu: İklim Değişikliği ve İklim Göçmenleri**, Journal of Süleyman Demirel University Institute of Social Sciences, 2021, Vol.3 No.41, p.279.
[67] Robert J. Scholes, **Climate Change and Ecosystem Services**, Wiley Interdisciplinary Reviews: Climate Change, 2016, p.540.

changes in their habitats that are suitable for their feeding and breeding habits. In this case, migration is a hope for the continued existence of life. Climate change also affects species that currently migrate through nature. For example, changes have been observed in the migration times and migration routes of white storks in Spain and monarch butterflies in North and South America[68].

Another ecosystem that is severely affected by climate change are terrestrial ecosystems. While species living in the marine ecosystem have the opportunity to migrate due to the negative effects of climate change, this is not possible for plants in the terrestrial ecosystem. The effects of climate change on plant species vary from country to country and region to region. The effects of climate change are more evident in the terrestrial ecosystems of Romania, Bulgaria, Spain, Portugal, the former Yugoslavia, Albania, Greece and Italy. In northwestern European countries (Netherlands, England), heat-loving plant varieties suitable for cultivation in hot climates are more common than 30 years ago[69]. If temperatures rise by 3°C by 2100, there will be changes in the distribution of species. It is expected to shift 300-400 km north in the temperate zone. This displacement leads to interactions between species and increases competition. Due to interaction with other species, some species are likely to become extinct[70].

2.3.6 Changes on Agriculture Patterns

Agriculture has ensured the continuity of vital activities since the beginning of humanity and has been the basic source of life. Soil is a great resource for both agriculture and grazing. Changes in agriculture that have such a major impact on all people and their life cycle will also have a parallel impact on all of these systems. Climate change will lead to some changes in agriculture due to changing rainfall and temperature rates. In food production, the temperature sensitivity of some crops can have a negative impact on production. When the negative effects of warming are accompanied by unexpected rainfall, this has an impact on agriculture[71].

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[68] Thomas T. Moore, **Climate Change and Animal Migration**, Envtl. L, 2011, p.404.
[69] Michel Bakkenes, Bas Eickhout and Rob Alkemade, **Impacts of Different Climate Stabilisation Scenarios on Plant Species in Europe**, Global Environmental Change, 2006, p.23.
[70] Lesley Hughes, **Biological Consequences of Global Warming: Is the Signal Already Apparent?,** Trends in Ecology & Evolution, 2000, p,56.
[71] J. L. Hatfi eld, K. J. Boote, B. A. Kimball, L. H. Ziska, R. C. Izaurralde, D. Ort, A. M. Thomson, and D. Wolfe, **Climate Impacts on Agriculture: Implications for Crop Production**, Agronomy Journal, 2011, p.365.

Greenhouse gas emissions caused by the agricultural sector account for about 20% of total global emissions. This percentage is close to greenhouse gas emissions from industry and higher than greenhouse gas emissions from transport. Emissions from livestock farming account for more than three quarters of the sector's emissions. For these reasons to take measures to reduce greenhouse gas emissions caused by agriculture and animal husbandry so important. However, the livestock sector is expected to grow in the coming years, especially in developing countries[72].

Looking at hectares around the world, 1.2 to 1.5 billion hectares are used for agriculture and 3.5 billion hectares are used for pasture. In addition to grazing, agriculture directly or indirectly impacts numerous industries and ecosystems. Since agriculture is directly affected by temperature, rainfall and water availability, it is important to emphasize its vulnerability to climate change.[73]

In addition to food production, areas that will be affected by climate change include access to land, diversity and ease of use, and price standardization. Nutrition, food availability, health status, livelihoods and product productivity are also the direct and indirect areas where climate change impacts agriculture[74]. Greenhouse gas emissions from food systems account for 19–29% of total anthropogenic emissions worldwide. It is estimated that a 2°C increase experienced in tropical climates where rice, wheat and corn grow will have a negative impact on production. The number of water-stressed and flood-prone regions is expected to increase in the 21st century due to increasing warming. Climate change will negatively impact renewable water and groundwater resources in subtropical regions, so water competition between countries is expected to increase. Disturbances in treatment processes, deterioration in water quality, and sediment formation due to rain are possible effects of climate change on water. Climate change is predicted to negatively impact economic growth and complicate measures to combat poverty and food security. However, rural areas are

[72] Anthony J McMichael, John W Powles, Colin D Butler, Ricardo Uauy, **Food, Livestock Production, Energy, Climate Change, and Health**, Energy and Health 5, p.1253.
[73] S. Mark Howden, Jean-Franc¸ois Soussana, Francesco N. Tubiello, Netra Chhetri, Michael Dunlop and Holger Meinke**, Adapting Agriculture to Climate Change**, Proceedings of the National Academy of Sciences, 2007, p.19691
[74] Sonja J. Vermeulen, Bruce M. Campbell, and John S.I. Ingram, **Climate Change and Food Systems**, Annual Review of Environment and Resources, 2012, p.215.

expected to be more affected than urban areas in terms of water supply and food security. It is predicted that poverty traps will also occur in urban areas[75].

The negative impacts and concerns that climate change causes on agriculture and food security are expected to increase the severity and duration of poverty currently suffered by developing countries. The monetary resource in most developing countries is agriculture. Also developing countries that are more sensitive to agriculture than other countries[76].

According to reports from the FAO, some leading grain producing countries were affected by the drought and flood between 2005 and 2007. In 2006, grain production fell by 3.6% compared to 2005. Although the rate increased in 2007, it had a worrying impact on the markets. The direct or indirect impacts of climate change on production have attracted attention[77].

It would not be right to leave agriculture, which occupies such an important place in human life, to climate change and its possible effects. At this point, it is important to adapt to factors that may negatively impact food production under normal conditions, such as excessive rainfall. Supporting small farmers and providing financial support are steps to reduce the impact of climate change on agriculture. The proximity of production resources and technology is also one of the adaptation options for agriculture [78].

2.3.7 Effects on Sustainable Livestock System

Climate change is seen as a threat to the survival of many species and the continuity of animal production in most parts of the world [79]. For some societies around the world, livestock farming is particularly important. Climate change is particularly causing problems for these communities whose livelihoods depend on animal husbandry. Demand for animal products is expected to reach 100% by the middle of the 21st century. Climate change, animal health and natural resources are stated to be

[75] IPCC The Core Writing Team, p.69.
[76] Emmanuel Skoufias Mariano Rabassa Sergio Olivieri, **The Poverty Impacts of Climate Change A Review of the Evidence**, Poverty Reduction and Equity Unit The World Bank, p.2.
[77] FAO, p.10.
[78] The Core Writing Team, p.97
[79] Mehmet Koyuncu and Faridaa Ibrahim Nageye, **İklim Değişikliğinin Sürdürülebilir Hayvancılığa Etkileri**, Review, 2020, p.158.

important factors affecting the process[80]. While climate change makes the livestock sector vulnerable, droughts or other extreme weather events can make the situation even worse. Climate change can directly impact animal health or harm animal food sources through damage to pastures. It is estimated that livestock production will not develop much, especially in arid and semi-arid regions, due to accessibility of water and the possibility of diseases. Climate change is having a negative impact on some endangered species. Among the farm animals, chickens (33%), pigs (18%) and cattle (16%) are threatened. The future of these animals depends on the climate of their region[81]. It is of great importance for the future to prevent climate change, which can affect animals, animal health and humans, and to try to adapt animal production to changing conditions.

2.3.8 Effects on Human Healthy

Climate change, which affects many areas, is also expected to have negative effects on human health. According to the IPCC report, climate change will cause health problems, especially in economically weak developing countries. The effects of climate change on human health can be direct or indirect. These impacts include fires caused by increases in temperature, reduced labor productivity in poor areas, and disease that can occur as a result of malnutrition[82].

Climate change also has an impact on mental health. Climate change impacts human health in two main ways. It increases the effects of health problems that have already occurred due to climate change or causes health problems that did not occur before/were unforeseeable[83].

According to the World Health Organization (WHO), flooding and warming caused by climate change have killed more than 150,000 people in the last 30 years. About 77,000 of the world's 154,000 deaths caused by climate change in 2000 occurred in Southeast Asian countries. In addition to the vulnerability of people in Southeast Asian countries to the effects of climate change, the increasing use of greenhouse gases is also negatively impacting population practices[84]. Research shows that 3.6 billion

[80] Mehmet Koyuncu and Faridaa Ibrahim Nageye, p.158.
[81] Mehmet Koyuncu and Faridaa Ibrahim Nageye, p.162.
[82] IPCC The Core Writing Team, p.69.
[83] Dr. John Balbus, Allison Crimmins**,** Dr. Janet L. Gamble**, Climate Change and Human Health**, The impacts of climate change on human health in the United States.
[84] World Health Organization, **Climate Change and Health**,2008, p.2.

people live in climate-sensitive areas. Between 2030 and 2050, climate change is expected to cause 250,000 additional deaths due to reasons such as malnutrition, malaria and heat stress[85].

With the increasing impact of natural disasters caused by climate change in the region, migration is emerging as a solution. The impact of climate change on people's lives and health is expected to increase. Infections caused by reduced availability of water and heat, coupled with growing populations, pose a major threat to human health [86].

2.4 Policies to Combat Climate Change

In the international system, states have been creating international organizations and reaching compromises through agreements for decades. There are hundreds of international regimes established by states to promote their common interests[87]. There are regulations for the impacts and consequences of climate change, which have significant impacts on our world as well as on humanity, animals, plants and ecosystems. It cannot say that the history of climate protection regimes goes back to very ancient times. It took time for the consequences of climate change to become visible and for national/international measures to be taken to prevent this situation. For example, the IPCC with its published reports is a good example. It provides a good framework for understanding the consequences of climate change for our world[88].

The basis of the IPCC was conferences on climate change that took place in different countries and at different times. One of these conferences was the First World Climate Change Conference, organized under the leadership of the World Meteorological Organization and with the contributions of the United Nations Educational, Scientific and Cultural Organization (UNESCO), the United Nations Environment Program (UNEP) and the International Council for Climate Change

[85] WHO, https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health ,2023, (28.01.2024).
[86] Şenol Şevik, ‘’The Effects of Climate Change on Human Behaviors’’, **Environment, Climate, Plant and Vegetation Growth**, (Editors Shah Fahad, Mirza Hasanuzzaman Mukhtar Alam, Hidayat Ullah Muhammad Saee, Imtiaz Ali Khan, Muhammad Adnan), 2020, p.584.
[87] Karen J. Alter and Kal Raustiala, **The Rise of International Regime Complexity**, Annual Review of Law and Social Science, 2018, p.345.
[88] Medani P Bhandari, **The Role of International Organization in Addressing the Climate Change Issues and Creation of Intergovernmental Panel on Climate Change (IPCC),** Advances in Agriculture and Environmental Science: Open Access, 2018, p.19.

Science (ICSU). This conference also led to the creation of the World Climate Program. The aim is to draw attention to the extent and importance of human influence on climate change. Although the issue of global climate change gained attention on the world agenda, there was still no international organization capable of producing a global report on the consequences of climate change. For this reason, the IPCC was founded in Geneva in 1988 through the joint efforts of the World Meteorological Organization (WMO) and UNEP[89]. IPCC was established to understand the causes, effects and possible consequences of climate change[90].

The aim of the IPCC is to report all climate change information in a descriptive, detailed, objective and realistic manner. With the publication of the IPCC's first assessment report in 1990, the United Nations decided to take action on climate change and the UNFCCC was prepared. This meant that the climate protection agenda presented by the IPCC in its first assessment report was able to have an impact. Likewise, the second assessment report contributed to providing input for the Kyoto Protocol[91].

The UNFCCC was adopted in 1992 and is one of the most important global steps in the area of climate change[92]. The UNFCCC, which came into force in 1994 and was joined by 197 countries, defined the threats and risks that human activities, climate change, pose to our planet and our lives[93]. The main purpose of the UNFCCC is to keep greenhouse gas emissions at a certain level and prevent them from posing potential threats to our planet[94]. This set out the measures to prevent this danger and reduce greenhouse gas emissions[95].

Conferences of the Parties (COP), which meet every year in a different contracting state, are of great importance in showing what decisions they make and

[89] Medani P Bhandari, p.29.
[90] Erlend A.T Hermansen, Elin L. Boasson, Glen L. Peters, **Climate Action Post-Paris: How Can the IPCC Stay Relevant?**, Climate Action, 2023, p.2.
[91] K Setboth, **Intergovernmental Panel on Climate Change (IPCC)**, Encycl Energy Nat Res Environ Econ, 2013.
[92] Jonathan Kuyper, Heike Schroeder, and Bjorn-Ola Linn ¨ er´, **The Evolution of the UNFCCC**, Annual Review of Environment and Resources, 2018, p.344.
[93] Richard Kinley, Michael Zammit Cutajar, Yvo de Boer & Christiana Figueres, **Beyond Good Intentions, to Urgent Action: Former UNFCCC Leaders Take Stock of Thirty Years of International Climate Change Negotiations**, Climate Policy, 2020, p.594
[94] Tim Dunne, Milja Kurki, and Steve Smith, **International Relations Theories Discipline and Diversity**, 2013, p.278.
[95] Richard Kinley, Michael Zammit Cutajar, Yvo de Boer & Christiana Figueres, p.594

how these decisions can be implemented. The highest body of the Convention is the Conference of the Parties. One of the steps taken by the parties during the COP1 process was the introduction of the AIJ (Activities Implemented Jointly) market mechanism. The aim of the AIJ market mechanism was for investors to support emissions reduction projects in developing countries. After COP2, the United States recognized the importance of the problem of climate change, the possible impacts and the importance of the measures to be taken. The Kyoto Protocol was adopted at COP3 in 1997. The Kyoto Protocol did not bring a new perspective on climate change or add any new measures. The protocol worked on the existing articles of the climate agreement. The Kyoto Protocol provided favorable and applicable policies for all countries [96].

The Protocol's measures include controlling greenhouse gas emissions and implementing reforms in most sectors to control methane emissions. At the same time, reforestation efforts, reducing the use of fossil fuels and promoting the use of renewable energy are other measures of the protocol. The Kyoto Protocol proposed that developed countries take measures to reduce emissions of six greenhouse gases by 5.2% during 2008-2012 compared to 1990 levels. With the commitment of developing countries, the Protocol came into force in 2005 and remained a legally binding document for the next 10 years [97]. With all of these practices, the Kyoto Protocol has taken important steps toward achieving the goals of the United Nations Climate Change Framework. The commitment periods set out in the Kyoto Protocol cover the years 2008-2012 and 2013-2020. The first commitment period was successful and greenhouse gases were used within the specified limits. The Kyoto Protocol is important because of its binding targets for greenhouse gas consumption by 2012. However, the protocol also has some shortcomings. At the beginning there was not much participation from the states. In addition, some participating countries have committed to reducing greenhouse gas consumption. At the same time, there are deficiencies in sectors that need to be brought under control. Despite its shortcomings, the protocol is an important approach to climate change policy. In 2007, the Bali Conference was held to determine the agreement to be reached under the Protocol.

[96] Joyeeta Gupta, **A History of International Climate Change Policy**, Climate Change, 2010, p.642, 643.
[97] Joyeeta Gupta, p.643-644.

The Paris Climate Agreement was adopted on December 12, 2015 at COP21 in Paris to regulate the steps after 2020 and entered into force on November 4, 2016[98]. With the Paris Climate Agreement, all nations have come together to combat climate change, reduce its impact and minimize its consequences. In this sense, not only industrialized countries but also developing countries have certain obligations. The Paris Climate Agreement differs from the Kyoto Protocol in the responsibility it places on developing countries. The Paris Climate Agreement is the first agreement to bring all nations together on the consequences, impacts and adaptation of climate change. The aim of the legally binding Paris Climate Agreement is to limit the global average temperature to 2 °C, if possible even to 1.5 °C[99]. When assessing the situation that has developed in recent years, the importance of limiting global temperature to 1.5°C is highlighted. According to the United Nations Climate Change Convention, the negative impacts of climate change will be felt much more severely if global climate change exceeds 1.5°C. Potential risks include droughts and increased rainfall intensity.[100].

The Paris Peace Agreement attracts attention with eight features:

1- It is a legally binding document, not a political agreement like the Copenhagen Agreement.
2- It is a global document. The aim of the Paris Peace Agreement is to reduce greenhouse gas emissions not only for industrialized countries, but also for developing countries.
3- This sets out common core commitments that apply to all countries. At this point, the differentiation steps of the United Nations Framework Convention on Climate Change and the Kyoto Protocol were abandoned and an approach was chosen that takes into account the changes and capacities of the countries themselves.

[98] Christopher J. Rhodes, **The 2015 Paris Climate Change Conference: COP21**, Current Commentary, 2016, p.97.
[99] Sven Teske, **Achieving the Paris Climate Agreement Goals Global and Regional 100% Renewable Energy Scenarios with Non-energy GHG Pathways for +1.5°C and +2°C,** Springer Nature, 2019, p.2.
[100] United Nations Framework Conventions on Climate Change, https://unfccc.int/process-and-meetings/theparisagreement?gad_source=1&gclid=CjwKCAiAt5euBhB9EiwAdkXWO13JFmNuSjj41LRCPuHVXmzoFLPFjLD4OnfDAuTEnvLu1AnvWDEaEhoCU6UQAvD_BwE (15.04.2024).

4- Unlike the Copanhagen Agreement, it creates a longer-lasting and more durable environment.
5- It institutionalizes an iterative process in which the parties will return to the table to evaluate their situation and plan for the next 5 years.
6- Over time, the expectations for action increase.
7- The aim is to create a framework for transparency and accountability.
8- Finally, it appears to be gaining universal or near-universal acceptance[101].

The presidential elections held in the USA caused some problems with the implementation of the Paris climate agreement. According to newly elected US President Donald Trump, global warming is a lie made up by China to weaken US power. For this reason, the USA withdrew from the agreement on June 1, 2017. According to the US, the agreement strengthened countries other than the US but created obstacles for itself. At that point, Trump announced that he would begin negotiations to make the agreement fair. The USA's withdrawal from the agreement was not met with a positive response across the country; many countries joined the American climate alliance[102]. While the US withdrawal from the agreement was negatively received by the Secretary General of the United Nations, China, Italy and Germany announced that they would fulfill their obligations under the agreement[103].

The European Commission, seeking to take a leading role in tackling the global threat of climate change, has launched the European Green Deal (EGD). The European Green Deal proposes an ecological living system that prevents climate change not only in European countries but in all countries of the world. The European Union has set a goal of reducing gas emissions by 40% compared to 1990s levels by 2030, in line with the goals of the Paris Agreement[104]. However, in the Green Deal, it decided to reduce

[101] Daniel Bodansky, **The Paris Climate Change Agreement: A New Hope**?, The American Journal of International Law, 2016, p.290.
[102] American Climate Alliance: It is an alliance of at least 200 mayors to support the goals and principles of the Paris Agreement and to comply with its rules. Zhang Yong-Xianga, Chao Qing-Chena, Zheng Qiu-Hongb, Huang Lei, **The Withdrawal of the U.S. from the Paris Agreement and Its Impact on Global Climate Change Governance**, Advances in Climate Change Research, 2017, p.214.
[103] Zhang Yong-Xianga, Chao Qing-Chena, Zheng Qiu-Hongb, Huang Lei, p.214.
[104] Füsun Özerdem and Burhan Barlas, p.292.

the 2030 targets by 55% compared to 1990. It also aims for these rates to reach 100% by 2100[105].

COP28, the last Conference of the Parties, was important for assessing the results of the measures implemented in the Paris Climate Agreement to combat climate change. Next climate commitments include promoting the use of renewable energy sources such as wind and solar energy instead of fossil fuels[106].

As can be seen, measures are being taken around the world to raise awareness of climate change and its consequences and to reduce the effects of change. However, the impacts of climate change, discussed throughout the chapter, remain on agenda as an undeniable fact. Because climate change has irreparable consequences for ecosystems, human health, the sea, the air and the land, collaboration is so important for countries, international organizations and governments.

[105] European Commision, **Climate Action and Green Deal**, https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/climate-action-and-green-deal_en#actions (15.01.2024).
[106] UNFCCC, https://unfccc.int/cop28 (15.01.2024).

CHAPTER THREE

MIGRATION

In the third chapter of the study, after the concept of migration is defined in general, the relationship between migration and development will be mentioned. After the types of migration are explained, migration theories will be discussed in detail. At the end of the chapter, the steps taken in the international world to combat migration, collaborations and some international organizations will be explained.

3.1 Migration as a Phenomenon

Migration is defined as the movement of people from one place to another[107]. Migration is not a new phenomenon that has emerged in the last century. It is a phenomenon that has existed since the first days of human history. All living things, including humans, have moved from one place to another for many reasons. Even if the circumstances and the actors change, the movement itself is constant in human life[108]. There can be many reasons for this mobility. People may leave their place of residence for reasons such as natural disasters, health, safety, money, war or disruption of living conditions [109]. The countries of origin of immigrants in the world are populous countries such as North Africa, Brazil, China and Mexico. The low gross domestic product per capita in these countries is one of the triggering factors for migration. Immigrants migrate from these countries to countries with high gross domestic product per capita, namely the USA, Canada and Western European countries[110].

Even without triggering factors such as climate change, moving is normal for people. The four main reasons cited for age migration include retirement, severe and moderate disability, and the loss of a spouse. Likewise, disabled people may migrate to regions where the health sector is developed, or people may migrate to places with

[107] Susana Martinez Guillem, **Migration Discourse**, The International Encyclopedia of Language and Social Interaction, 2015, p.1
[108] Russell King, **The History of Human Migration**, 2007, https://coveringmigration.com/learning_pages/migration-as-a-global-phenomenon/ , (01.02.2024)
[109] Jana Čavojská, **What is Migration?**, 2019, https://coveringmigration.com/learning_pages/what-is-migration/, (01.02.2024)
[110] Hoda Rahmati S1 , Gurudeo Anand Tularam, **A Critical Review of Human Migration Models**, Climate Change, 2017, p.925.

milder climates[111]. The inadequacy of poor countries in basic sectors such as health and education is one of the triggering factors of migration [112].

The term migration is difficult to measure, define and limit to a single meaning. There are many variables, such as whether the migration is long or short-term, voluntary or forced, within national borders or between countries [113]. The underlying term "mobility" is not sufficient to explain the multidimensional concept of migration [114]. This mobility is not subject to any distance restrictions. For this reason, moving from one apartment to another, even if its beginnings and outcomes are different, is at least as much a migration as a transregional migration[115].

Mobility from one place to another is not just for humans. Animals, like humans, migrate to adapt to the changing conditions of their environment. Refuge, breeding and tracking migration are common in animals such as birds, bats, turtles and grasshoppers. In these migration styles, animals migrate to adapt to changing vegetation and food patterns due to rainfall[116].

The migration is generally category-based. However, it is not possible to divide the effects of migration into categories. People have an impact on the place they migrate to and the place they come from. Migration has long- or short-term effects on the arriving and already settled population. The integration process into this migration-related change is measured based on economic and social criteria [117].

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[111] William H. Walters, **Types and Patterns of Later-Life Migrations**, Geografiska Annaler: Series B, Human Geography, 2000, p.129.
[112] Ronald Skeldon, **Migration and Development**, In United Nations Expert Group Meeting on International Migration and Development in Asia and the Pacific, 2008, p.4
[113] Dhananjayan Sriskandarajah, **Migration and Development**, Institute for Public Policy Research, 2005, p.2.
[114] Ronald Skeldon, p.4.
[115] Everett S. Lee, **A Theory of Migration**, Demography, 1966, p. 50
[116] Allison K. Shaw, **Drivers of Animal Migration and Implications in Changing Environments**, Evolutionary Ecology, 2016, p.1002.
[117] Alina Sîrbu, Gennady Andrienko, Natalia Andrienko, Chiara Boldrini, Marco Conti, Fosca Giannotti, Riccardo Guidotti, Simone Bertoli, Jisu Kim, Cristina Ioana Muntean, Luca Pappalardo, Andrea Passarella, Dino Pedreschi, Laura Pollacci, Francesca Pratesi, Rajesh Sharma, **Human Migration: The Big Data Perspective**, International Journal of Data Science and Analytics, 2020, p.342.

3.2 Migration and Development

The connection between migration and development occupies an important place on the agenda [118]. The term "development" is often used in place of concepts such as economic strength, economic development, welfare and unemployment reduction that do not fit into a single meaning, such as migration[119].

To curb migration, it is important to understand the connection between migration and development. From a scientific and political perspective, the connection between migration and development is influenced by perspectives that are partly optimistic and partly pessimistic. Optimistic theories about the connection between migration and development are functionalist, neoclassical, modernization, net north-south transfer, brain gain, greater equality and development. Pessimistic theories are structuralist, neo-Marxist, disintegration, net south-north transfer, brain drain, more inequality, dependency. According to neoclassical theory within the optimistic perspective, migration is a way of organizing production factors for the benefit of sending and receiving countries[120]. According to another optimistic theory, development theory, which was dominant in the 1950s, immigrants who returned to their countries had many advantages. Immigrants not only brought money into the country, but also contributed to the development of their country with the innovations and changes they brought with them. In this sense, according to this understanding, the impact of migration and immigrants on the development and progress of their countries is viewed predominantly positively[121].

The arguments of the pessimistic approach that emerged in the 1960s differed from the arguments of neoclassical and developmental theories. According to the pessimistic approach, migration was not a phenomenon that reduced inequalities but rather caused them. According to the historical-structuralist approach, which is one of the theories of this approach, migration was nothing other than "escape from misery". According to the cumulative causality theory, one of the other pessimistic approach

[118] Martin Geige and Antoine Pécoud, **Migration, Development and the 'Migration and Development Nexus'**, Population, Space and Place, 2013, p.369.
[119] John Akokpari, '' Globalization, Migration, and the Challenges of Development in Africa'', **African Brain Circulation Beyond the Drain-Grain Debate**, (Editors Tukumbi Lumumba-Kasongo Rubin Patterson Masamichi Sasaki), 2006, p.61.
[120] Hein de Haas, **Migration and Development: A Theoretical Perspective**, International Migration Review, 2010, p.230.
[121] Hein de Haas, p.231.

theories, migration has a negative impact on underdeveloped countries of origin. This situation triggers greater external migration and this cycle continues[122].

3.3 Types of Migration

3.3.1 Internal Migration

Migration can take place within or outside national borders. Accordingly, it is called internal migration or international migration[123]. Internal migration is essentially about examining two questions: "Who is moving?" and "Which places are growing?" The answer to the first question may vary depending on climate change, economy, lifestyle, situation and location. The answer to the second question may vary depending on the needs of immigrants[124].

Overall, internal migration does not change the country's population, it only affects the population between regions. Internal migration also plays an important role in national well-being due to its impact on the country's economic, social and demographic characteristics[125]. Internal migration has received less attention compared to international migration, although it has greater long-term consequences in most countries. The internal migration process from rural to urban areas increased the rate of urbanization and subsequently had a positive impact on the industrialization process[126].

Internal migrations can be examined in four general groups;

1- From rural to rural areas
2- From rural to urban areas
3- From urban to urban areas
4- From urban to rural areas

Until a decade ago, according to the economic development literature, internal migration, particularly migration from rural to urban areas, attracted attention for its

[122] Hein de Haas, p.238.
[123] Ivan Etzo, **Internal Migration: A Review of the Literatüre**, 2008, p.18
[124] Michael J. White and David P. Lindstrom, **Internal Migration**, In Handbook of Population, 2005, p.311.
[125] Anne Green, **Understanding the Drivers of Internal Migration**, Internal Migration in the Developed World, 2017, p.1.
[126] Adrian Otoiu, Emilia Titan, Remus Dumitrescu, **Internal and International Migration: Is A Dichotomous Approach Justified?**, Procedia-Social and Behavioral Sciences, 2014, p.1011.

positive aspects. But according to economists, migration is no longer a solution to the increasing demand for labor. On the contrary, it is seen as a catalyst that triggers the labor imbalance between rural and urban areas and exacerbates the problems[127].

The economies of less developed countries, such as South Asia and sub-Saharan Africa, are generally dependent on agriculture. The relatively slow development of the agricultural sector compared to other sectors and the growing population have a long-term impact on the migration process. The increase in income accelerates the transition from agriculture to other sectors, shifting the workforce from rural to urban areas[128].

There is an increasing migration of workers from agricultural regions to industrialized regions in China. This mobility takes place from the underdeveloped regions of the country towards the East. While the number of immigrants in the country was 26 million in 1988, it rose to 126 million in 2004. In addition, nearly 200 million agricultural workers are considered potential immigrants. It is estimated that approximately 12 to 13 million immigrants will enter the city each year for the next 20 years [129].

In Ethiopia, which has been comparatively less urbanized than other African countries over the past 30 years, the urban population increased between 1984 and 1994 as a result of internal migration from rural to urban areas. One of the reasons for the future decline in rural-to-urban or urban-to-urban migration rates is the decline in employment and housing opportunities[130].

3.3.2 International Migration

International migration is not a new concept. Since the beginning of history, many people have acted for different reasons. For example, to escape enemies, find

[127] Michael P. Todaro, **Internal Migration in Developing Countries: A Survey**, University of Chicago Press, 1980, p.361-362.
[128] Robert E. B. Lucas, **Internal Migration in Developing Economies: An Overview**, KNOMAD's working Paper, 2015, p.6.
[129] Priya Deshingkar, Internal Migration, **Poverty and Development in Asia: Including the Excluded**, 2006, p.89.
[130] Blessing Uchenna Mberu, **Internal Migration and Household Living Conditions in Ethiopia**, Demographic Research, 2006, p.513.

food, get rid of the plague, etc. People throughout history are spread across different continents - Europe, Africa and Asia [131].

The historical course and the concrete consequences of international migration remain at the center of the agenda. The negative/positive consequences of this issue and its direct impact on human life have led countries to take steps to regulate their cooperation and policies in the field of migration[132].

The modern history of international migration can be examined in four main processes. In the 300-year period between 1500 and 1800, mass migration flows from Europe were the determining factor of migration. Migrations were triggered by economic growth and colonization processes. Thanks to migration during this period, Europe gained access to many parts of the world. During this time, over 10 million more African slaves moved to America. Due to the diseases caused by African slaves, changes occurred in the ethnic structure of the New World. In the 19th century, the so-called industrialization period, 48 million immigrants emigrated from the European continent. This number corresponded to 12% of the European population at the time. The UK is one of the countries with the highest number of immigrants at 41%. The countries after the UK are Norway (36%), Portugal (30%), Italy (29%), Spain (23%) and Sweden (22%), Denmark (14%), Switzerland (13%), Finland (13). %), Austria-Hungary (10%) and Germany (8%), Belgium (3%), Russia-Poland (2%) and France (1%). Between 1800 and 1929, the flow of money and products between America, Europe and Asia formed the basis of economic globalization. As a result of this growing and expanding global economy and industrialization, human mobility has accelerated. The global economic crisis in 1929 had a negative impact on mobility in the world. The so-called post-industrial migration took place after the 1960s. It differs from previous waves in that it changed the direction of migration. The direction of migration in the industrial era was from crowded and rapidly industrializing regions to less populated and rapidly industrializing regions. Post-industrial migration occurred from crowded regions in the early stages of industrialization to post-industrial societies[133]. In the period after the Second World War and up to 1973/74, liberal

[131] Ferrie, Joseph; Hatton, Timothy J., **Two Centuries of International Migration**, Discussion Paper, 2013, p.2

[132] Adrian Otoiu, Emilia Titan, Remus Dumitrescu, p.1012.

[133] Douglas S. Massey, **Patterns and Processes of International Migration in the 21st Century**, In Conference on African Migration in Comparative Perspective, 2003, p.2,3.

migration came to the fore due to the increased demand for foreign workers in Western European countries. Another fundamental factor that shaped this period was the Cold War, which led to a mass influx of refugees from East Germany and Eastern Europe. Goran Rystad summarized international migration in four periods as follows:

1- Open Gate: Free Migration (1860-1914)

2- Shut Gate: Immigration and foreign control (1914-1945)

3- Open Gate: Relatively free immigration and foreign labor force (1945-1974)

4- Shut Gate: Strict immigration control (1974-1980)[134].

In 2020, 281 million people, representing 3.6% of the world's population, are considered international immigrants. Approximately 24 million international migrants live in sub-Saharan Africa, approximately 32 million in East and Southeast Asia, and approximately 46 million in Central and South Asia[135]. Comparing the number of international immigrants in 2020 with the years 1970 and 1990 shows that it is three times higher than estimated in 1970 and 128 million more than in 1990. Europe with its international immigrant population is 87 million and Asia, with an international migrant population of 86 million, represents 61% of the global migrant population. Approximately half of the world's international immigrants in 2020 were born in Asia. This rate corresponds to 115 million. 20 million of these immigrants come from India, Pakistan, Bangladesh, the Philippines and Afghanistan. Mexico and the Russian Federation are the other largest countries of origin[136]. North America is third at 21%, while Africa has 9%, Latin America and the Caribbean 5% and Oceania 3% migrant population in 2020. When comparing the migrant population in the regions with the size of the region; Oceania comes first. The other continents after Oceania are North America and Europe. The ratio of the number of international migrants to the total population in these regions is 22%, 16% and 12%, respectively. In the remaining regions (Asia, Africa, Latin America and the Caribbean), the rate of international migrants is 1.8%, 1.9% and 2.3%, respectively. The biggest change between 2000 and

[134] Goran Rystad, **Immigration History and the Future of International Migration**, International Migration Review, 1992, p.1172.
[135] UN DESA, https://www.un.org/development/desa/pd/content/international-migrant-stock, 2020. (05.03.2024)
[136] International Organization for Migration (IOM), https://worldmigrationreport.iom.int/wmr-2022-interactive/, 2022, (05.03.2024).

2020 was in Asia at 74%. Europe was the second continent to record an increase in these 20 years. The third continent after Europe is Africa. The international migrant population on both continents increased by 18 million and 10 million, respectively. As can be seen from the above data, migration around the world is not uniform, in a specific direction and according to a specific standard. This situation leads to different migration corridors in the long term. Migration corridors are created by the accumulation of migration movements over the long term. It shows how migration patterns affect foreign-born populations in destination countries[137].

3.3.3 Forced/Voluntay Migration and Internally Displaced Person(IDPs)

There are many reasons for the emergence of the concept of migration, so identified with humanity. Sometimes people migrate voluntarily, sometimes for specific reasons. On the one hand, those who voluntarily migrate around the world for reasons such as work and education on the other hand, there are people who are forced to migrate due to climate change, war and poor living conditions. However, it is not correct to lump all migrations in the world into these two types of migration [138]. Although the distinction between forced and voluntary migration can be drawn sharply in some cases, it is not possible to describe the migration decisions of most migrants as entirely voluntary or entirely forced[139].

According to International Association for the Study of Forced Migration (IASFM) meaning of forced migration is: *"movements of refugees and internally displaced people (those displaced by conflicts) as well as people displaced by natural or environmental disasters, chemical or nuclear disasters, famine, or development projects."*[140].

The number of people forcibly displaced worldwide rose by 2.3 million people in 2018 to a total of 70.8 million. These people were forcibly displaced due to factors

[137] IOM Migration Report, Interactive World Migration Report 2022 (iom.int), (05.03.2024).
[138] Oliwer Bakewell, **Unsettling the Boundaries Between Forced and Voluntary Migration**, Handbook on the governance and politics of migration, 2021, p.2.
[139] Marta Bivand Erdal & Ceri Oeppen, **Forced to Leave? The Discursive and Analytical Significance of Describing Migration as Forced and Voluntary**, In Aspiration, Desire and the Drivers of Migration, 2020, p.981.
[140] International Association for the Study of Forced Migration, https://www.efms.uni-bamberg.de/iasfm/mission.htm (05.03.2024).

such as oppression, war and violence[141]. This number has gradually increased over the past 5 years, reaching 110 million in 2023. There was an increase of 1.6 million compared to 2022, which covers a population of 108.5 million. Data shows that more than one in 73 people in the world are forcibly displaced. Almost all of these displacements (9 out of 10) occurred in low- and middle-income countries. The displacement in the first half of 2023 led to a large number of new displacement situations. Somalia, Sudan, Afghanistan, Myanmar and Ukraine are the countries of origin of this mobility. As a result of the war in Sudan, 3.8 million people had to flee in 2023. Similarly, 1.3 million people have been displaced due to conflict in the Democratic Republic of Congo[142].

In addition to situations such as war and conflict, disasters caused by climate change such as volcanic eruptions, droughts and floods can also have an impact on migration flows. Population mobility caused by forced migration differs from voluntary migration in terms of its long- or short-term impact on the destination country. While forced migration occurs outside the control of migrants, in voluntary migration, the future of migrants lies in their own initiative [143]. In contrast to forced migration, voluntary migration can be thought of as individual migration rather than mass migration. Better education and a higher standard of living influence an individual's decision to migrate. Large differences in welfare levels between countries are strong motivations for migration[144].

An example of voluntary migration are guest workers between Germany and Turkiye. Germany and Turkiye had their own labor programs to solve the labor problem that arose after World War II. In the 1960s, guest workers played an important role in the reconstruction of West Germany. Many of the Turks who came to Germany as workers later gradually allowed their families to immigrate to Germany [145]. However, it should be emphasized again that in the literature the line between voluntary and forced migration is not clearly drawn in all circumstances. Not all people

[141] UNHCR, **2018 In Review Trends at a Glance**, https://www.unhcr.org/media/unhcr-global-trends-2018 , (05.03.2024).
[142] UNHCR, Mid-Year Trends Reports, 2023, https://www.unhcr.org/mid-year-trends-report-2023
[143] Sascha O. Becker, Andreas Ferrara, **Consequences of Forced Migration: A Survey of Recent Findings**, Labour Economics, 2019, p.2.
[144] Christina Wieser; Berhe Mekonnen; Lina Cardona-Sosa; Aisha Abubakar, **Voluntary Migration in Ethiopia: In Search for Work and Better Opportunities**, World Bank Group, 2022, p.29.
[145] Studymaker, **Voluntary Migration**, https://www.studysmarter.co.uk/explanations/human-geography/population-geography/voluntary-migration/ , (06.03.2024)

who move for reasons such as conflict, violence and climate change move across national borders. Millions of people are displaced in their countries of residence. According to Guiding Principles on Internal Displacement, IDPs are *"Persons or groups of persons who have been forced or obliged to flee or to leave their homes or places of habitual residence, in particular as a result of or in order to avoid the effects of armed conflict, situations of generalized violence, violations of human rights or natural or human-made disasters, and who have not crossed an internationally recognized State border"*[146].

8.7 million people had to leave their homes in 2022 due to natural disasters such as floods and droughts. These natural events mean that millions of people have to leave their homes. As stated in the 1951 Convention[147], one of the conditions for the definition of refugee is to cross the country border. Therefore, even if the reasons, conditions or outcomes are the same, IDPs are not included in refugee status because they have not crossed the border. On the contrary, there is no separate status in international law that defines internally displaced persons[148].

By the end of 2022, a total of 71.1 million people were internally displaced. During the year, the number of internally displaced persons increased by 60% compared to 2021 and reached the highest level until 2022. The war in Ukraine has resulted in the number of conflict-related internal displacements rising to 28.3 million so far. The La Niña[149] weather event lasted for three years and caused flooding in countries such as Pakistan, Nigeria and Brazil, causing displacement within the country. Likewise, drought in Somalia, Kenya and Ethiopia triggered the migration of 2.1 million people[150]. The effects of climate change and its consequences have become visible and make it possible to understand the connection between climate change and

[146] United Nations Human Rights Office Of The High Commissioner, **The Guiding Principles on Internal Displacement**, 1998 https://documents.un.org/doc/undoc/gen/g98/104/93/pdf/g9810493.pdf?token=BlbRfCtMUjW4ta2v0J&fe=true (07.05.2024).
[147] For the full definition of climate refugee according to 1951 Convention please see next page.
[148] IDMC, https://www.internal-displacement.org/focus-areas/Displacement-disasters-and-climate-change/ (07.05.2024).
[149] La Niña: The term La-Nina (the girl) is a name given by scientists investigating warm and cold oscillations in the tropical Pacific in the 1980s. Anti-El-Nino, ENSO cold event and El-Viejo (old man) are among the other names given. La- Niña affects the frequency and geographic distribution of tropical storms through changes sea surface temperature. Michael J McPhaden, **El Niño and La Niña: Causes and Global Consequences**, Encyclopedia of Global Environmental Change, 2002, p.13.
[150] IDMC 2023 GRID Global Report on Internal Displacement, p.3.

internal displacement. Rising temperatures and the associated rise in sea levels forced some people to leave their homes[151].

3.3.4 Temporary Migration: Temporary migration is a form of migration in which people emigrate for a specific period of the year to earn money. People migrate to where they can find work in order to earn money in another area.

3.3.5 Seasonal Migration: When people move to a place to earn money and stay there during that season, it is called seasonal migration. Migrations to Haryana and Uttar during the harvest season are examples of seasonal migrations.

3.3.6 Recurrent Migration: As the name suggests, migrations that occur repeatedly in the same period or in a particular season of every year are called recurrent migration. For example, if a particular job operates only during a certain period of the year, that region receives immigration at the same time each year

3.3.7 Permanent Migration: Permanent migration is when people leave the country or country in which they were born because of better living conditions and live permanently in another country. They are not seeking a return[152].

3.4 Climate Refugees

Although there is strong evidence of the impact of climate change on forced migration and the connection between these two phenomena, there is a call in the academic community to use the definitions of the 1951 Refugee Convention[153].

1951 Refugee Convention defines refugee as someone who *"owing to well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group or political opinion, is outside the country of [their] nationality and is unable or, owing to such fear, is unwilling to avail [themself] of the protection of that country; or who, not having a nationality and being outside the*

[151] IDMC, **25 Years of Progress on Internal Displacement 1998-2023**, Internal Displacement Index 2023 2023, https://api.internal-displacement.org/sites/default/files/publications/documents/IDMC_2023_25_years_of_progress_on_internal_displacement_report.pdf (07.05.2024).
[152] Richa Vats and Rahul Bhardwaj, **Genesis of Migration and Its Theories**, 2022, p.248.
[153] Issa Ibrahim Berchin, Isabela Blasi Valduga, Jéssica Garcia, José Baltazar Salgueirinho Osório de Andrade Guerra, **Climate Change and Forced Migrations: An Effort Towards Recognizing Climate Refugees**, Geoforum, 2017, p.147.

country of [their] former habitual residence, is unable or, owing to such fear, is unwilling to return to it."[154].

The term climate refugee refers to people who have to leave their homeland because of the climate. Climate refugees have no binding effect under international law. As is clear from the definition of the term "refugee" in the 1951 Refugee Convention, the Convention only provides protection for people displaced for security reasons for reasons such as war and conflict. Although climate change is not directly mentioned as one of these reasons, it may be included in the scope if climate change has an impact on the person's safety. For example, drought caused by climate change and the sharp decline in water resources have led to conflict between herders and fishermen. As a result of this conflict, thousands of people were displaced from their land[155].

Environmental refugees can be examined in three categories. The first category includes people who migrated because their living conditions were affected by environmental hazards. Secondly, it includes migration movements that can be traced back to a threat to living conditions caused by a project. Finally, it also covers people who migrate in search of better living conditions instead of damaged living conditions due to factors such as climate change. As can be seen from these categories, the concept takes into account the reason, duration and causes of migration. The concept covers a broad network of relationships, ranging from causes such as deforestation, sea level rise and land degradation to natural resource conflicts and climate change [156].

Environmental refugees and climate refugees refer to the population forced to migrate due to environmental changes caused by climate change [157]. The term climate refugee, which refers to a more specific problem compared to environmental refugees, has been used since the 1990s. People who have to leave their home, region or country due to the negative consequences of climate change are known as climate refugees[158].

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[154]UNHCR, **1951 Refugee Convention**, https://www.unhcr.org/about-unhcr/who-we-are/1951-refugee-convention, (06.03.2024).

[155] UNHCR, **Climate Change and Displacement: The Myths and the Facts https://www.unhcr.org/news/stories/climate-change-and-displacement-myths-and-facts ,** (07.03.2024).

[156] Büşra Yörük, **İklim Göçü ve İklim Mülteciliği Kavramlarına İnsan Hakları Temelli Sosyolojik Bir Bakış**, Van Yüzüncü Yıl University The Journal of Social Sciences Institute, 2023, No. 60, p.227.

[157] Carol Farbotko, Heather Lazrus, **The First Climate Refugees? Contesting Global Narratives of Climate Change in Tuvalu**, Global Environmental Change, 2012, p.384.

[158] Issa Ibrahim Berchin, Isabela Blasi Valduga et al., p.147.

It summarizes all the negative consequences of climate change under one heading. Climate refugee emphasizes a single factor as the reason for migration and ignores all other factors – war, conflict, economic reasons[159].

Although the term climate refugees has not found a legal definition, this issue remains on the agenda due to changing climate conditions. As the effects of global climate change become more common, the term "climate change refugee" is increasingly being used as a new concept. The 1951 Geneva Convention does not include climate refugees, but there is no barrier for countries to include climate refugees by interpreting the term refugee broadly. However, the countries' stance on this issue is quite restrictive. By keeping the scope of the refugee concept narrow, they want to enable their country to accept as few immigrants as possible.

It is estimated that millions of people will have to relocate due to climate change and its associated negative impacts [160]. International cooperation is needed to prevent climate change and climate refugees, which have the potential to trigger mass movements and indirect conflict, from becoming a serious security problem.

3.5 Migration Theories

Efforts to theorize the concept of migration have been an important research agenda for social scientists since the last century. In addition to the personal factors that trigger the decision to migrate, theories have also emerged that focus on macro determinants [161]. The existence of numerous micro and macro factors that can trigger migration has led to the formation of many theories that study and categorize these factors. These theories analyze migration according to its causes, consequences and target groups. Faist Faist and Hammar et al. divide migration theories into three main headings. Micro level, macro level and meso level. Micro-level theories examine migration in terms of personal expectations, needs and interests. For macro-level

[159] Gregory White, **"Climate Refugees"—A Useful Concept?,** Global Environmental Politics, 2019, p.133.
[160] Frank Biermann and Ingrid Boas, **Preparing for a Warmer World: Towards a Global Governance System to Protect Climate Refugees**, Global Environmental Politics, 2010, p.83.
[161] Xiana Bueno, and Prieto-Rosas Victoria, **Migration Theories**, Encyclopedia of Gerontology and Population Aging, Cham: Springer International Publishing, 2022, p.7

theories, the economic situation of the country is important. For middle-level theories, migration is framed on the basis of family and social ties[162].

3.5.1 Ravenstein's The Laws of Migration

Ravenstein's aim, who based his study on the British censuses of 1871 and 1881, was to identify objective laws governing the phenomenon of migration. To this end, he based the phenomenon of migration on seven basic laws. Ravenstein's work is far from analysis and detail, as it aims to draw a general framework for the phenomenon of migration [163]. For example, according to Ravenstein, migration was the move between the place where a person was born and the place where the census was taken. However, the concept of migration diversified and became the subject of deeper analysis in later studies[164]. One of the most important features of this study is that it paved the way for subsequent studies. Ravenstein determined migration laws at a time when industrialization was gaining momentum. At the end of the 19th century, industrialization and the associated development of job opportunities and transportation routes led people to migrate to northern America and the interior regions of Europe.

The seven migration laws identified by Ravenstein are as follows:

1- Migration and distance: Most migrants prefer to migrate over short distances [165]. Because of this short-distance migration, waves of migration in destination countries tend to concentrate in industrial areas [166].

2- Gradual Migration: According to Ravenstein, migration between cities progresses slowly and gradually. This gradual progression is similar to the movement that occurs in a water cistern after the faucet is opened[167]. The developing industry and the improvement of economic conditions are the triggers for increasing migration to the cities. The migration is gradual and fills gaps. The gap created by the emigrants will be closed in the next step. In this

[162] A.A.I.N. Wickramasingh and Wijitapure Wimalaratana, **International Migration and Migration Theories**, Social Affairs, 2016, p.18
[163] Savaş Çağlayan, **Göç Kuramları, Göç ve Göçmen İlişkisi**, Muğla University Social Sciences Institute Journal, 2006, p.68.
[164] Philip Rees, Nik Lomax, **Ravenstein Revisited: The Analysis of Migration, Then and Now**, Comparative Population Studies, 2020, p.354.
[165] E. G. Ravenstein, **The Laws of Migration**, Journal of the Royal Statistical Society, 1889, p.286.
[166] Savaş Çağlayan, p.69.
[167] E. G. Ravenstein, p.286.

way each group will gradually approach the city and so the migration will spread from far to near across the entire country[168].

3- Diffusion and absorption process: According to Ravenstein, current and countercurrent feed each other and serve the same purpose. According to Ravenstein, migration has a purpose. People don't migrate just because they want to migrate. They want to benefit from the economic cycle through migration. These trigger factors ultimately contribute positively to the spread of migration. Migration meets the workforce needs of the rapidly growing industry.
4- Migration chains: Ravenstein noted that the phenomenon of migration occurs in interconnected waves. Accordingly, regions that receive migration also emit migration over time. According to Ravenstein, the migration process is sequential and occurs based on a cause-and-effect relationship.
5- Direct migration: The types of migration mentioned by Ravenstein in his first four laws are gradual and interconnected models. However, Ravenstein directly mentions migration in his fifth law. According to this model, migration does not occur over short distances and gradually, but on the contrary is aimed directly at industrial centers. Both types of migration target cities where the economy is developing.
6- Difference between Rural/Urban settlers: According to Ravenstein, rural areas are more vulnerable to migration when comparing those living in rural areas with those in urban areas. While urban migration currently has no impact on urban residents, rural-rural migration does have an impact on migration.
7- Difference between men and women: Ravenstein emphasized in his last law that women are more likely to migrate than men. Women are at the forefront of internal migration and short-distance migration[169].

As can be seen from Ravenstein's seven fundamental laws of migration, these laws were created based on the conditions and circumstances of the time. Ravenstein's work formed the basis for later studies, but could not go further. The Ravenstein Laws

[168] Savaş Çağlayan, p.69.
[169] Savaş Çağlayan, p.70.

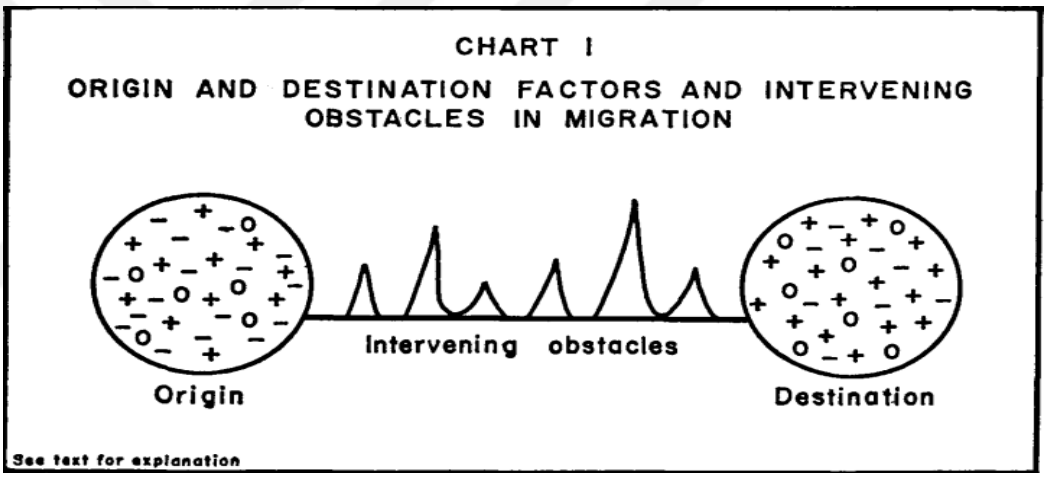
had a counterpart in England at the time, but even in our evolving and changing world the triggers, causes and consequences of migration have changed significantly.

3.5.2 Push and Pull Theories

Push-pull factors create a common synthesis of the conditions that countries have. Push-pull factors show how living conditions can affect human life[170]**.** Everett Lee, who formed the basis of the theory, basically divided migration into four categories. With this distinction, he identified the push and pull factors for migration.

1- *Characteristic factors of the country of origin*
2- *Characteristic factors of the country of destination*
3- *Existential barriers*
4- *Individualfactors*[171].

Figure 2:Lee's Push & Pull Factors Chart



Source: Everett S. Lee, p.50

According to Lee, in every region there are positive or negative factors that attract or motivate people. He represented these situations in the diagram as "+" and "-" (pull and push factors, respectively). In addition to these two categories, there are also factors that are neutral for humans and are marked "O". Although some factors generally have the same meaning for each person, some may vary from person to person. Climate, for example, means the same thing to almost everyone. Good weather conditions are a pull factor, bad weather is a push factor. However, the presence or

[170] Stanojoska Angelina and Petrevski Blagojce, **Theory of Push and Pull Factors: A New Way of Explaining the Old**, Conference Paper, 2012, p.1
[171] Everett Lee, p. 50.

absence of a good school in the area is a factor that only affects families who have children and seek a good education[172].

According to Lee, the decision to migrate is the result of a comparison between the conditions of his own country and those of the country he wants to go to. In this sense, migration is not an objective phenomenon, but rather a phenomenon that arises through the assessment of factors[173]. For each person migrating, the push and pull factors are different in their own country and in the countries they are migrating to. It is not possible to generalize push and pull factors [174].

According to Lee, in some cases there may be restrictive conditions between the country of migration and the country of origin. For example, the Berlin Wall or immigration laws can be limiting factors. Finally, Lee spoke about personal factors that influence migration positively or negatively. Some of these factors do not change, while others change depending on the stages in the life cycle[175].

Push-pull theories can be used as a version of neoclassical migration theories. Push-pull theories also interpret migration at the macro level as an income comparison between countries. Functionalist theories such as neoclassical theories and push-pull theories show that people view rational behavior as a reason for migration[176]. Better health conditions, educational opportunities, good economic conditions, high levels of welfare and a high standard of living are attractive factors for some immigrants. In addition to these positive characteristics, inadequate sanitary conditions, restrictions on religious and political freedom, persecution, conflict and violence are push factors and can lead to migration from this region[177].

In our changing and developing world, it has become more difficult to explain the concept of migration, limit push-pull factors and assess them separately for each group and state.

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[172] Everett Lee, p.50
[173] Flavia Andreea Murtaza, **Causes and Effects of International Migration**, Annals of the University of Craiova, Economic Sciences Series, 2020, p.147.
[174] Everett Lee, p.50
[175] Everett Lee, p.51
[176] Hein de Haas, **Migration Theory Quo Vadis?,** 2014, p.7.
[177] Mariusz Urba ´nski, **Comparing Push and Pull Factors Affecting Migration**, Economies, 2022, p.1-2.

3.5.3 Intervening Opportunaties Theory

Another theory about migration was put forward by Stouffer in 1940. Stouffer, who chose the city of Cleveland, Ohio, as his study area, used population statistics in that region and developed his theory based on people moving out of their homes. In Ravenstein's work and in almost all subsequent migration studies, the connection between migration and distance was one of the highlighted points. In his study, Stouffer sought answers to why people move for reasons such as work, marriage and trade. According to Stouffer's theory, the connection between migration and distance is not necessary. With the theory of intervening opportunities, it is emphasized that *"the number of persons going a given distance is directly proportional to the number of opportunities at that distance and inversely proportional to the number of intervening opportunities"*[178]. Thus, the theory emphasizes that the demand to go somewhere is parallel to the abundance of opportunities there[179].

Stouffer's thesis that migration between two regions is not directly proportional to the opportunities in between also parallels Ravenstein's emphasis that migration occurs gradually [180].

3.5.4 Neoclassical Economic Theory

3.5.4.1 Macro Level

Neoclassical theory is one of the main theories for analyzing labor migration. This theory explains migration as a result of geographical differences between labor supply and demand [181]. Macro-level neoclassical economic theory states that in countries where labor capacity is greater relative to capital, market wages are low. Conversely, market wage levels are high in countries with abundant capital and limited labor. This wage difference triggers the migration of workers from low-wage countries to high-wage countries.

The hypotheses of this theory are as follows:

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[178] Samuel A. Stouffer, **Intervening Opportunities: A Theory Relating Mobility and Distance**, American Sociological Review, 1940, p.845-846.
[179] Henk Elffers, Danielle Reynald, Margit Averdijk, Wim Bernasco and Richard Block, **Modelling Crime Flow Between Neighbourhoods in Terms of Distance and of Intervening Opportunities**, Crime Prevention and Community Safety, 2008, p.87.
[180] R.B.Bhagat, **Migration Theories: A Critical Evaluation and Synthesis**, 2020, p.4
[181] Alexandra Porumbescu, **Critical Perspective on the Neoclassical Economics and Labor Migration Theory**, Revista Universitară de Sociologie, 2018, p.11.

1- The wage gap between countries causes international labor migration.
2- Solving this problem of wage disparity will also solve the problem of labor mobility, and migration will not occur if there is no disparity.
3- The difference in the earning ratio of human capital is one of the reasons for the brain drain of highly qualified workers.
4- Compared to other markets, labor markets are the markets with the greatest influence on international migration.
5- To track migration, also have to track labor markets between countries[182].

3.5.4.2 Micro Level

In the microeconomic model, rational individuals migrate based on the positive outcomes they receive according to their cost-benefit analysis of migration. People want to migrate to places where they will be rewarded for their work and where they can be more useful. However, they also take into account some negative aspects that may arise in this process. The difficulties they may encounter in this process include material, spiritual and social difficulties, adaptation efforts and the effort to learn a new culture and language [183].

Neoclassical economics micro level assumptions are as follows:

1- Differences in employment rates and income, which determine predicted returns, represent international mobility.
2- Other factors being equal, factors such as education and language levels are more developed in the destination country than in the origin country, which will trigger migration.
3- While personal characteristics and social factors reduce the costs of migration, they increase the benefits of migration, thus triggering international migration.
4- The second and third points may cause people to have different migration tendencies even if they are in the same country.
5- Mass migrations between countries are the result of benefit-cost calculations by rational individuals.

[182] D. S. Massey, J. Arango,G. Hugo, Kouaouci, A., Pellegrino, A., & Taylor, J. E, **Theories of International Migration: A Review and Appraisal**, Population and Development Review, 1993, p.433-434.
[183] Alexandra Porumbescu, p.12.

6- Employment and earnings differences between countries are the main reasons for international mobility. Without these factors, international mobility cannot take place. This will continue until estimated yields are internationally aligned.
7- The magnitude of the difference in expected returns influences the flow of migration between countries.
8- The direct and primary factor in the decision to migrate is inequalities in labor markets.
9- When conditions in receiving countries are favorable for potential immigrants, migration costs can be negative. In this case, a negative earnings differential may be required to prevent churn.
10- Migration in receiving and sending countries is carried out with policies that affect expected income. For example, governments ensure migration control by increasing the likelihood that immigrants will become unemployed in the destination country and by increasing the material and moral burden of migration in the country of origin[184].

3.5.5 World System Theory

World systems theory attempts to explain the components of the capitalist world economy through the entire social system. With the assumptions made therein, it is also used in the areas of historical sociology and economic history[185]. According to Wallerstein's theory, historical systems, including individuals, classes and countries, should be the unit of research analysis. The historical system was built on the basis of the idea of division of labor. The division of labor that underlies a society ensures the roles and coordination between individuals. According to Wallerstein, there are three different historical systems in the world. Mini systems and world systems in two different versions. Minisystems that are not culturally heterogeneous belong to the pre-agricultural period. Wallerstein distinguishes two types of world systems based on their centers or boundaries. For example, the Roman world system was a world empire in the sense that it had a single political border. On the other hand, the global economy has more than one political center. Since the 15th century, markets, production networks and economies around the world have come together in the capitalist world

[184] D. S. Massey et al., p.435.
[185] Cosma Sorinel, **Immanuel Wallerstein's World System Theory**, Annals of Faculty of Economics, 2010, p.220.

economy. In Western Europe, the development of economic opportunities transformed feudal fiefdoms into centralized monarchies and then into modern nation-states. The class attitudes of nation states have effectively shaped the modern world system. The colonization of America and the integration of Eastern Europe into the Atlantic economy played an important role. This capitalist world system continued to grow with the addition of new regions. As a result, by the end of the 19th century, the world capitalist system was the only historical system that dominated the world[186].

According to Wallerstein, core countries are capitalist countries that are developed in manufacturing and agriculture, have relatively good economies, and have high wages. However, these core countries need peripheral countries that are dependent on them. In this sense, it is possible to view Wallerstein's world systems theory as an adaptation of dependency theory[187].

Core and peripheral countries are in a relational dialogue with each other. Core countries defined through peripheral countries; peripheral countries are also defined through center countries. As a result of trade between core production and peripheral production, if the core is strong, the periphery is weak. This imbalance in equality forms the basis of core-periphery theory [188]. Initially, the gap between core and peripheral countries was not large, but northwestern Europe's trade policies widened the gap [189]. In addition to the categories of core countries and periphery countries, the theory introduced a third category: semi-peripheral countries[190].

The six assumptions of world systems theory, which is based on the idea that international migration follows growing global markets, are explained by Massey as follows.

1- International migration occurs as a result of the capitalist market. The integration of the capitalist market into developing countries and regions triggers international movements.

[186] William I Robinson, **Globalization and the Sociology of Immanuel Wallerstein: A Critical Appraisal, International Sociology**, 2011, p.5,6.
[187] Cosma Sorinel, p.221.
[188] Ivan Eckhardt, **Immanuel Wallerstein: World-Systems Analysis: An Introduction**, 2004, p. 96.
[189] Daniel Chirot and Thomas D. Hall, **World-System Theory**, Annual Reviews, 1982, p.85.
[190] Kees Terlouw, **The Semiperipheral Space in the World-System**, Review (Fernand Braudel Center), 2002, p.4.

2- The international flow of labor and the international flow of capital and products are in opposite directions.
3- International migration occurs between former colonial powers and their colonies, which are linked through language, transportation and administration.
4- Since the globalization of the market economy is an important trigger factor for migration, the way to control migration is to regulate the investment mobility of companies and control international capital flows.
5- When interventions aimed at supporting foreign countries that favor global market mobility fail to achieve their goals, refugee movements occur which targeting specific countries.
6- Differences in wage rates and employment conditions between countries are not the cause of international migration. International migration occurs as a result of the economic structure[191].

3.5.6 Dual Labor Market Theory

According to Piore's dual labor market theory, the sector is divided into primary sector and secondary sector. These two sectors differ from each other in many ways and the theory is based on this assumption. The conditions for jobs in the primary sector are quite good. The working conditions in these professions are good and employment is stable[192]. In the secondary sector there are significantly lower wages and less favorable working conditions than in the primary sector. In addition to these characteristics, the relationship between workers and their managers in the secondary sector is not formal but personal, and working conditions do not follow a specific standard[193]. According to Piore, negative conditions in the countries of origin are not push factors for migration. On the contrary, good conditions in the receiving countries are a trigger for migration [194].

The triggering reasons for this migration towards economically developed industrial societies are:

[191] Massey et al., p.447-448.
[192] Tobias Müller, **Migration Policy in a Small Open Economy with a Dual Labor Market**, Review of International Economics, 2003, p.132.
[193] Michael Joseph Piore, **Notes for A Theory of Labor Market Stratification**, 1972, p.2.
[194] A.A.I.N. Wickramasingh and Wijitapure Wimalaratana, p.23.

1- *Structural Inflation*: Wages in society express people's status, reputation and the value of their work in society. Official institutions and institutional mechanisms in the country help to keep the wage and status relationship in balance. When increasing wages, a balance must be achieved for each hierarchy level and the ratio must be maintained. In this case, structural inflation comes to the fore. For this reason, it is cheaper to employ immigrant workers who accept lower wages than native workers who have to increase wages for the lower layer of the hierarchy. Motivation problems: Professional hierarchies as well as income, reputation and social status are also very important for the motivation of employees. For this reason, motivational problems sometimes arise at the lowest level of the hierarchy. The solution to this problem is to select workers who choose this type of work only to make money and do not associate it with status. In this sense, immigrants are compatible with this demand. For immigrants, the low wages of the country they immigrate to may be higher than in their home country. Immigrants see themselves not as low-paid, lower-class workers of the country they immigrate to, but as citizens who send cash to their own country and work abroad.
2- *Economic dualism*: While capital is a fixed factor of production, labor can vary over time and conditions. Primary sector workers are skilled workers and therefore important to the companies they work for. Additionally, the fact that primary sector workers are unionized makes them more valuable. Therefore, laying off primary sector employees is more expensive than laying off secondary sector employees. However, it is easier to find replacements for workers in the secondary sector. Because it costs little or almost nothing to lay off workers in the secondary sector. Given this situation and other conditions, the demand from primary sector workers for secondary sectors is almost non-existent. In this case, immigrants are preferred to reduce labor shortages in the secondary sector.
3- *The demography of labor supply*: For most of history, women only worked for extra income as they were not the primary responsible for the financial balance of the home. Since work was not their top priority, they did not care about the working conditions or the wage difference. Similar to women, young people viewed their jobs as additional income and thought they would have more skilled jobs after leaving school. For this reason, they did not care about the conditions

and status of their jobs. However, in developing industrial societies, these attitudes of women and young people have changed over time. Women's view of their work as status and primary resource, declines in birth rates, and developments in education have led to a decline in the labor force in both sources. This declining demand has increased employers' demand for immigrants[195].

Although neoclassical economic theory and dual labor market theory have no inherent contradictions with each other, dual labor market theory makes different assumptions than other micro-level theories.

1- International labor migration is generally demand-driven. In developed countries, it begins with the hiring process of employers or governments acting on their behalf.
2- The connection between international wages and labor migration is not direct, as the structural needs of the economy create a demand for migrant workers
3- The increase in the supply of migrant workers does not trigger a reaction among low-wage workers in host countries. The freedom of low-wage workers to comment on these changes is controlled.
4- Institutional controls can be effective in raising low wages, but they cannot prevent wage rates from falling. However, an increase in the supply of immigrant workers could further reduce low wages.
5- Changes caused by wage and employment policies do not affect international migration. Immigrants respond to labor demand in modern, post-industrial economies. The possibility of influencing this demand comes through changes in economic institutions.

3.5.7 Networks Theory

The decision to migrate is the first and most important step in this process. There are many theories that evaluate the migration decision from different perspectives. As explained in the previous pages, some of these theories examine the micro level, some the macro level, and some the meso level. According to social network theory, the family is the decision maker and not the people directly affected by push and pull factors. In other words, the decision maker has shifted from the

[195] Massey et al., p, 442-443.

individual to the family[196]. The theory attempts to understand the migration process and explain how migration occurs and how it continues over the years. The theory has caused controversy in scholarship due to its assumptions about the relationships and roles of immigrants' social networks[197]. According to Massey et al. '' *migrant networks are sets of interpersonal ties that connect migrants, former migrants, and nonmigrants in origin and destination areas through ties of kinship, friendship, and shared community origin*''[198].

In this way, immigrants engage in dialogue with each other through the migration network. These established social networks have many advantages. In addition to allowing immigrants to help each other, networks play an important role in disseminating information. These advantages of social networks reduce barriers to migration. This situation can ultimately lead to a migration chain. As this network of immigrants and social networks grows and expands, more and more immigrants benefit from these networks[199]. Migration networks are effective in adapting to short-term immediate situations or to long-term general functioning. Thanks to migration networks, overcoming short-term difficult conditions (e.g. adjustment of housing and employment conditions, emotional support) is supported by most studies in the literature[200].

Social and cultural factors, the type of migration, the preference of the destination country and the immigrants' experiences with their new life are the determining factors in the migration process. Family is also considered another important migration factor. Because the family dynamics and social networks provided by communication have a major influence on the motivation to migrate. Haug puts forward the following hypotheses, based on the assumption that kinship ties are an important factor in decision-making:

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[196] Douglas R. Nelson, '' Complexity and Geographical Economics Topics and Tools'', **Migration and Networks**, (Editors Pasquale Commendatore, Saime Kayam, Ingrid Kubin), 2015, p.144.
[197] Heila Sha, **Migrant Networks as Social Capital: The Social Infrastructure of Migration**, MIDEQ: Migration for Development and Inequality, 2021, p.3.
[198] Massey et al. p.448.
[199] Dr Sonja Haug, **Migration Networks and Migration Decision-Making**, Journal of Ethnic and Migration Studies, 2008, p.588.
[200] Douglas T. Gurak and Fee Caces, **Migration Networks and the Shaping of Migration Systems**, International Migration Systems: A Global Approach, 1992, p.153,154.

1- *Affinity Hypothesis*: The presence of relatives, friends, or people to whom people have a strong bond in the place where they currently live, are factors that can have a negative impact on your migration process. Social networks in settlements are coming to the fore with their function of preventing migration [201].

2- *Information Hypothesis:* The fact that the family lives in another region or country is a triggering factor for the decision to migrate. Knowledge of the conditions in the target country plays an encouraging role [202]. In other words, providing information about the destination country is important when making migration decisions. The distance between home and destination country has a direct impact on the exchange of information. The long distance between two countries has a negative impact on the supply of information. Social networks at the destination are a pull factor.

3- *Facilitating Hypothesis:* Immigrant relatives behave in such a way that they positively influence the migration decision and accelerate migration. They control migration by taking advantage of the conditions and opportunities in the region being migrated. In this sense, social networks in the target country are a pull factor.

4- *Conflict Hypothesis:* Conflicts within the family play a triggering role in the migration decision. In this sense, social networks at home can be push factors due to conflicts

5- *Encouraging Hypothesis:* One of the reasons why families encourage family members to migrate is work. For this reason, social networks at home can be seen as a push factor[203].

3.5.8 New Economics of Labor Migration (NELM)

According to the new economic theory of labor migration developed by Stark in 1991, the decision to migrate cannot only be made by individuals, but larger social units such as households must also play a role. New economic theories of labor migration also aim to explain the onset of migration, such as dual labor market theory, neoclassical economic theory and world systems theory. Labor

[201] Dr Sonja Haug, p.589.
[202] P. Neal Ritchey, **Explanations of Migration**, Annual Review of Sociology, 1976, p.389.
[203] Dr Sonja Haug, p.589.

migration of a family member is one way to reduce the risk of insufficient household income[204].

Although based on the neoclassical tradition, it can be seen as a reaction to it or a variant of it with modifications and additions. According to Stark, the goal of migration is to eliminate risks such as unemployment and loss of income and not to maximize income. Another assumption of the new economics of labor migration theory, which differs from neoclassical economic theory, is that wage differences initially do not make much of a difference. According to Stark, wage differences were not the trigger for the migration decision. The concepts predominant in the theory are family, household and remittances[205].

Massey et al. explained the assumptions of the theory as follows:

1- Autonomous individuals are not suitable units of analysis for migration research. Instead, households, families, or other cultural units of production/consumption stand out as appropriate units of analysis..
2- Wage differences are not the main reason for international migration. Even without a wage difference, households have a strong incentive to diversify risks through migration movements
3- Migration and local employment/production are not independent processes. Households are motivated to emigrate and take part in local events. In this process, migration can play a positive role in increasing the returns of local economic activities, solving the problem of capital shortage and promoting such activities. Therefore, economic development in the country of origin does not necessarily reduce international migration pressure.
4- Even if the problem of wage differences within national borders is solved, this will not necessarily have an impact on international mobility. In other words, migration can continue even if other markets in the sending country are unequal.

[204] Alexandra Porumbescu, **Defining the New Economics of Labor Migration Theory Boundaries: A Sociological-Level Analysis of International Migration**, Revista de Științe Politice Revue des Sciences Politiques,2015, p.58.
[205] Joaquı´n Arango, **Explaining Migration: A Critical View**, International Social Science Journal, 2018, p.109.

5- The same expected increase in income for households with different income levels or different income distribution within households has different effects on households' migration probabilities.
6- Governments can control migration rates not only through labor market policies, but also through insurance markets and capital markets. Unemployment insurance can be an important factor in international departure.
7- The impact of government policies and economic change on household incomes affects households' relative poverty and their incentives to migrate.
8- Government policies and economic changes that affect income distribution will affect international migration, independent of their impact on average income. Although government measures lead to higher average incomes in the countries of origin, migration can increase if relatively poor households do not share in the income gains. Otherwise, these measures could reduce migration if relatively wealthy households do not benefit from increases in income[206].

3.5.9 Migration Systems Theory

With the theory of migration systems that they proposed after Mabogunje in 1992, Kritz and Zlotnik want to combine the main assumptions of other migration theories instead of focusing on a specific theory. The theory of migration systems is based on the assumption that the exchange of people and capital between countries takes place in a specific economic, social and political context[207]. In other words, migration system theory, in contrast to neoclassical theory, evaluates the migrant from many aspects (social, political, historical) and aims to evaluate the phenomenon of migration in all its dimensions[208]. One of the assumptions of the theory, which emerged in 1970 under the leadership of Mabogunje, is the recognition of the importance of feedback from previous migrations, which plays an important role in later movement patterns. Providing the sending country with information about the immigrants' progress will have a positive impact on immigration if it is positive[209].

[206] Massey et al. p.439-440.
[207] Roel Jennissen, **Causality Chains in the International Migration Systems Approach**, Population Research and Policy Review, 2007, p.411.
[208] Tisha M. Rajendra, **The Rational Agent or the Relational Agent: Moving from Freedom to Justice in Migration Systems Ethics**, Ethical Theory and Moral Practice, 2015, p.363.
[209] Oliver Bakewell**, Relaunching Migration Systems**, Migration Studies, 2014, p.303.

This allows the formation of stable geographical structures and migration clusters, rather than being a "random state"[210].

Massey et al. summarized the assumptions of the theory as follows:

1- The decisive factor for migration flows is not the spatial distances, but rather the political relationships between countries. In this case, the geographical proximity of countries within the system may facilitate relations, but distance is not an obstacle.
2- Multiple dispersed core countries receiving immigration from multiple countries of origin can create multipolar systems.
3- Compared to receiving countries, nations in sending countries may be involved in more than one immigration system
4- Changes in political and economic conditions as well as the development of systems prevent the formation of a stable structure. Because of these changes and fluctuations, countries can join or leave a system[211].

The fact that the phenomenon of migration cannot be defined in all its dimensions, that it is the subject of research not only in the field of social sciences but in many areas, and that these disciplines interpret migration from their own perspectives, has led to its emergence countless causes, consequences and theories about migration. As noted above, migration studies that began with Ravenstein in the 19th century continued to be shaped according to the conjuncture and theorists' areas of research. The units of analysis and perspectives of each of these various emerging theories differ significantly from one another. The fact that the theories are based on different foundations may be because they are the subject of research in many disciplines. Migration is as old as human history and will continue to exist. Developing countries and changing conditions have changed and will change the reasons for migration, the precipitating factors of migration, unit analysis and decision-making motivations throughout the history of migration. Theories have changed and will change in relation to these factors.

[210] Akin L. Mabogunie, **Systems Approach to a Theory of Rural-Urban Migration**, Geographical Analysis, 1970, p.13.
[211] Massey et al., 454.

3.6 International Organizations and Steps in Migration Management

In recent years there have been changes in the way international organizations deal with migration. The emergence of migration as an international global problem has also made it easier for international organizations to take the initiative on migration policy [212]. While state sovereignty remains the main decision-maker in migration policy, with the globalization of the world, in some cases international organizations have also become important actors in the design and implementation of the migration process. According to advocates of international organizations, participation in international organizations promotes cooperation and thus enables larger and clearer steps in the field of human rights[213].

3.6.1 United Nations

After the economic and psychological devastation of World War II, the idea of the United Nations first emerged in 1945 to prevent possible wars and secure and maintain world peace. After the failure of the League of Nations, its organs participated in it at the international level to ensure and maintain international peace and security, to ensure rights and equality, to cooperate internationally on economic/political/social problems and to solve international problems.

3.6.2 Geneva Convention (1951)

According to Article 14 of the Universal Declaration of Human Rights ''*Everyone has the right to seek and to enjoy in other countries asylum from persecution*'' [214]. This document is important because it is the first international document that recognizes the general right to asylum. The 1951 Convention Relating to the Status of Refugees was the first legal instrument created to protect the rights of certain groups in international law[215]. The document also outlines a framework for refugees to lead independent lives, including their basic rights such as housing,

[212] Martin Geiger and Antoine Pécoud, **International Organisations and the Politics of Migration**, Journal of Ethnic and Migration Studies, 2014, p.881.
[213] Martin Geiger and Antoine Pécoud, p.865.
[214] The UN, https://www.un.org/en/about-us/universal-declaration-of-human-rights, (15.03.2024).
8[215] Lucy Mayblın, **Colonialism, Decolonisation, and the Right to be Human: Britain and the 1951 Geneva Convention on the Status of Refugees**, Journal of Historical Sociology, 2014, p.424.

education and health rights. On the other hand, the responsibility of refugees towards their host countries was explained[216].

3.6.3 International Organisation for Migration (IOM)

The International Organization for Migration, formerly known as the Provisional Intergovernmental Committee for the Movement of Migrants from Europe (PICMME), was founded in 1951 as a result of the displacement of millions of people after World War II. It was tasked with defining resettlement areas for millions of people displaced as a result of World War II [217]. This postwar overpopulation increase posed a risk to Europe's socioeconomic recovery. The IOM's goal was to facilitate the migration of Europeans to less populated continents such as Latin America [218].

The foundation of the organization was laid in Brussels. The "Intergovernmental Committee on European Migration (ICEM)", founded at the International Migration Conference, changed its name to "Intergovernmental Committee on Migration (ICM)" in 1980 and was renamed IOM in 1989. IOM follows the changing dynamics of migration and also supports migrants around the world. Thanks to these missions, it offers guidance in the design and implementation of migration policy. IOM, a United Nations-affiliated organization, acts on the basis of the fundamental principles contained in the Charter of the United Nations [219]. Over the last 10 years, IOM has become the global leader in migration. With its developed vision, it has become the choice of countries that want to adapt to the changing dynamics of migration and ensure the control and well-being of the immigrant population. The performance and responsibility of the IOM in emergency situations is a guide for governments[220].

3.6.4 European Union (EU)

When the European Union was founded, there was not as much demand for migration. However, there are many reasons in the changing economy that have led to

[216] UNHCR The UN Refugee Agency, https://www.unhcr.org/about-unhcr/who-we-are/1951-refugee-convention, (15.03.2024).
[217] IOM, https://www.iom.int/iom-history (15.03.2024).
[218] Antoine Pécoud, **What do We Know about the International Organization for Migration?**, Journal of Ethnic and Migration Studies, 2018, p.1624.
[219] International Organisation for Migration, https://www.iom.int/mission, (15.03.2024).
[220] IOM, **Strategic Vision: Setting a Course for IOM**, 2020, https://publications.iom.int/books/strategic-vision-setting-course-iom, p.1 (15.03.2024).

increased migration to European countries. There was a high demand for labor migration in most European countries, especially after the Second World War. Free movement between member states and improvements in working conditions are other reasons for migration to the European Union[221]. In addition, the relatively better living conditions and better economy of European countries are attracting factors for immigrants. However, the increasing burden of immigration over time has led European countries to take steps to take control of their own future. The establishment of FRONTEX and the development of migration control systems such as the Schengen Information System and Eurodac are important steps to combat irregular migration and border controls[222].

While FRONTEX and EUAA are at the forefront in the area of migration, border management and refugee policy, the Visa Information System (VIS), the Schengen Information System (SIS), Eurodac, Eurosur and readmission agreements are other EU instruments for combating irregular migration.

FRONTEX: The European Border and Coast Guard Agency facilitates the coordination of the management of external borders. It supports member countries and Schengen-associated countries in preventing cross-border crime[223]. While FRONTEX has a positive impact on cooperation between member states, it has also had a positive impact on the coordination of EU border management[224].

EUAA: The EUAA addresses the issue of asylum and encourages EU member states to cooperate on this issue. With its annual reports it provides information about the current situation of refugees in the EU. It acts as a specialist center for technical and information services, which it provides to EU Member States requesting assistance in fulfilling their obligations under the Common European Asylum System (CEAS).[225].

VIS: Visa policy plays an important role in the development of the Schengen system and is one of the oldest areas of cooperation between Member States. Thanks

[221] Gustavo De Luna Gallardo, Elena Korneeva and Wadim Strielkowski, **Integration of Migrants in the EU: Lessons and Implications for the EU Migration Policies**, Journal of International Studies, 2016, p.244.
[222] Lena Karamanidou, **The Securitisation of European Migration Policies: Perceptions of Threat and Management of Risk**, The Securitisation of Migration in the EU: Debates since 9/11, 2015, p.38.
[223] FRONTEX, https://www.frontex.europa.eu/about-frontex/who-we-are/tasks-mission/, (15.03.2024).
[224] Jori Pascal Kalkman, **Frontex: A Literature Review**, International Migration, 2021, p.170
[225] European Commission, **Agencies**, https://home-affairs.ec.europa.eu/agencies_en , (15.03.2024).

to a visa, people can easily visit all European countries. As an instrument of migration control, visa policy is one of the least restrictive instruments of international agreements[226].

SIS: Schengen Information System, based on the security of Europe, is the most preferred information exchange system in border management. It helps ensure internal security in cases where internal border controls are inadequate[227]. Thanks to the Automated Fingerprint Identification System (AFIS), SIS-AFIS has made it possible to identify relevant people based on their fingerprints at EU level since 2018[228]

EURODAC (EU Asylum Fingerprint Database): Eurodac provides a guide for assessing European asylum applications by collecting in its database the fingerprints of asylum seekers and irregular immigrants who have entered European countries. In this way, asylum seekers already registered in the database and new applicants can be compared[229]. The system is used by 31 countries, including 27 member states and four associated countries [230]. By recording the fingerprints of all asylum seekers over the age of 14 in the database, Eurodac prevents an asylum application from being lodged in a country other than the EU. If such a situation is identified, asylum seekers may be sent back to the country in which they made their first application[231].

[226] Claudia Finotelli and Giuseppe Sciortino, **Through the Gates of the Fortress: European Visa Policies and the Limits of Immigration Control**, Perspectives on European Politics and Society, 2013, Vol:14, No:1, p.82.

[227] J. Galbally, P. Ferrara, R. Haraksim, A. Psyllos, L. Beslay, **Study on Face Identification Technology for its Implementation in the Schengen Information System**, Joint Research Centre Science for Policy Report, 2019, p.18.

[228] EU-Lisa, **Schengen Information System**, eu-LISA - Schengen Information System (europa.eu) , (15.03.2024).

[229] Eu-Lisa, **Eurodac**, eu-LISA - Eurodac (europa.eu), (15.03.2024).

[230] The EU countries are: Austria, Belgium, Bulgaria, Croatia, Republic of Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden. Associated Countries: Iceland, Norway, Switzerland and Liechtenstein

[231] Europen Commission, **Eurodac**, https://home-affairs.ec.europa.eu/networks/european-migration-network-emn/emn-asylum-and-migration-glossary/glossary/eurodac_en , (15.03.2024).

EUROSUR (European External Border Surveillance System): It is a system created to keep the EU's external borders under control. Eurosur's tasks also include detecting and combating irregular migration and cross-border crime [232].

Readmission Agreements: Readmission agreements are another EU instrument for combating irregular migration. These agreements are based on cooperation between Member States of the European Union and third country partners. It is mutually agreed that illegal residents return to their home countries or transit countries[233].

Migration has been on humanity's agenda since ancient times. Many theoretical approaches have been proposed to understand the causes of migration and to interpret them from different perspectives depending on the units of analysis. The events to which the phenomenon of migration is related in the context of cause and effect stand out as a reality of our world. In our world where competition is increasing, it is necessary to take some precautions towards asylum seekers, refugees and immigrants.

[232] European Commission, **Eurosur,** https://home-affairs.ec.europa.eu/networks/european-migration-network-emn/emn-asylum-and-migration-glossary/glossary/european-border-surveillance-system-eurosur_en , (15.03.2024).
[233]EuropeanCommission, https://ec.europa.eu/commission/presscorner/detail/en/MEMO_05_351 (20.03.2024).

CHAPTER FOUR

THE EFFECT OF CLIMATE CHANGE ON MIGRATION DECISION

Climate, as a global and important factor, is important and indispensable for the whole world, both in terms of sustaining people's lives and in terms of its potential to influence their lives positively or negatively. The impact of such an important factor for our planet is also very important. Due to the increasing use of greenhouse gases, especially after the Industrial Revolution, the world has faced the problem of climate change over time. Climate has been very important to humans throughout history. Tribes and nomadic societies have designed their lives and lifestyles according to the climate.

Climate was then and still is a determining factor, particularly in the agricultural sector of some countries. This centuries-old relationship between climate and humans still exists today on the same basis, but on a larger scale. The first part of the thesis mentions that the changes in the atmosphere, ocean, human and animal life and ecosystems caused by climate change. These changes have consequences such as sea level rise, droughts, floods and deforestation. These results ultimately became the cause of another situation such as migration in some regions or some lives. Although there are many examples of the impact of climate change on migration, the relationship between the two (climate change and migration) should not be viewed as a direct and automatic feedback. People's spatial behavior is shaped by a combination of many factors and migration preferences change depending on region and group[234]. For example, while in some places migration occurs as a result of rapid-onset events such as floods, storms and hurricanes, in other places it occurs as a result of slow-onset and gradual events such as drought and land degradation[235].

The impact of climate change on human migration has attracted the attention of scientists and policymakers in recent years, and this issue is high on the international agenda. Climate change is recognized as an important driver of mobility in the Agenda

[234] R. Mcleman and B. Smit, **Migration as an Adaptation to Climate Change**, Climatic Change, 2006, Vol.76, No.1, p.32.

[235] Cristina Cattaneo, Michel Beine, Christiane J. Fröhlich, Dominic Kniveton, Inmaculada Martinez-Zarzoso, Marina Mastrorillo, Katrin Millock, and Etienne Piguet, **Human Migration in the Era of Climate Change,** Review of Environmental Economics and Policy, 2019, p.2

for Humanity, at the 2016 UN Summit for Refugees and Migrants, as well as in the Global Compact for Migration and the Global Compact for Refugees [236]. Some of the other agreements signed to support global cooperation against the threat of climate change by supporting the implementation of the Kyoto Protocol, the Paris Agreement and the UNFCCC are: the Sendai Framework for Disaster Risk Reduction (2015-2030), which is finance-focused is Addis Ababa Action Agenda (2015) and the New Urban Agenda (2016) as well as the Kigali Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer (2016)[237]. Climate change is also identified as a driver of mobility in global frameworks, including the 2010 Cancún Adaptation Framework, the Nansen Initiative 2015 Agenda for the Protection of Cross-Border Displaced Persons in the Context of Disasters and Climate Change, and the Platform on Disaster Displacement[238]. The 2019 Kainaki II Declaration for Urgent Climate Change Action Now by the leaders of the Pacific Islands Forum is an example of climate change being seen as a trigger for human mobility across regional and national borders[239].

According to the International Organization for Migration 2022 report, states are promoting cooperation on migration management through regional and transnational frameworks, which include adaptation strategies aimed at strengthening societies exposed to the negative impacts of climate change. For example, the Pacific Climate Change Migration and Human Security Program has enabled ongoing national consultations in 13 countries on climate-related mobility. To create an integrated approach to climate change-related mobility in the region, IOM and UNFCCC supported the Government of Uganda to organize a conference on migration, environment and climate change in the East and Horn of Africa. At the end of the conference, the Kampala Ministerial Declaration on Migration, Environment and Climate Change was adopted, in which 15 states were represented[240].

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[236] David J. Kaczan and Jennifer Orgill-Meyer**, The Impact of Climate Change on Migration: A Synthesis of Recent Empirical Insights**, Climatic Change, 2020, Vol.158, No.3, p.282.
[237] IPCC AR6 Climate Change 2023 Synthesis Report, p.52,
[238] Celia McMichael, **Climatic and Environmental Change, Migration, and Health**, Annual Review of Public Health, 2023, Vol.44, p.172
[239] Siobhan McDonnell, **The Importance of Attention to Customary Tenure Solutions: Slow Onset Risks and the Limits of Vanuatu's Climate Change and Resettlement Policy**, Current Opinion in Environmental Sustainability, 2021, Vol.50, p.283.
[240] IOM Annual Report 2022, p.9

There is evidence that the climate has changed to some extent compared to the past and that the impact of adverse climatic conditions on human activities will gradually increase in the future. The Stern Report[241], one of the studies on this topic examined the global consequences of climate change and concluded that most countries would be negatively affected by climate change. According to the United Nations' first intergovernmental report on climate change, climate change will lead to migration, particularly in developing countries[242].

According to the first report of the Intergovernmental Panel on Climate Change in 1990, a major consequence of climate change will be human migration[243]. Some of the Intergovernmental Panel on Climate Change's ongoing reports also address the impact of climate change on the number of displaced people. According to the IPCC's sixth synthesis report, many parts of the world are affected by extreme climate and weather conditions. For example, Africa, Asia, North America, Central and South America as well as small island states in the Caribbean and the South Pacific are influenced by climatic conditions. Climate change-induced vulnerability to involuntary migration and displacement due to extreme weather and climate events remains[244].

The IPCC's Fifth Synthesis Report predicts that climate change will have a negative impact on economic growth and make it more difficult to avoid poverty. Additionally, the report predicts that climate change will cause the number of people to be displaced[245]. According to the third synthesis report published by the IPCC, flooding and erosion risks will occur in low-lying coastal areas due to climate change. This situation will directly impact the lives of millions of people, especially those living on some small islands[246]. According to the evaluation of the sixth synthesis report, climate change has negative effects on people and nature. The damage caused

[241] Stern Report: The Stern Review on the Economics of Climate Change, commissioned by the British Government, is a 700-page report. The Review, written by Lord Stern, is about the impact of climate change and global warming on the world economy. The report emphasizes that 1% of the global gross domestic product should be invested to protect against bad possibilities that may be caused by climate change. Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (UN-REDD) Programme, https://www.un-redd.org/glossary/stern-reportreview

[242] Michel Beine and Lionel Jeusette, **A Meta-Analysis of the Literature on Climate Change and Migration**, Journal of Demographic Economics, 2021, Vol.87, No.3, p.2

[243] IPCC, First Assessment Report, p.103.

[244] AR6 Climate Change 2023 Synthesis Report, 2023, p.51.

[245] IPCC Fifth Synthesis Report, p.16.

[246] IPCC Third Synthesis Report, 2001, p.73

by climate change has not affected all regions and sectors equally[247]. According to the International Organization for Migration, climate change and environmental change are impacting human mobility. It shapes human mobility with its effects and therefore plays an increasingly crucial role over time.

4.1 Climate Change Effects on Least Developed and Developing Countries

It is estimated that between 25 million and 1 billion people could be displaced by climate change over the next 40 years. It corresponds to the number of people in certain regions who are exposed to climate change for various reasons. Although the figures are estimates, they ultimately managed to attract the attention of policymakers[248]. According to the IPCC's Third Synthesis Report, the impacts of climate change will occur particularly in developing countries and on all poor people around the world. This will further increase inequalities in access to healthcare, clean water and adequate food. Developing countries are at high risk of the negative impacts of climate change compared to other countries. In addition, poverty and other factors in developing countries lead to a reduction in the adaptive capacity of countries[249]. Hurricane Katrina killed more than 1,800 people and displaced a million people along the U.S. Gulf Coast. The example of Hurricane Katrina shows that the socio-economic situation is an important factor in the possible effects of a natural disaster. Hurricane Katrina was an example of how natural disasters primarily affect the poor and elderly[250]. According to International Organisation for Migration these are the most affected groups of population:

a) Marginalized sectors of society

b) Groups dependent on agriculture

c) Populations in least developed countries, low-lying islands and coastal areas

[247] AR6 Climate Change 2023 Synthesis Report, p.51.
[248] Frank Laczko and Christine Aghazarm, **IOM Migration, Environment and Climate Change: Assesing The Evidence**, 2009, p.9
[249] IPCC, Third Synthesis Report, p.12.
[250] IOM Compendium of IOM'S Activities in Migration, p.20.

d) The most affected groups are often the least successful in getting out of the danger zone [251].

The National Adaptation Programs of Action (NAPAs) are a framework adopted by low-income developing countries to address environmentally induced migration [252]. According to the United Nations Framework Convention on Climate Change, NAPAs *"provide a process for Least Developed Countries (LDCs) to identify priority activities that respond to their urgent and immediate needs to adapt to climate change – those for which further delay would increase vulnerability and/or costs at a later stage"*[253].

NAPAs are one of the planning tools for the least developed countries, which are likely to experience large-scale disruption due to climate change. Loss of livelihoods and habitats will trigger migration, particularly in coastal areas that may be primarily affected by sea level rise and in areas sensitive to factors affecting agriculture, such as drought.

The following examples of NAPAs exist for this situation:

1- Bangladesh: It is stated that excessive depth of standing water negatively affects crop cultivation during the Kharif season[254] in Bangladesh, thus also livelihoods affecting negatively. Due to limited food availability, people migrate to other cities in search of work and livelihood.
2- Cambodia: Farmers in Cambodia say they are sustaining their livelihoods thanks to temporary rain-fed rice cultivation that is threatened by droughts. Factors triggering migration include increasing crop losses and associated inadequate food resources and poor health conditions.
3- Cape Verde: Due to the great famine caused by the interaction of environmental and population pressures, the residents of the island nation of Cape Verde decide to migrate. NAPA states that frequent heavy rains

[251] IOM Perspectives on Migration, Environment and Climate Change, p.2.
[252] Frank Laczko and Christine Aghazarm, p.361.
[253]UNFCCC, **National Adaptation Programmes of Action** https://unfccc.int/topics/resilience/workstreams/national-adaptation-programmes-of-action/introduction (23.03.2024).
[254] Kharif Season: The crop season begins with sowing in April-June and harvesting during October-December. Rice, sugarcane, cotton, maize, mong, mash, bajra and jowar are some of the "Kharif" crops. Goverment of Pakistan Finance Division, **Agriculture**, https://www.finance.gov.pk/survey/chapters/02-Agriculture08.pdf (23.03.2024).

negatively impact the agricultural sector and cause problems in infrastructure, so this situation acts as a catalyst for the decision to migrate.

4- Eritrea: Eritrea notes that individual coping strategies include extensive seasonal migration, particularly for casual workers in urban areas, and migration to cooler plateaus and/or plateaus.
5- Ethiopia: In Ethiopia droughts, which have occurred many times in the past, have resulted in deaths and loss of property in addition to the impact on migration. Traditional and modern strategies to combat climate change include: reduction in consumption, changes in farming practices, collection of wild foods, storage of crops, sale of assets such as livestock and agricultural equipment, temporary and permanent migration in search of work, access to food, etc.
6- Gambia: Unpredictable rainfall and droughts have a negative impact on the availability of forest products, animal husbandry and crop yields in Gambia. While this situation leads to loss of income in rural areas and serves as a catalyst for rural-urban migration.
7- Gine- Bissau: As a result of long dry seasons, particularly in rural areas in the east of the country, villagers have been displaced. People forced to abandon their rice fields due to the saltwater invasion migrate from south to north or to Guinea. Migration movements also take place to the east, northwest and some regions in the south.
8- Haiti: Large migration occurs in Haiti due to the combination of poverty, population growth, and negative environmental impacts. Migrations take place from rural areas to Port au Prince[255].
9- Mali: Migration in Mali occurs as an adaptation strategy. From the north to the south of the country, towards the coastal countries and in the west, there is a battle with drought. Internal migration in the country has affected the fragile ecosystem.
10- Mauritania: Pastoralists have experienced a large overland migration and many of them are abandoning their nomadic lifestyle due to reduced rainfall in Mauritania.

[255] Port au Prince: Capital of Haiti. Myrtho Joseph, Fahui Wang and Lei Wang, **GIS-Based Assessment of Urban Environmental Quality in Port-au-Prince, Haiti**, Habitat International, 2014, p.34.

11- In Sudan herders' search for pasture forced them to move south. In this case, drought is seen as a reason for internal displacement [256].

Paul Chinowsky et al. state that, the impacts of climate change are not limited to developed countries with good economies and countries with high levels of welfare. On the contrary climate change poses greater potential risks for developing countries than for industrialized countries[257]. In developing countries, climate change is also likely to impact local natural resources and reduce their availability, thereby limiting the ability of rural households to use these resources for commercial purposes[258].

Due to the low level of economic development of underdeveloped and developing countries, they are less able to adapt to changing climate conditions. They are also not geographically advantageous as their location at lower latitudes means temperature increases and long dry seasons are expected. In addition, water scarcity will also negatively impact their ability to raise food and livestock[259].

4.2 The Nexus Between Environmental Degradation Due to Climate Change and Migration

Although the concepts of war, hunger, conflict and poverty are highlighted as triggering reasons for forced migration, the question has recently been raised in the literature like whether and what extent environmental disasters and water scarcity influence forced migration[260]. People may migrate due to the impact of climate change on their lives, livelihoods and access to food. Environmental migration is an undeniable fact. Migration due to environmental and climate change is increasingly on the agenda in most countries. All environmental changes, whether sudden or slow, affect migration, although there is debate in the literature about the causality of these two phenomena[261]. Climate change is increasing the frequency of natural disasters and accelerating environmental degradation through factors such as increased air

[256] Frank Laczko and Christine Aghazarm, p. 363-364.
[257] Paul Chinowsky, Carolyn Hayles, Amy Schweikert, Niko Strzepek, Kenneth Strzepek, C. Adam Schlosser, **Climate Change: Comparative Impact on Developing and Developed Countries**, The Engineering Project Organization Journal, 2011, p.67.
[258] Pradosh K. Nath and Bhagirath Behera, **A Critical Review of Impact of and Adaptation to Climate Change in Developed and Developing Economies,** Environment, Development and Sustainability, 2011, p.146.
[259] Frank Laczko and Christine Aghazarm, p. 323.
[260] Tamer Afifi and Koko Warner, **The Impact of Environmental Degradation on Migration Flows Across Countries**, 2008, p.2
[261] African Union and IOM, **Africa Migration Report: Challenging the Narrative**, 2020, p.66

temperature, rising sea levels and ocean acidification. In recent decades, the vast majority of natural disasters have been caused by climate-related natural disasters[262].

The impacts of climate change on migration continue to be a topic of research for policymakers and researchers. However, due to uncertainty about the mechanisms affected, the number of individuals and the geographical regions, information in this area is limited. The debate continues between those who argue that the environment has a direct influence on population movements and those who assume that economic and social reasons are at the forefront of mobility[263]. According to those who do not view migration as a direct consequence of climate change, it is difficult to separate the effects of climate change from the economic, political, demographic and environmental factors that influence human movements[264].

According to K. Warner, M. Hamza et al. people in areas where environmental degradation is ocur they don't have many options. As a first option, they can stay at home and try to mitigate the impact by trying to adapt to the situation. Second, they may choose to do nothing and so continue to live with a low standard of living. Finally they can migrate. The migration decision-making process is the result of a number of push and pull factors [265].

Shurke states that the literature on environmental migration can be divided into two main categories. Firstly, the minimalists, who argue that the environment only has a contextual influence on the migration decision, and secondly, the maximists, who establish a direct connection between the environment and migration [266]. Each discipline adds its own input to the literature[267].

Anthony Oliver Smith notes that the connection between environment and migration cannot be established directly due to conceptual difficulties. The inherent complexity of social and ecological systems makes it even more difficult to understand

[262] Swati Tyagi, Neelam Garg and Rajan Paudel, **Environmental Degradation: Causes and Consequences**, European Researcher, 2014, p.1495.
[263] Etienne Piguet, Antoine Pécoud and Paul de Guchteneire, **Migration and Climate Change: An Overview**, Refugee Survey Quarterly, 2011, Vol.30, No.3, p.1
[264] Celia McMichael, p.172.
[265] K. Warner, M. Hamza, A. Oliver-Smith, F. Renaud and A. Julca, **Climate Change, Environmental Degradation and Migration**, Natural Hazards, 2010, p.690.
[266] Frank Laczko and Christine Aghazarm, p.14.
[267]Etienne Piguet, Antoine Pécoud and Paul de Guchteneire, p.1.

the relationship between people, the environment and migration [268]. Furthermore, Andrew Baldwin and Elisa Fornale argue that climate change and its consequences are not the only triggering factor for the decision to migrate [269]. According to Georgina Cundill et al. whatever the figures on climate-related migration, there is little doubt that climate change will influence the decision-making process [270].

On the other hand according to the final report of the Foresight Project emphasized that the environment as a part of life is very important for the whole world. However, in countries where the economy is based on agriculture or animal husbandry, this can have more destructive and serious consequences in a short period of time. For this reason, changes in ecosystems directly impact migration decisions. Likewise, environmental events such as floods, land degradation, tsunamis, etc. lead to displacement.[271]

The natural environment has played an important and crucial role in migration and displacement throughout history. Water and land shortages lead to conflicts over natural resources and natural disasters. Climate change is expected to exacerbate these factors[272]. There is no legal or internationally accepted definition of moving people due to environmental factors. The International Organization for Migration has established a definition based on studies:

"Environmental migrants are persons or groups of persons who, predominantly for reasons of sudden or progressive change in the environment that adversely affects their lives or living conditions, are obliged to leave their habitual homes, or choose to do so, either temporarily or permanently, and who move either within their country or abroad"[273].

[268] Anthony Oliver Smith, **Debating Environmental Migration: Society, Nature and Population Displacement in Climate Change**, Journal of International Development, 2012, Vol. 24, No.8, p.1062.
[269] Andrew Baldwin and Elisa Fornale, **Adaptive Migration: Pluralising the Debate on Climate Change and Migration**, The Geographical Journal, 2017, Vol. 183, No. 4, p. 322.
[270] Georgina Cundill, Chandni Singh, William Neil Adger, Ricardo Safra de Campos, Katharine Vincent, Mark Tebboth and Amina Maharjan, **Toward a Climate Mobilities Research Agenda: Intersectionality, Immobility, and Policy Responses**, 2021, Vol.69, p.2.
[271] Black, R., Adger, W. N., Arnell, N. W., Dercon, S., Geddes, A., Thomas, D, **Migration and Global Environmental Change Future Challenges and Opportunities**, 2011, p.9.
[272] Naudé Wim, **Conflict, Disasters and No Jobs: Reasons for International Migration from Sub-Saharan Africa,** WIDER Research Paper, 2008, p.6
[273] IOM Ninety Fourth Session, **Discussion None: Migration and The Environment**, 2007, p.2.

The general assumptions of the International Organization for Migration on the relationship between migration, environment and climate change are as follows:

a) Environmental factors have always been a cause of migration.
b) Surviving natural disasters and the deteriorating environment make people inclined to flee. People flee when faced with both of these situations.
c) Climate change is expected to result in a rapid, slow onset and gradual degradation of the environment.
d) Environmental migration, whether voluntary or forced, does not include clear and easily distinguishable cases.
e) Migration is increasingly accepted as an adaptation strategy that allows people to cope with environmental factors. Temporary migration or remittances can provide alternative sources of income to reduce dependence on the environment for subsistence[274].

The International Organization for Migration's assumptions about how environmental factors and climate change will affect human mobility are as follows:

a) The frequency of natural disasters, which occur in parallel with weather conditions, also leads to humanitarian emergencies and therefore the possibility of population mobility.
b) The negative effect of climate change on very basic aspects of human life, such as public health, food security and livelihoods can trigger existing vulnerabilities and accelerate the decision to migrate.
c) Sea level rise can negatively impact life in low-lying coastal areas.
d) The competition that arises from the scarcity of natural resources can lead to conflict. This situation could ultimately be a trigger for forced migration.
e) Migration can seen as a survival strategy during natural disasters.
f) Migration can also be viewed as an adaptation strategy. Because migration helps people diversify their livelihoods, manage risks and deal with environmental changes. For example, temporary migration and remittances can pave the way for replacement sources of income.

[274] IOM, **IOM Perspectives on Migration, Environment and Climate Change,** p.1 https://publications.iom.int/system/files/pdf/meccinfosheet_climatechangeactivities.pdf , (21.03.2024).

g) Environmental migration can occur as a result of forced or voluntary movements. But in most cases it is difficult to distinguish between these two types of movements[275].

International Organization for Migration's Strategic Plan 2024-2028 state that, migration and climate change are closely linked. They create a complex interaction that influences the lives of individuals and, by extension, societies. The impacts caused by climate change may cause people to migrate internally or externally [276]. It is controversial whether migrations related to climate change or the environment should be considered voluntary or forced migration. While some of these migrations are considered voluntary migration, others are considered forced migration. For example, when some rapid-onset natural disasters occur, people have no choice but to migrate. In cases where environmental change occurs slowly and gradually, migration is more likely to be voluntary, depending on other economic, social and political factors[277].

The four key messages highlighted by the IOM regarding effective human mobility policies based on environmental and climate change are as follows:

1- The reasons and dimensions of environmental and climate-related migration are diverse. Environmental and climate factors are push factors for some regions and people and pull factors for some regions and people. These are mediated by economic, social and political factors. All of these different dimensions together define the fragility of a community and an individual. The connection between migration, the environment and climate change represents a "double sensitivity challenge". While climate negotiations are already a sensitive issue from a political perspective, issues of environmental migration make the issue even more sensitive. Migration is itself a complex phenomenon and sensitivities remain regarding intergovernmental cooperation in the area of migration.

2- Migration in the context of climate change means dealing with the human side of climate change debates. More attention should be paid to migrants themselves, their families and communities to understand their strategies and

[275] IOM Perspectives on Migration, Environment and Climate Change, p.2.
[276] IOM 2024-2028 Strategic Plan, 2024, p.22, https://publications.iom.int/books/iom-strategic-plan-2024-2028 , (21.03.2024).
[277] laczaczko and Christine Aghazarm, p.18.

mobility. Policymakers should be empowered at national, local/regional or international levels to address the nexus between climate change, migration and the environment.

3- Human mobility can be read as a barometer of resistance and sensitivity. Migrants' movement strategies are neither fundamentally positive nor negative. While mobility can save lives and reduce risks, it can also leave people vulnerable and expose them to risks. The inability to leave affected areas can be seen as a major sign of danger. Because the trapped population doesn't have much choice against environmental threats.
4- Migration is an adaptation option that can be supported by policy measures. Migration has been favored by individuals and societies throughout history to adapt to changing environmental conditions. In some contexts, supporting migration through policy measures can represent a positive adaptation strategy. Developing knowledge about how migration contributes to adaptation and how it will influence future environmental changes plays an important role[278].

Environmental migration, like all types of migration explained in previous chapters, is a complex phenomenon. It may not be easy to find the main trigger of the migration. It is impossible to justify environmental migration on a simple cause and effect basis. Environmental migration is a complex phenomenon with variables such as push and pull factors, permanent/temporary migration, forced/voluntary migration and long-term/short-term migration. Migration arises from a combination of several factors that can be complex in themselves. For example, climate change can affect the order of life and the economy, triggering people's decision to migrate. At a conceptual level, Ferris has modeled the impacts of climate change on human displacement in various ways.

1- Due to climate change, which is leading to an increase and severity of sudden natural disasters such as hurricanes, floods and storms, people are forced to leave their homes to escape the devastating effects.

This model appears to have the most empirical support. While those who remain within national borders due to sudden natural disasters are considered

[278] IOM Outlook on Migration Environment and Climate Change, 2014,

internally displaced persons, those who cross national borders as a direct result of natural disasters are considered immigrants.

2- Climate change has impacts on the environment, also known as long-term or slow-onset disasters, such as desertification. As in the Sahel region[279], as a result of this situation, people's livelihoods are negatively affected and they are forced to migrate.

This model is the most difficult to evaluate because the relationship between climate change, hunger, environmental change, population growth and displacement is non-linear. In the long run, people choose to leave their communities for many reasons. It is difficult to determine the environmental changes caused by climate change as the primary and sole cause.

3- As in the Darfur Crysis[280], environmental impacts caused by climate change increase conflicts over resources. Thus, people are forced to leave their communities.

Although this model makes intuitive sense, the influence of environmental factors is not prominent in conflicts involving resource scarcity and many other causes.

4- Climate change is causing environmental changes that the government is not responding to adequately, forcing people to leave their communities.

Famines arise as a result of inadequate environmental conditions, poor government policies and poverty, and their effects are compounded by conflict. People displaced due to these factors are either internally displaced or treated as refugees despite not having legal status.

[279] The Sahel is the semi-arid region of West and North-Central Africa, stretching from Senegal eastwards to Sudan. The Sahel region includes northern Senegal, southern Mauritania, the great bend of the Niger River in Mali, Burkina Faso (formerly Upper Volta), southern Niger, northeastern Nigeria, south-central Chad, and Sudan, Britannica, https://www.britannica.com/place/Sahel (22.03.2024).

[280] According to some views that see the basis of the Darfur Crysis as environmental destruction, the first climate change conflict in the world occurred as a result of the Darfur Crysis and climate migration began. Jeffrey Mazo, **Darfur: The First Modern Climate-Change Conflict**, Adelphi Pap, 2009, p.74 cited by Nur Çelik Efşan and Vedat Yılmaz, **Darfur Krizinin İklim Değişikliği Bağlamında Değerlendirilmesi**, 2023, Vol.14, No.1, p.388.

5- The long-term environmental impacts caused by climate change will be mitigated through large-scale government/international community development projects.

Further research is needed to clarify the connection between climate change and some environmental impacts that prompt governments to undertake large-scale development projects. In particular, the relative impacts of environmental impacts and population growth need to be assessed[281].

Climate change is expected to transform the world through rising temperatures, rising sea levels and ocean acidification. Regions likely to be affected by climate change through natural disasters include small island states, countries with monsoon rains, drylands and agricultural areas dependent on rivers supported by glaciers[282]. Walter Kalin's five possible climate change scenarios related to migration are as follows: increase in events such as floods, storms, tornadoes, typhoons and hurricanes; evacuation of high-risk areas; slow-onset disasters such as desertification and water shortages; the risk of loss of small island states due to sea level rise and conflict over access to basic resources[283].

As a result of climate change, changes in precipitation and snowmelt in many regions have an impact on water systems and thus on the quantity and quality of water resources. As a result of evaluating many studies covering a large region, it was found that the negative impact of climate change on crop yields is greater than its positive impact [284]. Climate change in the 21st century is predicted to have negative impacts on renewable surface water and groundwater resources in most arid subtropical regions. It is estimated that this situation will intensify the struggle for water between sectors[285]. Due to large-scale weather events such as floods and droughts, populations unprepared for planned migration are at high risk of displacement[286]. According to the International Red Cross and Red Crescent Movement, 10.3 million people were

[281] Elizabeth Ferris, **Making Sense of Climate Change, Natural Disasters and Displacement: A Work In Progress**, Bern Universität: Calcutta Research Group Winter Course, 2007, p.4-5.
[282] Seda Yurtcanlı Duymaz, **İklim Değişikliği, Afetler ve İnsan Hakları: Çevresel Zorunlu Göç**, Marmara University, Social Science Instıtute, 2019, p.17
[283] Walter Kalin, **The Climate Change-Displacement Nexus**, The Brookings Institution, https://www.brookings.edu/articles/the-climate-change-displacement-nexus/ (07.04.2024).
[284] IPCC Fifth Synthesis Report, p.6.
[285] IPCC Fifth Synthesis Report, p.69.
[286] IPCC Fifth Stnthesis Report, p.73.

displaced in the six months between September 2020 and February 2021. These 10.3 million people displaced by climate change are four times the number displaced by war or conflict during this period[287].

Climate change is predicted to lead to extreme weather events such as droughts and floods, with increasing temperatures and rainfall. Furthermore, these changes are expected to lead to greater population mobility. According to the United Nations International Strategy for Disaster Risk Reduction (UNISDR), the number of storms, floods and droughts has increased threefold in the last 30 years. Although extreme environmental events such as tsunamis and hurricanes are gaining more attention, environmental changes that occur gradually can have a greater impact on human movements [288].

In the 20-year period between 1995 and 2015, floods affected 2.3 billion people and accounted for almost half of all weather-related disasters. Compared to the previous decade, the average annual number of floods increased from 127 to 171 between 2005 and 2014. Storms, hurricanes and storm surges caused the deaths of more than 242,000 people in the 20-year period between 1995 and 2015. With 2,018 storms recorded between 1995 and 2015 by CRED's Emergency Events Database (EM-DAT), storms were the second largest natural disaster after floods[289]. As a result of the effects of climate change occured floods in South Asia, severe droughts in Africa and devastating hurricanes in the Caribbean in 2017. These disasters caused great damage to people's lives and property. As the frequency and intensity of these events increase slow-onset climate impacts such as water shortages, food shortages and sea level rise are forcing people to leave their homes[290].

4.3 Natural Disasters: Slow-onset and Rapid-onset Environmental Changes

Natural disasters can occur suddenly, such as a storm, or they can occur slowly, over a long period of time and gradually, such as a drought. Natural hazards become

[287] Peter Rüegg, **Climate Change Significantly ,Increases Population Displacement Risk**, https://ethz.ch/en/news-and-events/eth-news/news/2021/03/increased-population-displacement-risk.html , (26.03.2024).
[288] Frank Laczko and Christine Aghazarm, p.15.
[289] UNISDR, **The Human Cost of Weather Related Diasters 1995-2005**, p.14.
[290] The World Bank, **Annual Report, 2018**, p.28, https://documents1.worldbank.org/curated/en/630671538158537244/pdf/The-World-Bank-Annual-Report-2018.pdf , (07.04.2024).

natural disasters when they damage people's lives, livelihoods, health and homes and force people to flee to survive [291]. Therefore, migrations caused by environmental degradation are studied in two different groups: “migrations associated with rapid and sudden disasters caused by climate change” and “migrations associated with slow and gradual disasters caused by climate change”. Disasters that develop slowly and gradually include: rising temperatures, desertification, decreasing rainfall, loss of biodiversity, land and forest degradation, glacier retreat and associated impacts, ocean acidification, sea level rise and salinization[292]. Many people are forced to migrate as a result of sudden events such as hurricanes and floods[293].

According to the 2023 IDMC report, a total of 8.7 million people in 88 countries were internally displaced as of December 31, 2022. The distribution of the total number is as follows: 2,164,000 in Afghanistan, 717,000 in Ethiopia, 373,000 in Kenya, 283,000 in the Democratic Republic of Congo, 854,000 in Nigeria, 227,000 in Sudan, 533,000 in the Philippines[294].

While 1.6 million people were displaced due to natural disasters in sub-Saharan Africa in 2013, the number was 0.7 million in 2014, 1.1 million in 2015 and 2016, 2.6 million in 2017 and 2018, 3.4 million in 2019, 4.4 million in 2020, 2.6 million in 2021 and 7.4 million in 2022. In 2022, people were displaced due to natural disasters, mostly in the Democratic Republic of Congo, Ethiopia, Nigeria, Somalia, and South Sudan. The figures are 423,000, 873,000, 2,437,000, 1,152,000 and 596,000 respectively[295].

These disasters caused great damage to people's lives and property. As the frequency and intensity of these events increase, slow-onset climate impacts such as water shortages, food shortages and sea level rise are forcing people to leave their homes[296]. Sudden natural disasters such as floods and storms account for the majority of international disaster relief efforts. Sudden geophysical events can also cause large displacements, such as the 2004 Indian Ocean tsunami and the 2010 Haiti

[291] IOM Compendium of IOM’S Activities in Migration, Climate Change and The Environment, p.16.
[292] AR6 Climate Change 2023 Synthesis Report, p.6.
[293] Nyahunda Louis, Tirivangasi Happy Mathew, and Chibvura Shyleen, **Migration as a Determinant for Climate Change Adaptation: Implications on Rural Women in Muzarabani communities, Zimbabwe**, In Handbook of Climate Change Management: Research, Leadership, Transformation, Cham: Springer International Publishing, 2021, p.6.
[294] IDMC 2023 GRID Global Report on Internal Displacement**,** p.7.
[295] IDMC 2023 GRID Global Report on Internal Displacement**,** p.16.
[296]The World Bank Annual Report, p.28,

earthquake[297]. Regardless of their slow or sudden onset, all natural disasters can cause temporary or permanent disruption to society and the environment. For example, drought has a very wide area of impact. One of the most visible areas of impact is the agricultural sector[298].

Climate change, which is discussed in detail in the first chapter, has a variety of impacts such as droughts, storms, hurricanes and rising temperatures. This section explains the impact of these natural disasters on human mobility using examples from around the world.

4.3.1 Drought Induced Migration

One of the main causes of land degradation is drought. This land degradation has parallel negative effects on the resource-dependent rural population and their livelihoods. This situation can lead to migration in the some regions [299]. Many countries could see a decline in agricultural production in the coming decades. This ratio can be between a third and a half of their production capacity. The loss in the countries of Equatorial Africa can reach 60%. The group that will be most affected by this situation are the rural communities that make their living through agriculture. Prolonged droughts and crop failures due to water shortages can force people to migrate to places with better conditions[300]. For example, drought-affected areas in the sub-Saharan Africa region are expected to increase by 60 to 90 million hectares [301].

According to the World Meteorological Organization's 2023 report, drought, which had been long-standing in some parts of northwest Africa and the Iberian Peninsula, continued in some parts of central and southwest Asia. In addition, the effects of drought are increasing in the southern United States. Two of the countries most affected by drought are north of Argentina and Uruguay. In the eight-month period between January and August, rainfall in northern and central Argentina was 20-

[297] IOM Outlook on Migration Environment and Climate Change, p.87.
[298] Sandra Banholzer, James Kossin and Simon Donner, **The Impact of Climate Change on Natural Disasters**, Reducing Disaster: Early Warning Systems for Climate Change, 2014, p.26.
[299] Kathleen Hermans and Robert McLeman, **Climate Change, Drought, Land Degradation and Migration: Exploring the Linkages**, Current Opinion in Environmental Sustainability, 2021, Vol. 50, p.236.
[300] Frank Laczko and Christine Aghazarm, p.323.
[301] UNDP, **Human Development Report 2007/2008 Fighting Climate Change: Human Solidarity in a Divided World**, 2009, p.9.

50% below average. Eight Brazilian states recorded their lowest rainfall in over 40 years from July to September[302].

Drought is a major factor in migration between Mexico and the United States and has been analyzed at many levels [303]. Nowitzki et al. concluded that the same relationship between rainfall deficit and migration does not exist in all states of Mexico. They found a strong connection between lack of rainfall and migration in the dry states of northern Mexico. They did not find such a connection in the south and east of Mexico City, where there is no rainfall deficit[304]. Shuaizhang Feng et al. show that the drought caused an increase in migration rates due to the damage it caused to agriculture in the decade 1995–2005. The main factor in the migration decision of 1.4 to 6.7 million people who will migrate over the next 60 years is drought. In this context, the connection between drought, migration from Mexico to the United States, and crop yields becomes clear[305].

The number of displacement due to drought in Afghanistan is 17,000 in 2022[306]. Drought is one of the reasons for migration also in Ghana, a coastal city on the Gulf of Guinea. Most people living in northern Ghana migrated to the south due to inefficient agricultural conditions. This means that 30.8% of people born in northwest Ghana no longer live there. Migration to Accra, the capital of Ghana, comes primarily from Nigeria, Niger, Mali and Burkina Faso [307].

The year 2011 was very dry in Somalia. Food insecurity caused by drought in southern Somalia led to a food crisis over time. As of August, 12.4 million people in Djibouti, Ethiopia, Kenya, Somalia and Uganda were facing food insecurity. This number had doubled compared to the beginning of the year. The famine in Somalia gradually spread to some areas of Middle Shabelle, the Afgooye Corridor refugee

[302] World Meteorological Organisation, p.25.
[303] Guillermo N. Murray-Tortarolo and Mario Martínez Salgado, **Drought as a Driver of Mexico-US Migration**, Climatic Change, 2021, Vol.164, No.48, p.48.
[304] Raphael J. Nawrotzki, Fernando Riosmena and Lori M. Hunter, **Do Rainfall Deficits Predict U.S.-Bound Migration from Rural Mexico? Evidence from the Mexican Census**, Population Research and Policy Review, 2013, p.150.
[305] Shuaizhang Feng, Alan B. Kruegera and Michael Oppenheimer, **Linkages Among Climate Change, Crop Yields and Mexico–US Cross-Border Migration**, Proceedings of the National Academy of Sciences, 2010, Vol.107, No.32, p. 14257.
[306] 2023 GRID Global Report on Internal Displacement, p.67 cited by IOM, Afghan Response Multi-Sector Rapid Assessment System Dashboard.
[307] David Rain, Ryan Engstrom, Christianna Ludlow and Sarah Antos, **Accra Ghana: A City Vulnerable to Flooding and Drought-Induced Migration**, Case Study Prepared for Cities and Climate Change: Global Report on Human Settlements, 2011, p.6.

settlement and the internally displaced communities in Mogadishu [308]. The number of displaced people in Mogadishu between January and March was 31,400. 66% of this ratio was due to drought. Although 20% said they came to Mogadishu because of financial difficulties, the main reason for this group was the impact of the drought on their livelihoods[309]. According to the latest data from UNHCR Somalia, 440 of the 5,096 displacements recorded between March 22, 2024 and March 28, 2024 were due to drought[310].

4.3.2 Rising Sea Level Induced Migration

Tuvalu is one of the places where the effects of climate change are most clearly visible. Tuvalu remains at risk of flooding from hurricanes, tsunamis and storm surges, as well as sea level rise [311]. According to the 2022 World Disaster Report, Tuvalu ranks first in terms of the impact of disasters as a percentage of population in 2020-2021. The report lists countries according to the number of people affected per 1,000 inhabitants. Tuvalu's rate is 850.3[312].

Studies conclude that Kiribati, a low-lying country in the central tropical Pacific, cannot withstand the effects of climate change in the long term. The likelihood of life in Kiribati is low given sea level rise [313]. According to estimates by Richard Curtain and Matthew Dornan by 2030, around 64% of I-Kiribati[314] adults aged 20-44 years, 47% of Tuvaluan adults and 10% of Nauruan adults will want to migrate but they will fail. This corresponds to 61,000 people, 4,900 people and 780 people respectively[315].

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[308] Mehdi Achour and Nina Lacan, **Drought in Somalia: A Migration Crisis**, The State of Environmental Migration, 2012, Vol.6, No.12, p.78.
[309] Mehdi Achour and Nina Lacan, p.82.
[310] UNHCR, https://prmn-somalia.unhcr.org/dashboard/displacement-report (28.03.2024)
[311] Sonali Narang, **Imaginative Geographies of Climate Change Induced Displacements and Migrations: A Case Study of Tuvalu**, Journal of Alternative Perspectives in the Social Sciences, 2015, Vol. 7, No.2, p.271.
[312] International Federation of Red Cross and Red Crescent Societies, **World Disasters Report 2022 Trust, Equity and Local Action - Lessons from the COVID-19 Pandemic to Avert the Next Global Crisis**, 2023, p.219
[313] Lacey Allgood and Karen E. McNamara, **Climate-Induced Migration: Exploring Local Perspectives in Kiribati**, Singapore Journal of Tropical Geography, 2017, Vol. 38, No.3, p.370.
[314] I- Kribati means that most of the people of Kiribati. Xing-Yin Ni, **A Nation Going Under: Legal Protection for "Climate Change Refugees "**, BC Int'l & Comp. L. Rev., 2015, Vol.38, p.333.
[315] Richard Curtain and Matthew Dornan, **A Pressure Release Valve? Migration and Climate Change in Kiribati, Nauru and Tuvalu**, 2019, p.1

In the Nile Delta, sea levels are expected to rise by 50 centimeters by 2025. This could lead to the displacement of at least two million people, the flooding of 1,800 square meters of land and damage to land, property and infrastructure. A one meter rise in sea level in the Nile Delta could affect at least six million people and damage 4,500 square meters of land [316].

4.3.3 Storm/Typhoon/ Hurricane Induced Migration

In East Asia and the Pacific, the storms were less severe than in previous years, but their area of impact was larger, causing more displacement than other natural hazards. Around 6.8 million storms were recorded in 2023. China and the Philippines, which are prone to natural disasters, are two countries with reported high numbers. Tropical Storm Nalgae, Typhoon Muifa and Tropical Storm Megi impacted both China and the Philippines. More than three-quarters of the displacement in the region was due to these three storms [317]. Tropical cyclones affected 9.6 million people in the Philippines. 5.3 million people were displaced by five of the 18 tropical cyclones in the Philippines. Typhoon Rai (Odette)[318], which occurred in 2021 effects continued for a long time. Because of Typhoon Rai displaced 3.9 million people[319].

The tropical storm in Haiti caused major damage in the country in 2008. 800,000 people were directly affected by the storm. The Gonaives and Artibonite region was most affected by the storm. Of the 350,000 residents, 100,000 were displaced [320]. Cyclone Nargis in Myanmar directly affected 2.4 million people and displaced 800,000 people as a result [321].

On average, three to four hurricanes occur in Madagascar every year. Likewise, three hurricanes occurred in the country in 2008. As a result of the hurricanes, 106,000 people died and 340,000 people were displaced[322]. Cyclones Idai and Kenneth displaced hundreds of thousands of people in Mozambique, Malawi, Madagascar,

[316] Compendium of IOM'S Activities in Migration, p.81.
[317] 2023 GRID Global Report on Internal Displacement, p.48.
[318] It is a typhoon that caused torrential rains, strong winds, and landslides in Surigao del Norte and Dinagat Islands in Mindanao, five provinces of the Visayas, and the island of Palawan on 16/12/2021. UNHCR Philippines, https://www.unhcr.org/ph/typhoon-rai-odette (28.04.2024)
[319] United Nations Office for the Coordination of Humanitarian Affairs (OCHA) Annual Report 2022, p.31.
[320] Compendium of IOM'S Activities in Migration, p.168.
[321] Compendium of IOM'S Activities in Migration, p.17.
[322] Compendium of IOM'S Activities in Migration, p. 99.

Zimbabwe, and the Comoros and Mayotte archipelagos. Hurricane Dorian also caused displacement in the Bahamas, neighboring islands, Canada and the United States[323].

4.3.4 Flood Induced Migration

A flood occurs when water rises and overflows onto dry land. This situation can occur due to various scenarios. Flooding can occur immediately when the land surface is unable to absorb or redistribute water due to sufficient rainfall. Another possibility is that the river overflows[324]. The impact of floods, like all other disasters, is quite large. Depending on the severity of the flood, it damages agricultural products, livelihoods, animals and infrastructure. Hundreds of people died and millions were displaced by floods in Nigeria, according to the 2022 OCHA report[325]. Md Mahabub Chowdhury and Marjina Masud's study of Kurigram and Chilmari, two flood-affected areas in northern Bangladesh, showed that people migrated to avoid the negative impact of floods on their lives[326]. Bangladesh is one of the countries where floods are common due to heavy rains. An increase in the frequency of flooding can be observed, particularly after 1990. Between 1970 and 2009, a quarter of the population (an average of 39 million people) was displaced. In 2000, an average of three million people were forced to leave their homes because five coastal counties were flooded. The flood that occurred four years later affected 39 counties and left 36 million people homeless[327]. According to Tahera Aktar's findings on Bangladesh, 2% of the population is displaced by hurricanes, 25% by floods, 0.1% by riverbank erosion and 3% by drought. These rates correspond to 3 million, 39 million, 50,000 and 5 million of the total population, respectively[328].

According to IDMC's 2023 annual report, the number of weather-related displacements in 2022 is 31,845,000. Of these, 19,219,000 are floods, 2,215,000 are droughts, 9,980,000 are storms and 12,000 are high temperatures[329]. By the end of the

[323] IOM Global Report on Internal Displacement 2020, p.4
[324] P.H. Whitfield, **Floods in Future Climates: A Review**, Journal of Flood Risk Management, 2012, Vol.5, No.4, p.336.
[325] OCHA Annual Report 2022, p.6
[326] Md. Mahabub. Chowdhury and Marjina Masud, **Impact of Flood Induced Migration on Livelihood and Gender Relation: A Study on Chilmari, Kurigram**, International Journal of Engineering Applied Sciences and Technology, 2020, Vol.5, No.5, p.6.
[327] Tahara Akter, **Climate Change and Flow of Environmental Displacement in Bangladesh**, Centre for Research and Action on Development, Dhaka, 2009, p.7.
[328] Tahara Akter, p.9.
[329] 2023 GRID Global Report on Internal Displacement, p.9.

monsoon season, 2.1 million people were displaced across India. Additionally, 482,000 people were displaced during the monsoon floods in Bangladesh in 2022[330].

Although there are opinions in the literature that there is no direct connection between environmental degradation caused by climate change and migration, the numbers of people displaced for this reason are showed in international reports. After this chapter, which mentions the connection between climate change, migration and environmental degradation using examples from around the world, the next chapter examines the countries of sub-Saharan Africa.

[330] 2023 GRID Global Report on Internal Displacement, p.61.

CHAPTER FIVE

SUB-SAHARAN AFRICAN

In the last chapter of the study, climate change and migration will be evaluated through Sub-Saharan African countries. After giving general information about the climate of the Sub-Saharan African region, migration caused by climate change will be supported with numerical data for countries

5.1 General Information about Sub-Saharan Countries

Sub-Saharan Africa (SSA) region covers the part of the continent except the five Arab countries of Egypt, Libya, Tunisia, Morocco and Algeria[331]. According to the list published by Republic of Turkiye Ministry of Foreign Affairs, Sub-Saharan African countries are: Angola, Eritrea, Benin, Botswana, Nigeria Burkina Faso, Burundi, Cabo Verde, Swaziland, Chad, Comoros, Côte d'Ivoire, Democratic Republic of Congo, Equatorial Guinea, Ethiopia, Gabon, Ghana, Guinea Bissau, Kenya, Congo, Lesetho, Zimbabwe, Liberia, Madagascar, Malawi, Mali, Central African Republic, Mauritania, Mauritius, Mozambique, Namibia, Niger, , Rwanda, Sao Tome and Principe, Senegal, Gambia, Seychelles, Sierra Leone, Guinea, Somalia, South Sudan, South Africa, Djibouti, Sudan, Tanzania, Togo, Uganda, Zambia,[332].

The African continent faces many problems due to geographical conditions as well as political and socio-economic reasons. When Africa is mentioned, the picture that comes to mind is Sub-Saharan Africa rather than North Africa[333]. North Africa and Sub-Saharan Africa differ in terms of their political and geopolitical differences as well as their humanitarian situation. There are many low-income countries in the Sub-Saharan Africa region that are also vulnerable to climate change[334].

The macroeconomic and socioeconomic levels of these sub-Saharan countries are not homogeneous. While countries like Nigeria and South Africa stand out within the continent and among all countries for their gross domestic product, countries like

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[331] INSAMER, **Afrika'da İnsani Durum**, 2021, https://www.insamer.com/tr/afrikada-insani-durum_3954.html, (13.04.2024)

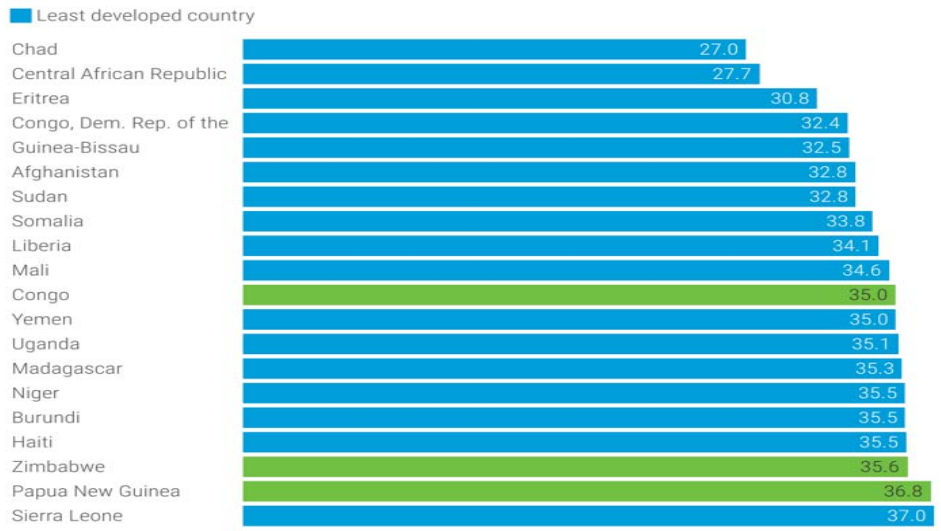
[332] Republic of Turkiye Ministry of Foreign Affairs, Sub-Saharan Africa, https://www.mfa.gov.tr/sub.en.mfa?4be7cc34-c47c-4814-940a-de518162ff84 (13.04.2024).

[333] INSAMER, p.1.

[334] Ahmet Keser, Zeynep Köse and Pelin Aliyev, **Doğal Afetlerin Tetikleyicisi Olarak İklim Değişikliği ile Gıda Güvenliği Arasındaki İlişkinin İncelenmesi: Sahra Altı Afrika Örneği**, Journal of Academic Approaches, 2024, Vol.15, No.1, p.218

Gambia and Guinea-Bissau have the lowest gross domestic product among sub-Saharan and other countries.[335] According to the United Nations Conference on Trade and Development, Mauritania , Angola, Benin, Burundi, Central African Republic, Chad, Comoros, , Djibouti, Eritrea, Togo Ethiopia, Gambia, Guinea, Zambia Guinea-Bissau, Lesotho, Liberia, Madagascar, Malawi, Mali, Mozambique, Niger, Rwanda, Burkina Faso Sao Tome and Principe, Senegal, Sierra Leone, Democratic Republic of the Congo, Somalia, South Sudan, Sudan, Uganda, United Republic of Tanzania and are the countries in Sub-Saharan Africa countries which are located 45 least developed countries in the world[336]. The World Bank supports the economies of sub-Saharan Africa to address their existing economic, social and political challenges, as well as those posed by climate change. $385 million was provided to sub-Saharan countries to adapt to climate change, which were severely affected by drought, floods and rising temperatures. In this way, the undeveloped groundwater in Somalia, Kenya and Ethiopia is to be benefited from. Access to water supplies will reduce vulnerability to climate change[337].

Figure 3*: The 20 Countries that are the Most Vulnerable to and Least Ready for the Climate Crisis, 2021*[338]



[335] Umut Ünal, **Sahra Altı Afrika Ülkelerinde Yoksulluğun Doğası ve Sebepleri Üzerine**, 2018, p.2.
[336] UNCTAD, **Least Developed Countries Report 2023**, https://unctad.org/topic/least-developed-countries/list , (15.04.2024).
[337] The World Bank, **Groundswell Acting on Internal Climate Migration Part II**, 2021, p.17.
[338] UNCTAD, **Least Developed Countries are Highly Vulnerable to Climate Change** https://unctad.org/publication/least-developed-countries-report-2023 (15.04.2024)

Source: Notre Dame Global Adaptation Initiative (ND-GAIN)[339] https://gain.nd.edu/our-work/country-index/rankings/

According to the 2023 UNCTAD report, 17 of the 20 countries are most affected by climate change between 1961 and 2021 are the least developed countries and they having faced 69% of global climate-related deaths [340]. Although the majority of climate refugees migrate within the continent, a significant proportion of them reach European countries. Migration caused by the challenges of climate change also triggers the existing problems of health systems. Considering that immigrants make up almost 9.6% of the European population, the rate of climate-related diseases will increase in Europe[341].

Due to climate change, agricultural productivity and production rates are expected to decline by 18.6% over the next 50 years [342]. While the decline in rainfall could potentially have a negative impact on the world, Sub-Saharan Africa has historically been at the forefront with its lack of rainfall. In some countries in sub-Saharan Africa, lack of rainfall is causing food and water shortages and leading to the death and displacement of a large proportion of the population[343]. Most Sub-Saharan African countries are among the food deficit countries due to the impact of climate change on food resources and currently also for economic reasons. The economies of sub-Saharan countries, which are largely dependent on natural resources, are severely affected by the increase in climate-related disasters. Deforestation, desertification and land degradation have a negative impact on agricultural production. Considering that a large part of the population uses agriculture as a source of income, the vulnerability of economies will increase significantly[344]. Climate shocks in sub-Saharan Africa are complicating access to food and causing hunger problems. More than 31.5 million

[339] ND-GAIN combines measures of vulnerability and readiness of countries.
[340] UNCTAD, https://unctad.org/publication/least-developed-countries-report-2023.
[341] Maya Negeva, Na'ama Teschner, Anat Rosenthalc, Hagai Levined, Clara Lew-Levya, Nadav Davidovitch, **Adaptation of Health Systems to Climate-related Migration in Sub-Saharan Africa: Closing the Gap,** International Journal of Hygiene and Environmental Health, 2019, p.312.
[342] William R. Cline, **Global Warming and Agriculture**, Center for Global Development and Peterson Institute for International Economics, p.2
[343] Barrios Salvador, Bertinelli Luisito and Eric Strobl, **Climatic Change and Rural-Urban Migration: The Case of Sub-Saharan Africa**, Journal of Urban Economics, 2006, Vol.60, No.3, p.8.
[344] Johanna Klein and Stefanie Reiher, ''Sub Saharan Africa – Potentials and Barriers for Green(er) Economies'', **The Rise of the Green Economy A New Paradigm for the Developing World?,** (Editors Alexander Carius, Dennis Tänzler, Elsa Semmling), 2016, p.178.

people are struggling with the hunger crisis in Ethiopia, Kenya, Somalia and South Sudan[345].

There are 34 Sub-Saharan African countries in the Low-Income Food-Deficit Countries (LIFDCs) list, which was last updated by the Food and Agriculture Organization of the United Nations in June 2023. Benin, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Comoros, Congo, Democratic Republic of the Congo, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Niger, Rwanda, Sao Tome and Principe, Senegal, Sierra Leone, Somalia, South Sudan, Sudan, Togo, Uganda, United Republic of Tanzania and Zimbabwe stand out with low income and lack of food[346].

In the countries of sub-Saharan Africa, the temperature is quite high in the regions that are at sea level. Forest does not occur except in the mountains of East Africa. In the countries south of the Sahara, some of which have a tropical climate, the climate varies from region to region. Latitude, altitude and mountains play an important role in this variability [347]. Up to certain latitudes north and south of the equator, the climate is rainy in summer and dry in winter. These seasons, along with high temperatures, lead to the creation of savannahs (grasslands) that cover more than half of the African continent. The further you are from the equator, the longer the dry season lasts and deserts form. Examples include deserts in North Africa, including the Sahara and parts of the Horn of Africa. In the south lie the Namib and Kalihari deserts[348].

5.2 Sub-Saharan Africa, Climate Change and Migration

Climate influences how people can live under what conditions. Environmental degradation caused by climate change has led to major changes on the continent. Climate change threatens human life in the short term and also has a long-term negative impact on the livelihoods of developing and vulnerable countries. Climate

[345] OXFAM, p.2.
[346] FAO, **Low-Income Food-Deficit Countries**, 2023, https://www.fao.org/countryprofiles/lifdc/en/ , (15.04.2024).
[347] Fatma Yılmaz, **Ekoturizmde Kültür ve Coğrafyanın Etkisi: Sahraaltı Afrika Bölgesi Örneği**, Necmettin Erbakan Unıversity, Socıal Science Instıtute, Konya, 2022, p.28
[348] David E. Bloom, Jeffrey D. Sachs, Paul Collier and Christopher Udry, **Geography, Demography, and Economic Growth in Africa**, Brookings Papers on Economic Activity, 1998, Vol. 2, p.221-222.

change shows its effects more clearly, particularly in vulnerable countries where the likelihood of an economic crisis is low[349].

The United Nations assesses climate change as a "threat multiplier," noting that in regions where poverty, conflict and access to basic resources such as water are difficult, climate makes these problems even more difficult[350]. Difficult access to resources and environmental tensions are increasing the number of people migrating to the region. The food and water crisis in some sub-Saharan African countries threatens the health of millions of people and poses a security problem. As a result, people are migrating to regions where their food, water and health are safer[351]. In Africa, where there is currently water scarcity due to the natural climate structure, climate change is expected to further increase air temperatures and reduce rainfall [352].

Table1: **SSA Displacement between 2013-2022**

Region	**General Internal Displacement in SSA between 2013-2022**		**Internal Displacement in SSA by natural disasters between 2013-2022**
SSA	**2013**	**3.7 m**	**1.6 m**
	2014	**4.5 m**	**0.7 m**
	2015	**2.2 m**	**1.1 m**
	2016	**2.7 m**	**1.1 m**
	2017	**5.5 m**	**2.6 m**
	2018	**7.4 m**	**2.6 m**
	2019	**4.6 m**	**3.4 m**

[349] African Union and IOM, p.66.
[350] United Nations General Assembly, 2009 cited by Ezgi Kovancı and Duygu Yıldız Karakoç, **Bir Güvenlik Tehdidi Olarak İklim Değişikliği**, 2019, p350
[351] Saliha Metin, **Afrika'da İklim Değişikliğinin Etkileri: İklim Adalet ve Göç**, Journal of Mediterranean Basin and African Civilizations, 2023, Vol. 5, No. 2, p.111.
[352] Saliha Metin, p. 106

	2020	**6.8 m**	**4.4 m**
	2021	**11.5 m**	**2.6 m**
	2022	**9 m**	**7.4 m**

Source: IDMC 2023 GRID Global Report on Internal Displacement**,** p.16.

Climate variability and drought are a driving factor of migration in sub-Saharan Africa. Major droughts played a crucial role in migration. Climate migration is expected to increase in sub-Saharan Africa. By 2050, the expected number of climate refugees in East Africa is expected to reach 12.1 million [353]. Due to the increasing drought in the Sahel[354], thousands of people had to migrate and continue their lives in camps[355]. It is estimated that 75 to 250 million people will lack access to drinking water due to drought and desertification in Burkina Faso, Mozambique, Nigeria, Rwanda, Somalia, Tanzania, Sudan, Ethiopia and Malawi. The proportion of dry areas is expected to increase by 10% in 2080[356].

According to the IPCC's Fourth Synthesis Report, Africa is one of the regions most at risk from climate change [357]. The effects of population growth and climate change will continue to increase the frequency of natural disasters in the future [358]. According to development scenarios, the population in East Africa is expected to initially reach 675 million and then 786 million by 2050. This population growth and climate change will also create greater challenges for countries' development[359].

[353] Rigaud, K.K., A. de Sherbinin, B. Jones, J. Bergmann, V. Clement, K. Ober, J. Schewe, S. Adamo, B. McCusker, S. Heuser, A. Midgley **Groundswell: Preparing for Internal Climate Migration,** 2018 cited by African Union and IOM p.69.
[354] World Meteorological Organization, **State of the Climate in Africa 2021**, 2022, p.24.
[355] Saliha Metin, p.107.
[356] Seda Yurtcanlı Duymaz, p.18.
[357] Fourth Synthesis Report, p.65.
[358] CRED, **Disasters in Africa: 20 Year Review (2000-2019)**, No.56. p.1
[359] Rigaud, K.K., A. de Sherbinin, B. Jones, J. Bergmann, V. Clement, K. Ober, J. Schewe, S. Adamo, B. McCusker, S. Heuser, A. Midgley **Groundswell: Preparing for Internal Climate Migration,** 2018 cited by African Union and IOM p.69

Table 1. Displacement of Five Countries in 2022

Country	General Internal Displacement in 2022	Internal Displacement by natural disasters in 2022
Dem. Rep. Congo	**4,004,000**	**423,000**
Ethiopia	**2,032,000**	**873,000**
Nigeria	**148,000**	**2,437,00**
Somalia	**621,000**	**1,152,000**
South Sudan	**337,000**	**596,000**

Source: IDMC 2023 GRID Global Report on Internal Displacement, p.16.

Estimates suggest that one in 45 people will have to move due to climate change by 2050[360]. In recent years, the number of people forced to leave their homes due to natural disasters, drought or other factors caused by rising temperatures has increased. According to the OXFAM report, East Africa experienced large numbers of migrations as a result of natural disasters caused by climate change, such as floods and droughts. More than two million people have been displaced in East Africa in the last two years[361]. Lake Chad, which has shrunk by 90%, has displaced millions of people in need of water over the past 60 years. 2.5 million people had to migrate to Cameroon,

[360] Md Moynul Ahsan and Nehir Varol, **Çevreden Kaynaklanan Göçün Boyutu: Gelişmiş ve Gelişmekte Olan Ülkeler Üzerine Bir Çalışma**, Anthropology, 2020, Vol.39, p.123.
[361] OXFAM, p.7

Niger and Chad [362]. Lake Chad plays an important role in the lives of a total of 25 million people from four different countries[363] .

Sub-Saharan African countries are affected by many different disasters. In the 19-year period from 2000, there were 60 drought-, flood- and storm-related events in Kenya, 55 in Mozambique and 54 in South Africa. According to the report published by the World Bank, climate change has serious impacts, particularly for poor and vulnerable regions.

Table 3: Hotspots for Drought

Country	Environmental Consequences of Climate Change	Number of Affected People
Dem. Rep. Congo	**Drought**	**26.0 million**
Ethiopia	**Drought**	**24.1 million**
Nigeria	**Drought**	**19.1 million**
Sudan	**Drought**	**11.8 million**
Niger	**Drought**	**4.4 million**
Burkina Faso	**Drought**	**3.5 million**

Source: EMDAT, **2022 Disasters in Numbers**, p.5, https://www.cred.be/sites/default/files/2022_EMDAT_report.pdf

[362] Füsun Özerdem and Burhan Barlas, p.281.
[363] World 101 From the Council on Foreign Relations, **Regions of the World Sub-Saharan Africa**, https://world101.cfr.org/rotw/africa/people-and-society#climate-refugees-represent-growing-crisis

According to the Emergency Event Database (EMDAT) 2022 report, some countries most affected by drought include the Democratic Republic of Congo, Ethiopia, Nigeria, Sudan, Niger and Burkina Faso. The number of people affected by the flood is 26 million, 24.1 million, 19.1 million, 11.8 million, 4.4 million and 3.5 million, respectively[364]. It is estimated that at least 216 million people will have to migrate by 2050 due to climate change. Sub-Saharan Africa with its dry areas is considered the most fragile region. The number of people migrating in sub-Saharan Africa due to climate change in 2050 is expected to be 85.7 million. This value corresponds to 4.2% of the region's total population[365].

While the prolonged drought severely affected agricultural production in Mozambique, storms Idai and Kenneth in 2019 caused the displacement of 640,000 and 45,000 people, respectively. Cyclone Kenneth caused high levels of displacement not only in Mozambique, but also in Malawi, Madagascar and Zimbabwe. Heavy rains prevented people in the region from returning to their homes. Even a year after the cyclone, over 100,000 people were still displaced[366]. La Niña and cooling surface temperatures in the central and eastern equatorial Pacific have caused droughts in some parts of the Horn of Africa and storms and floods in others. Damage to livestock and crops negatively impacted livelihoods and food security[367].

Compared to 2021, 16.5 million internal displacements were recorded in sub-Saharan Africa. This means that there was a 17% increase in 2022. This reflects the fact that the number of people displaced by the disaster increased on average three-fold to 7.4 million. The negative impacts of drought, desertification and erratic weather conditions on livelihoods can also cause conflict and trigger internal displacement. Ethiopia, Democratic Republic of Congo, Somalia, Nigeria, Central African Republic, Cameroon and South Sudan, Nigeria, Somalia and Kenya are among the top 10 displaced by the disaster. In most of these countries, natural disasters led to conflict and, as a result of these conflicts, there was more migration [368].

[364]EMDAT, **2022 Disasters in Numbers**, p.5, https://www.cred.be/sites/default/files/2022_EMDAT_report.pdf (20.04.2024).
[365] The World Bank, p.80.
[366] EMDAT, https://www.emdat.be/publications/ , (20.04.2024).
[367] 2023 GRID Global Report on Internal Displacement, p.18.
[368] African Union and IOM, p.55.

135 million people are at risk of displacement due to desertification in sub-Saharan Africa, particularly in the Sahel and the Horn of Africa. Loss of productive land and land degradation are the driving forces of forced migration [369]. Many people have had to migrate due to climate shocks and conflicts in the Central Sahel, which mainly consists of Mauritania, Mali, Niger, Chad, Sudan, Eritrea, Senegal, Burkina Faso, Nigeria, South Sudan and Ethiopia[370]. The number of climate-related disasters in the sub-Saharan Africa region and their impact on vulnerable families are increasing day by day. In most countries in West and Central Africa, not only droughts but also floods were observed. In 2021, 1.4 million people in 15 West and Central African countries were affected by floods[371].

5.2.1 Mozambique

Mozambique is one of the least developed countries in Southeast Africa. Rising temperatures and rainfall in Mozambique are already triggering violent extreme weather events. Between 1970 and 2013, Mozambique experienced 34 hurricanes and five major floods [372]. Over the past 25 years up to 2013, Mozambique experienced prolonged droughts and floods, which directly impacted the country's economy. The most severe drought periods were 1981–1984, 1991–1992 and 1994–1995; Floods were observed in 1977–1978, 1985, 1988, 1999–2000 and 2007–2008. Displacements in Mozambique are triggered by recurring floods in the Zambezi River valley and droughts on the fertile banks of the Zambezi River. Flooding and Tropical Cyclone Eline in 2000 left thousands of people homeless. The floods in Mozambique provide a framework for the possible consequences that many developing countries could experience as a result of climate events. Hurricane Favio, which occurred seven years later, also caused flooding in the Zambezi. In 2008, more than 90,000 people were again displaced as a result of the flooding of the Zambezi. In addition to floods, hurricanes and droughts, soil erosion and sea level rise also have a negative impact on

[369] UNCCD, **Desertification- The Invisible Frontline**, 2014, p.7. https://www.unccd.int/sites/default/files/documents/12112014_Invisible%20frontline_ENG.pdf (20.04.2024).
[370] Durdu Mehmet Özdemir, **İklim Değişikliğine Bir Örnek: Yüzde 95'i Kuruyan Çad Gölü**, Journal of Kriter, 2021, https://kriterdergi.com/dosya-afrikada-turkiye/neden-ve-sonuc-olarak-afrikada-goc (20.04.2024).
[371] OCHA, p.117.
[372] Vanesa Casta´n Brotoa, Bridget Oballab and Paulo Junior, **Governing Climate Change for a Just City: Challenges and Lessons from Maputo, Mozambique**, Local Environment, 2013 Vol. 18, No. 6, p.684.

the lives of people along the coast[373]. Cyclone Idai in 2019 caused widespread destruction in Mozambique, Malawi and Zimbabwe. The hurricane was so violent that the city of Beria was cut off from the rest of the world. Thousands of people were displaced after this devastating hurricane[374].

In Maputo, the capital of Mozambique, representatives of international organizations and scientists working on migration and the environment conducted a survey of displaced people in the Zambezi, mainly in urban areas. As a result of this study, it was concluded that thousands of people were displaced as a result of the flood in Mozambique and that internal migration shows that environmental disasters have had a devastating impact on the country's economy. Although the impact of environmental change is so great, there is a need for government support programs to protect fertile land for agriculture[375].

5.2.2 Niger

Although Niger is one of the largest countries in Africa, there are no settlements in these parts as 65% of its land lies in the Sahara. From north to south, the desert turns into a semi-arid savanna and then into a tropical region[376]. Among the triggering factors in Nigerians' decision to migrate are drought, the drying up of Lake Chad, deforestation and Niger river problems.

The triggering factors for Nigerians' decision to migrate include drought, drying up of Lake Chad, deforestation and problems with the Niger River. The negative impact of climate change on environmental degradation in Niger is visible. Droughts caused by climate change are leading to conflicts over livelihoods. The shrinking of Lake Chad due to irregular rainfall and hot climate is also a clear consequence of climate change[377]. Climate change threatens food security by negatively impacting socio-economic development in some parts of the country. The country's rainfall deficit in 2021 negatively impacted agricultural productivity. As of

[373] Marc Stal, **Flooding and Relocation: The Zambezi River Valley in Mozambique**, 2011, p.128, 129.
[374] Carolien Jacobs and Bernardo Almeida, **Land and Climate Change: Rights and Environmental Displacement in Mozambique**, Van Vollenhoven Institute for Law, Governance and Society, 2020, p.3.
[375] EACH-FOR Environmental Change and Forced Migration Scenarios, **D.3.4. Synthesis Report**, 2009, p.41.
[376] Dr. Tamer Afifi, **Economic or Environmental Migration? The Push Factors in Niger**, 2011, p.95.
[377] Dr. Tamer Afifi, p.104.

October 2023, floods have affected the lives of at least 327,000 people. 195 of these resulted in death[378].

During Afifi's fieldwork, a total of 80 people, 60 immigrants and 20 non-immigrants, participated in the survey. In the field study with 25 experts, the places visited in the Niamey region were randomly selected. Although people who migrate cite poor living conditions as the main reason for migration, environmental problems are the main reason. Due to Niger's climate, seasonal migration has always been an option. However, the fact that migration has become a long-term and permanent option shows the influence that climate-related environmental degradation has on the migration decision[379]. For this reason, long-term migrations occur to Nigeria, Mali, Chad, Cameroon and Benin[380].

5.2.3 Senegal

Senegal is located in a semi-arid region with limited water resources**.** The vegetation of Senegal, located in West Africa, generally consists of bush savanna. A decrease in rainfall was observed, particularly in the 1960s. While the central and northern parts of the country are affected by drought, erosion and decline in soil fertility are other environmental concerns[381]. In Senegal, where environmental degradation and climate change are affected, rural-urban migration is observed intensively. Economic and political reasons as well as environmental destruction and survival purposes are important factors in the decision to migrate[382] .

Rainfall deficit, drought and climate fluctuations caused by climate change have a negative impact on the country's livelihoods and food security. This effect is expected to increase gradually. The fact that more than half of the population's source of income comes from agriculture makes the situation even more significant. It is possible that environmental degradation could necessitate migration or even forced migration. An example of this is migration from forest areas to urban areas[383].

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[378] OCHA, p.132
[379] Dr. Tamer Afifi, p.116.
[380] EACH-FOR Environmental Change and Forced Migration Scenarios, p.43
[381] EACH-FOR Environmental Change and Forced Migration Scenarios, p.44
[382] Frauke Bleibaum, ‘’Case Study Senegal: Environmental Degradation and Forced Migration’’, **Environment, Forced Migration and Social Vulnerability**, (Editors Tamer Afifi l Jill Ja¨ger), p.187
[383] IOM Compendium of IOM’S Activities in Migration, p.123.

It is difficult to establish a direct link between climate change and irregular migration in Senegal. Negative environmental factors in Senegal negatively impact people's lives and make them defenseless. People who have no other options other than migration may choose to migrate for a better life [384].

5.2.4 Ghana

In the Republic of Ghana, located in the Gulf of Guinea in West Africa, there is inequality between the northern and southern parts of the country. While agriculture is developed in the southern parts of the country, it is less developed in the northern parts. Except for northern Ghana, the entire country has a tropical climate with two seasons. The vegetation cover in the north of the country consists of savannahs, low rainfall and frequent droughts are the prominent features of the region. Environmental problems in Ghana can be listed as follows: water scarcity, desertification and drought in the northern parts of the country; soil degradation and erosion; deforestation; sensitive coastal and marine areas; and water pollution. Kees van der Geest's study considers the environment as a triggering factor for migration from the dry areas in the north of Ghana to the south of the country. In addition to the 203 immigrants who migrated to the inner city from northwest Ghana, 37 other immigrants were also interviewed for the EACH-FOR project. For the hypothesis that migration increases as environmental problems increase, an analysis was conducted using census and age data. Migration is a preferred strategy by both migrants and their relatives to improve food security. For most migrants, declining soil fertility, erratic rainfall and food security issues are environmental issues that trigger migration. As a result of the analysis of secondary data, it was found that migration is more preferable where natural resources are scarce, rainfall is low, and the rural population rate is high. The main cause of migration in northern Ghana is likely to be the lack of fertile land rather than environmental degradation and disasters. Between 1970 and 1980, despite the drought in the Sahel, there was a decline in north-south migration. This situation can be explained by the economic crisis and political instability in the country. It was concluded that economic and political conditions could reduce the relationship between migration and environmental pollution[385].

[384] IOM Compendium of IOM'S Activities in Migration, p.124.

[385] EACH-FOR Environmental Change and Forced Migration Scenarios, p.47.

5.2.5 Zimbabwe

Compared to previous years, Zimbabwe became a much hotter and drier country at the end of the 20th century. Irregular rainfall has a negative impact on rain-fed agriculture and other sectors. In Zimbabwe, which has a semi-arid and arid climate, rainfall decreases towards the south[386]. Extreme climate events caused by climate change are estimated to negatively impact agricultural productivity in Zimbabwe. Climate change can also have devastating effects such as heavy rain, floods and hurricanes[387].

In Gokwe, Zimbabwe's largest region, the main income comes from cotton. Therefore, the economic impacts of climate change are expected to be large both locally and internationally in Gokwe. As a result of the correlation tests, it was concluded that the relationship between increase in temperature, decrease in precipitation and decrease in cotton production is linear. As a result of the droughts of 1981–1982 and 1991–1992, there was a visible decline in cotton production. The economic consequences of the decline in cotton production have led to migration to cities to make a living [388].In Zimbabwe, widespread displacement occurred as a result of tropical cyclones. In addition, thousands of people have been displaced due to flooding in Tokwe Mukosi district [389].

The climate in Zimbabwe has been characterized by rising temperatures and rainfall deficits in recent years. The desertification occurring in the southern parts of the country is seen as a result of climate change. The vulnerability of the agricultural sector affected by climate change is exacerbated by policies that negatively impact its potential to adapt to climate change. With declining livelihoods and limited economic opportunities, migration is a preferred strategy[390]. Due to the negative impacts of climate change on agriculture, livelihood diversification is considered an adaptation

[386] Sandra Bhatasara, **Rethinking Climate Change Research in Zimbabwe**, Journal of Environmental Studies and Sciences, 2017, p.39-40.
[387] IOM Compendium of IOM'S Activities in Migration, p.135.
[388] Donald Brown, Rabecca Rance Chanakira, Kudzai Chatiza, Mutuso Dhliwayo, David Dodman, Medicine Masiiwa, Davison Muchadenyika, Prisca Mugabe and Sherpard Zvigadza, **Climate Change Impacts, Vulnerability and Adaptation in Zimbabwe**, International Institute for Environment and Development, 2012, p.6.
[389] Mediel Hove, **When Flood Victims Became State Victims: TokweMukosi, Zimbabwe**, Democracy and Security, 2016, p.136.
[390] IOM Compendium of IOM'S Activities in Migration, p.139.

strategy in Murowa District. Migration has also occurred in Zvishavane, a city in Zimbabwe, and other cities due to climate change[391].

5.2.6 Mauritius

Tropical small island states, including the Republic of Mauritius, are vulnerable to rising sea levels, temperature changes and extreme weather events[392]. The Republic of Mauritius consists of many islands and is located in the Indian Ocean near Madagascar. In Mauritius, most of the rural areas are along the coast. Villages along the coast face the risk of coastal erosion in addition to the risk of sea level rise. Mauritius is considered one of the small island states and is affected by tropical storms and irregular rainfall due to its location in the Indian Ocean[393]. Mauritius is vulnerable to the negative impacts of climate change and environmental disasters caused by climate change. Sea level rise, irregular rainfall patterns and hurricanes are among the devastating effects of climate change in Mauritius[394].

While coastal communities are vulnerable to erosion and sea level rise, some central communities in the country are also at risk of drought. Cyclones, floods caused by heavy rainfall, drought and erosion are the biggest disasters in Mauritius[395].

Although Mauritius is sensitive to climate change, environmental degradation in the country is not considered a trigger for migration. Little attention has been paid to the economic consequences of environmental degradation in Mauritius[396].

5.2.7 Ethiopia

Migration triggered by rising temperatures and extreme weather events occupies an important place on the agenda in most African countries. In this context, Ethiopia is a country where extreme weather events lead to water and food shortages and food insecurity[397]. Agriculture, which plays an important role in Ethiopia's

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[391] V.T. Mutekwa, **Climate Change Impacts and Adaptation in the Agricultural Sector: The Case of Smallholder Farmers in Zimbabwe**, Journal of Sustainable Development in Africa, 2009, Vol.11, No.2, p.249.
[392] Laura Jeffery, **Sustainable Mauritius? Environmental Change, Energy Efficiency, and Sustainable Development in a Small Island State in the Indian Ocean,** 2019**,** p.177.
[393] Shreetee Devi Appadu, **Assessing the Relationship Between Climate Change and Human Migration in the Republic of Mauritius**, 2021, p.13-14.
[394] IOM Compendium of IOM'S Activities in Migration, p.111
[395] Shreetee Devi Appadu, p.25.
[396] Shreetee Devi Appadu, p.24.
[397] Walter Leal Filho, Desalegn Yayeh Ayal, Desalegn Dawit Chamma, Marina Kovaleva, Gabriela Nagle Alverio, Daniel M. Nzengya, Serafino Afonso Rui Mucova, Jokastah Wanzuu Kalungu,

economic development, is also a source of income[398]. Repeated droughts in the Somali region of Ethiopia have led to food insecurity. While the drought negatively impacted the agricultural sector, deaths occurred in pastoralist herds due to lack of water[399]. For this reason, hunger and a decline in living standards are observed in the country as a result of drought triggered by climate change. Ethiopia's prevailing poverty, economic, political, and environmental problems have attracted attention in the study of the country's environmental migration[400].

The destruction of livelihoods caused by the major drought in 2015 directly or indirectly affected the lives of 10.2 million people in Ethiopia.[401]. There were also 2.1 million migration movements in Somalia and Kenya [402]. The number of drought-related displacements was 130,597 in 2019[403]. The impact of water and food shortages resulting from the drought in 2020-2023 continues. Agro-pastoralist communities in the Somali region, one of Ethiopia's regions, make their living from farming. While 10% of people made money from growing crops during the drought, this rate fell to 6% in the final periods of 2023[404].

Wondimagegnhu and Zeleke chose Habru north of the capital Addis Ababa as their research area. Habru Province uses migration as a livelihood strategy. Due to the drought in this region and the negative impact it has on livelihoods, people prefer seasonal or permanent migration. In the survey, which was conducted with the aim of randomly selecting 200 houses to represent 2473 houses, most rural residents (95.16%) reported that drought was the main reason for migration. The remaining small group did not give their reasons for migrating. While almost all (97.4) of the migrant

Gustavo J. Nagy, **Assessing Causes and Implications of Climate-induced Migration in Kenya and Ethiopia**, Environmental Science and Policy, 2023, p.149.

[398] Abebayehu Girma Geffersa, **Effects of Climate Shocks on Household Food Security in rural Ethiopia: Panel Data Estimation**, Wageningen University – Department of Social Sciences, 2014, p.27.

[399] REACH, **The Impact of Drought and Climate-Related Shocks on Livelihood Practices in Somali,** 2024, p.1

[400] Clark Gray and Valerie Mueller, **Drought and Population Mobility in Rural Ethiopia**, World Development, Vol.40, No.1, 2012, p.136.

[401] Insamer, https://www.insamer.com/tr/etiyopya-kuraklik-ve-gida-krizi_269.html (21.04.2024).

[402] GRID 2023, p.6.

[403] Bülent Gülçubuk and Hasan Parça, '' Dünyada Göç Hareketliliğinin Yeni Bir Belirleyicisi: İklim Değişikliği ve Etkileri'', **International Studies on Natural and Engineering Sciences** (Editors Aydın Ruşen and Sadık Alper Yıldızel), p.80

[404] REACH, p.4

household heads indicate that drought is a triggering factor in the migration decision, according to others, drought is not one of the migration factors[405].

Clark Gray and Vlaerie Mualler used results from the Ethiopian Rural Household Survey (ERHS), which collected data from 1,500 households over a 15-year period. According to the results, it was concluded that drought had an impact on population mobility in some parts of Ethiopia. The drought has caused the migration rate of men to more than double. Those who had difficulty dealing with the drought problem were more vulnerable to drought. This conclusion is consistent with the assumption that mobility is a coping mechanism[406].

5.2.8 Kenya

Kenya's economy is heavily dependent on natural resources and stable ecosystems. For this reason, the effects of climate change and environmental degradation trigger poverty and violence, whether they occur slowly or quickly[407]. Natural or human-induced disasters such as drought, floods, storms, land degradation, fire and armed attacks affect an average of 3 to 4 million people every year. Kenya is also among the countries prone to earthquakes, infrastructure problems and human and animal diseases[408]. Kenya is facing a severe drought due to consecutive seasons of low rainfall. Drought caused the death of 2.5 million animals. Drought is also causing conflict in Baringo, Nyeri, Meru, Lamu, Mandera, Turkana and Marsabit districts[409]. Climate risks in Kenya, which has the largest economy in East Africa with around 54 million inhabitants, also endanger development goals [410]. In addition to the economy's reliance on agriculture and livestock, Kenya's dry soil and generally high temperatures make the country physically vulnerable to drought [411].

, [405] Beneberu Assefa Wondimagegnhu and Mesfin Eshetu Zeleke, **Determinants of Rural Out-Migration in Habru District of Northeast Ethiopia**, International Journal of Population Research, 2017, p.6.

[406] Clark Gray and Valerie Mueller, p.142.

[407] Trabajo Fin de Grado, **Influence of Climate Change on Migration Study Case: Kenya**, 2022, p. 14.

[408] Government of the Republic of Kenya, **Third Medium Term Plan 2018-2022 Transforming Lives: Advancing Socio-economic Development Through the "Big Four"**, 2018, p.111.

[409] OCHA, p.101.

[410] USAID(United States Agency for International Development) from the American People, **Kenya Climate Change Country Profile**, 2023, p.1

[411] Trabajo Fin de Grado, p.14.

Migration is preferred as a solution to the drought problem. Examples of this situation include herders crossing the Ugandan border in search of pasture. In addition to this seasonal migration, temporary internal labor exodus is common in Kenya. In addition to those who migrate completely out of the region to continue their lives, there are also those who migrate within the country to expand their sources of income[412].

Drought is also a major problem for livestock farming in the Tana River area, which includes Isiolo in the north, Kilifi in the south and Kitui in the west [413]. The spread of drought increases pressure in many ways and leads to conflict in the region. The damage to animal health caused by the drought is affecting livestock farmers' sources of income. In drought-affected northern and southern regions, mobility is preferred as a coping method[414]. In Kenya, temporary and permanent migration is also viewed as a livelihood strategy [415].

On the other hand, some parts of Kenya are facing flooding due to rain and rising sea levels. For example, excessive rainfall caused flooding in Nairobi, the capital of Kenya [416]. Floods have a negative impact on livelihoods as they reduce soil fertility [417]. According to the Kenya Red Cross, the floods killed a total of 186 people and affected 800,000 people. This figure includes an average of 300,000 people displaced by floods[418].

5.2.9 Somalia

Somalia is one of the East African countries vulnerable to the effects of climate change due to its weak economy. For this reason, mass displacement and forced migration are occurring in Somalia due to the negative impacts of climate change[419].

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[412] Trabajo Fin de Grado, p.16-17.
[413] Hussein Abdullahi Mahmoud, Padmini Iyer, Louisa Brain, Maissoun Hussein, **Closing the Environment Migration Gap in Climate Policy and Programmes in Kenya**, The Research and Evidence Facility Consortium, 2023, p.7.
[414] Hussein Abdullahi Mahmoud et al. p.13.
[415] Clark L. Gray, **Soil Quality and Human Migration in Kenya and Uganda**, Global Environmental Change, 2011, p.423 cited by Black, R., Crush and J., Peberdy, Migration and Development in Africa: An overview, Idasa Publishing, 2006.
[416] Mary Kilavi, Dave MacLeod, Maurine Ambani, Joanne Robbins, Rutger Dankers, Richard Graham, Helen Titley, Abubakr A. M. Salih and Martin C. Todd, **Extreme Rainfall and Flooding over Central Kenya Including Nairobi City during the Long-Rains Season 2018: Causes, Predictability, and Potential for Early Warning and Actions**, Atmosphere, 2018, Vol.9, No.12, p.11.
[417] Trabajo Fin de Grado, p.18.
[418] OCHA, **Floods in Kenya**, 2018, https://perma.cc/B47A-HSYF (21.04.2024).
[419] E.J. Meeking, **A Study of Climate Change Induced Migration in Somalia**, E-International Relations, 2013, p.2.

Severe drought led to water shortages and negatively impacted Somalia's agricultural sector. Many people were displaced due to livelihood problems, water shortages and hunger. The impact of climate change on migration is undeniable in Somalia. However, in Somalia, food and water security is one of the reasons for forced migration[420].

Before 2011, the country experienced many droughts. Droughts were observed in different parts of the country in 1974-75, 2001, 2006 and 2008. Disasters in other countries have indirectly led to some disasters in Somalia. For example, heavy rains in Ethiopia in 2001 caused floods in the southern parts of Somalia. Because of this, there were a lot of migrations. The flood disaster in 2001 was not limited to this situation and droughts continued one after another. This situation increased the country's vulnerability[421].

Due to the drought in Mogadishu, the capital of Somalia, a total of 31,400 people were displaced between January and March 2011. 60% of displaced people said that drought was the main cause of this movement, and 20% of respondents said that lack of livelihoods were reasons for migration[422]. Due to the drought in Somalia in 2011, Ethiopia and Kenya were among the countries that recorded the most immigration flows. The average daily number of immigrants was 2,000 in Ethiopia and 1,200 in Kenya. According to the OCHA report in 2017, the drought in the Horn of Africa led to the displacement of about 943,000 people in Somalia. The main reasons for this displacement include the search for water and food[423]. In Somalia, the negative impact of environmental conditions on their livelihoods led them to move from rural to urban areas. The drought, which affected the health and daily lives of animals, ultimately forced people to use migration as a solution[424].

5.2.10 Burkina Faso

Burkina Faso is one of the poorest countries in sub-Saharan Africa. Burkina Faso can be examined in three main regions. Firstly, the Sahel region which receives

[420] E.J. Meeking, p.3.
[421] Mehdi Achour and Nina Lacan, **Drought in Somalia: A Migration Crisis**, The State of Environmental Migration, 2011, p.78.
[422] Mehdi Achour and Nina Lacan, p.82.
[423] Shazia Chaudhry and James Ouda, **Perspectives on the Rights of Climate Migrants in the Horn of Africa: A Case Study of Somalia**, Journal of Somali Studies: Research on Somalia and the Greater Horn of African Countries, 2021, p.15 cited by OCHA, 2017.
[424] Mehdi Achour and Nina Lacan, p.81.

an average of less than 600 mm of rainfall per year, the North Sudan region which receives an average of 600-900 mm of rainfall per year and finally the South Sudan which receives an average of more than 900 mm of rainfall per year [425]. The livelihood of the people of Burkina Faso depends on animal husbandry and agriculture. Rain is very important for the countries of Burkina Faso as agriculture is largely dependent on rain. Because of this, it is possible to see the major impacts of climate change on households and livelihoods. Precipitation is considered a reason for temporary or permanent migration in the country. Apart from climate change affecting livelihoods as the primary cause, migration has historically been the preferred method in the country. For this reason, Burkina Faso is one of the appropriate countries to study environmentally induced migration[426].

Drought and desertification have a negative impact on agriculture and resources. Due to persistent droughts, farmers are migrating to the east or west of the country [427]. According to the results of the survey, conducted with a total of 465 farmers in Burkina Faso, deforestation, land degradation and a decline in soil fertility are the reasons for migration caused by environmental changes. 90% of farmers view fertile land as a pull factor and land degradation and deforestation as a push factor[428].

[425] Alexandra T Tapsoba, Pascale Combes Motel, Jean-Louis Combes, **Remittances, Food Security and Climate Variability: The Case of Burkina Faso**, 2019, p.11.
[426] Christopher Smith, Dominic Kniveton, Richard Black and Sharon Wood, **Climate Change, Migration and Agent-Based Modelling: Modelling the Impact of Climate Change on Forced Migration in Burkina Faso**, Forced Migration Review Special Issue, 2008, p.2.
[427] Oli Brown and Alec Crawford, **Climate Change: A new Threat to Stability in West Africa? Evidence from Ghana and Burkina Faso**, African Security Review, 2010, p.52.
[428] Safieto Sanfo and William M. Fonta, Ulrich J. Diasso and Michel P. Nikiema, John P. A. Lamers, Jerome E. Tondoh, **Climate- and Environment-Induced Intervillage Migration in Southwestern Burkina Faso**, West Africa, Weather, Climate, and Society, 2017, Vol.9, No.4, p.830.

CONCLUSION

Living things on Earth are largely in contact with the outside world to continue their lives in a quality manner. In this context, climate is one of the factors affecting life. The climate still retains its importance today. Parallel to this importance, the effects of changes in the climate also have an impact. The globalizing world is confronted with the threat of anthropogenic climate change caused by the intensive use of greenhouse gases. At this point it is very important to identify all causes of climate change, develop solution-oriented guidelines and show a common stance in cooperation.

Warming of the air due to increased use of greenhouse gases is leading to some climate changes. Rising sea levels, melting glaciers, decline in the agricultural sector due to extreme weather events, changes in ecosystems and decline in biodiversity are some of the major impacts of climate change. While these negative consequences are problems in themselves, they are also triggers for other changes. For example, the negative impacts of climate change on the agricultural sector are leading to conflict, food insecurity and a decline in livelihoods in underdeveloped societies whose economies rely on this sector. Sea level rise poses a major threat, particularly to coastal regions. Livestock farming is also affected by climate change, with reduced grazing areas, feed problems for animals and endangered animal health. In this case, migration is one of the preferred way from the past to the present.

Migration has more than one type, meaning and various factors. Since the end of the 19th century, prominent theories in literature have interpreted migration according to the prevailing conditions of the day and the approaches of the theorists. From this point of view, the multi-causal characteristics of migration can be emphasized. Migration due to climate change has been on the agenda for 30 to 40 years and studies have been carried out on it. For this reason, it is notable that there are fewer studies on the intersection of these two separate concepts, which are actually quite old, than on others. The reasons for the lack of clarity in the literature on this topic include the ambiguity of the concepts and the fact that the term “climate refugees” does not have a legally binding international dimension. Although there are intense migrations, especially in some parts of the world due to climate shocks and extreme weather events, climate refugees do not meet the definition of the 1951 Geneva Convention.

This situation also poses a security problem for climate refugees. In this sense, this study aims to: to fill the gap in the literature and serve as a source for future studies.

Today, migration caused by climate change stands before the whole world as an undeniable fact. According to the report published by the IPCC, climate change has a major and decisive impact on mobility. Underdeveloped and developing countries in particular are more vulnerable to climate change due to their socio-economic and geographical conditions. Climate change influences migration, but whether this effect occurs directly or indirectly is still controversial in the literature. Climate change is increasing the frequency of natural disasters and causing them to worsen over time. While migration is more common in rapid-onset disasters, in slow-onset disasters it can be voluntary. Like all types of migration, environmental migration is a complex phenomenon. It is not correct to establish a simple, uniform connection between climate change and migration.

Most countries in the Sub-Saharan Africa region, which includes almost all but five countries in North Africa, face poor economic conditions, threatened food security and hunger crises. In this case, any factor that negatively affects the country, such as climate change, has a visible impact on the order. The countries most affected by climate change include sub-Saharan Africa, most of which are currently on the list of low-income countries.

In this study, which aims to provide a general overview of the impact of climate change on migration:

- Climate change poses a threat to the entire World,

-In countries with weak socio-economic and geographical conditions and an existing migration memory, it leads to faster and bigger results,

-In particular, the world's major powers should work together to prevent climate change,

-Climate change is increasing the frequency of natural disasters and causing environmental degradation,

- Climate change causes migration, but it should be accepted that there are other factors that influence this process,

- The lack of a definition of environmental migrants in international law leads to legal gaps,

-Most countries in sub-Saharan Africa are severely affected by climate change due to their economic conditions. This situation triggers water shortages and hunger crises in the region. Therefore, it was concluded that migrations occurred.

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