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SCHOOL OF ECONOMICS AND BUSINESS

MASTER'S THESIS

THE IMPACT OF CLIMATE CHANGE ON GLOBAL AND EUROPEAN MIGRATION

Ljubljana, May 2024 VERONIKA GERIČ ŠKOPAC

AUTHORSHIP STATEMENT

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LIST OF ABBREVIATIONS

CBS – (en. Central Bureau of Statistics) Centraal Bureau voor de Statistiek
EEA – European Environment Agency
FWI – Fire Weather Index
ICCPR – International Covenant on Civil and Political Rights
IDMC – Internal Displacement Monitoring Centre

IDP – Internally Displaced People
ILO – International Labour Organization
IOM – International Organization for Migration
IPCC – Intergovernmental Panel on Climate Change
ISCED – International Standard Classification of Education
UDHR – Universal Declaration of Human Rights
UN – United Nations
WoS – Web of Science
WUI – Wildlife Urban Interface

1 INTRODUCTION

In the past decades, summer news about record temperature heatwaves being broken has become more and more the norm. The debate around climate change and global warming has been taking place for many years but the scientific community is in accordance. Humans are the cause of global warming, and the average global temperature has already increased by at least 1.1 °C relative to the late 19th century (IPCC, 2021).

While rising summer temperatures and long heat waves have been experienced by almost all people around the world, some feel the consequences more severely than others. Besides the temperatures, shifting rain patterns and increasing sea levels are affecting people who live by the coast, or next to expanding deserts. More extreme monsoons and cyclones threaten people who live in their paths, and populations living in flood plains are in danger of more common flash floods (Longstreth, 1999).

Additionally, these changes while in themselves already dangerous to populations, create other effects typically not directly attributable to climate change. Widespread disasters can damage infrastructure and roads, pushing people on the outskirts farther away from civilization and the benefits of a connected community. Poor crop yields raise food prices, leaving many who live hand-to-mouth without their next meal. Areas with poor social protection nets are one serious storm or wildfire away from leaving half of their population homeless. All these issues create a more unequal and dissatisfied society, riddled with social tensions, and perhaps even unrest (Islam & Winkel, 2017).

People living in bad conditions will often make the choice to move and seek a better life for themselves and their families. The choices they make regarding where to move will affect our societies, through changes in the labour market, pension and insurance schemes, the housing market, and general social cohesion. Additionally, people who do not, or cannot move will be in danger of being left behind in disaffected areas, pushed to the margins of society (van der Velde & van Naerssen, 2016).

The aim of this thesis is to examine how climate change will affect people and their lives and their decisions about where to live. It also aims to examine past trends and combine this knowledge with predictions to understand what can be expected in the future. The focus of the paper is on domestic and international migration and internal displacement due to climate change, with a particular focus on migration to and within the European Union. The aim is to better understand how to use policy to improve our lives while considering expected changes.

The following research questions will be answered:

Q1: What factors influence migration and how do migration policies affect them?

Q2: What is the impact of climate change on migration in theory?

Q3: How has climate change affected global migration?

Q4: How has climate change affected migration in the European Union?

- How has climate change affected international migration to the EU?
- How has climate change affected internal migration in the EU?

Q5: How can we better prepare for climate change migration in the EU?

- What are the best policy choices we can make to prevent the need for migration within the EU?
- What are the best policy choices we can make to ease the problems created by migration in the EU?

The text comprises two main methodological approaches. Chapter 2.1 first uses bibliometric methods to examine trends in research on this topic, the most important authors and themes, and developments over time. Chapter 2.2 is a more traditional literature review, describing the main migration theories and their impact on the world around them. Lastly, Chapter 2.3 focuses on the theory of climate change and the different channels through which it affects migration around the world and in the European Union.

Chapter 3 is based on an empirical approach that draws on publicly available data to describe population trends and the demographic characteristics of migrants such as age, gender, education, and the urban-rural divide. It primarily uses secondary data as a basis for describing, analysing, and predicting trends. Statistical packages such as R and Excel are used.

The analysis was to some extent limited by the nature and availability of data on migration. The most notable problem is the lack of depth and detail in publicly available databases, as they generally do not specify reasons for migration or ask about environmental factors. On occasion, the data is also quite old, but it is nonetheless provided when no more recent resources exist. Furthermore, surveys rarely ask about migrants' lives, particularly the length of their stay, their employment and education levels or aspirations. These questions are addressed when relevant.

Chapter 4 concludes with a policy approach and discussion which, on the one hand, focuses on the various solutions to the factors through which climate change forces people to move. On the other hand, it also looks at the negative consequences and possible solutions to migration movements themselves. This is not an exhaustive and comprehensive overview of EU policies, but rather a look at different regional practices that others can follow and learn from. The aim is to raise public awareness of the issue and encourage debate on the topic.

2 THEORETICAL OVERVIEW

The following chapter studies the factors and policies that can affect migration, as well as the theoretical determinants of climate migration. With that the chapter addresses the first two research questions: (Q1) What factors influence migration and how do migration policies affect them? And (Q2) What is the impact of climate change on migration in theory?

The chapter with the theoretical overview is divided into three sections. The first section is a bibliometric analysis of the topic of environmental migration. The aim is to clarify how the interest and focus of the academic community has evolved over time and what the main issues, topics and research areas are. To this end, the bibliographic data of articles on this topic were collected via a search engine and a statistical analysis of the data was carried out.

The second section serves to familiarize the reader with the economic theory of migration and its development over time. It explains terms related to migrants, the theories of why they choose to leave or stay, what distinguishes them different from everyone else, and how their choices affect the economies with which they interact. It also outlines any notable developments in the academic debate on this topic. All information is taken from academic journals, discussion papers, government publications or research by non-governmental organizations.

Finally, an overview of climate change and its effects on migrations is given. First with examples of climate migrations in the distant and recent past and the theory of what global warming processes drove them. This is followed by an overview of research on these drivers around the world and in the European Union. The focus is on the specific drivers and the conclusions of the research on their development and predictions for the future.

2.1 Bibliometric analysis

This chapter contains a bibliometric analysis of the topic of environmentally induced migration. The search engine used to obtain the bibliographic data was Web of Science (WoS), and the tool used to analyse the data was Bibliometrix, a package for the statistical programming language R. All data were collected on January 22, 2024.

The analysis began with a search for the keywords "human migration and climate change" and "human mobility and global warming" (Table 1). The search was limited to relevant categories such as demographics, economics, urban studies, development studies, etc. In addition, only articles, review articles and book chapters were included in the analysis. The initial screening revealed that many articles on animal migration and other irrelevant topics were still included in the sample. Therefore, words that occurred frequently and could identify a broad pool but had little chance of appearing in our target articles were also excluded.

The words fauna, flora, birds, mosquitoes, and sea appeared in many articles dealing with the migration of animals and plants due to climate change and were not of interest. The word transport was excluded as it appeared in many articles about daily labour migrations that are not relevant to this study. Finally, the words electrical and metal appeared frequently in articles about chemical processes and the migration of particles within compounds, which seemed far removed from our topic.

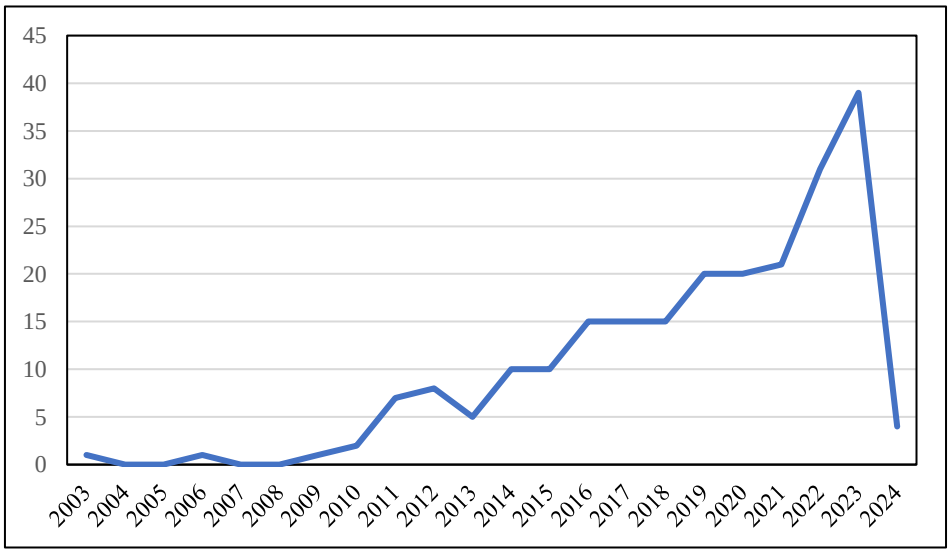
Table 1: Bibliometric screening process

Search terms →	**Allowed WoS categories** →	**Allowed document types** →	**Excluded words**
Human migration climate change	Demographics	Article	Fauna
	Economics		Flora
	Urban studies		Birds
	Regional urban planning	Review article	Mosquitoes
Global warming and human mobility	Development studies		Electric
	Social sciences interdisciplinary	Book chapter	Marine
	Social issues		Transport
	Ethnic studies		Metal

Source: Own work

The final step consisted of a manual review of all remaining articles, weeding out those that referred only to migration or only to climate change, those that focused on how migration affects climate change, and all other unrelated articles. The remaining sample included 225 documents from the period 2003 to 2024 with 533 different authors.

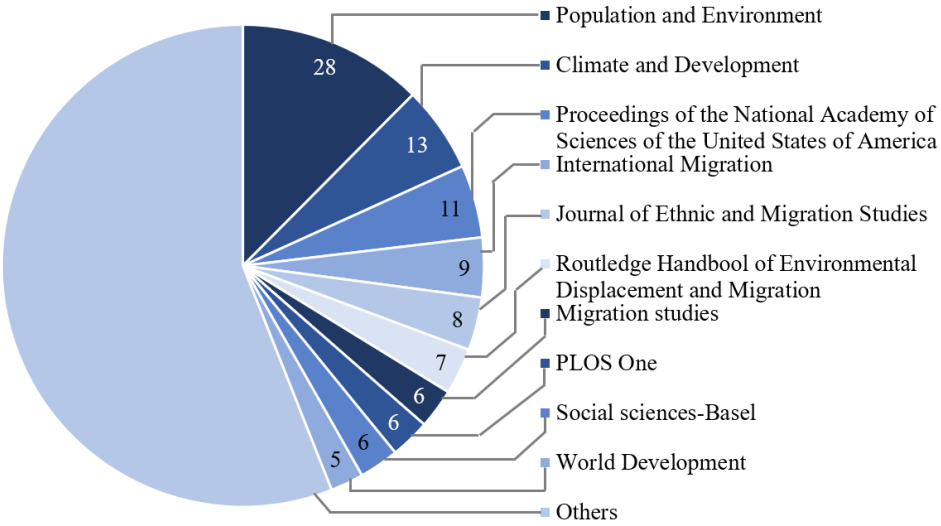
Figure 1: Number of articles on climate migrations published per year



Source: Own work

The topic is being discussed with increasing frequency as the number of articles published annually has risen since 2003 (Figure 1). Although the data was collected before the beginning of February 2024, four relevant documents have already been published. Thus, this year is already on track to continue the surge in publications since 2022.

Figure 2: Most common sources of articles



Source: Own work

The sources of the articles were very diverse, with 101 different publications. The 10 most frequent are shown in Figure 2. The journal Population and Environment published the most articles, namely 28. In the category Other, no journal published more than four documents.

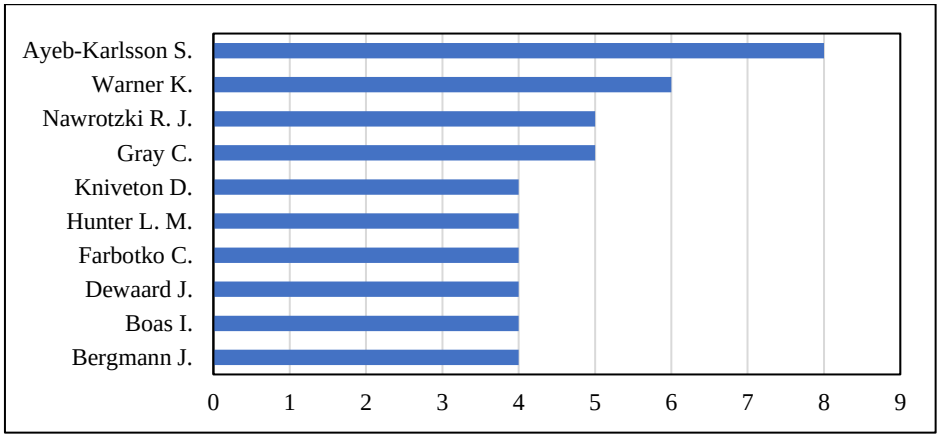
Figure 3: Climate migration word cloud

Source: Own work

The word cloud of keywords in the sources (Figure 3) shows that by far the most common keyword was climate change, followed by adaptation, migration, variability, etc. Minor keywords include risk, health, policy, conflict, perceptions, resilience, strategies, etc. This

indicates different areas of interest within the topic as researchers focus on the lives of affected people and their stories around the decision to migrate due to environmental change. The keyword adaptation describes a trend in the scientific debate that migration should be understood as a form of adaptation to climate change, as people use different forms of mobility to vary their risk.

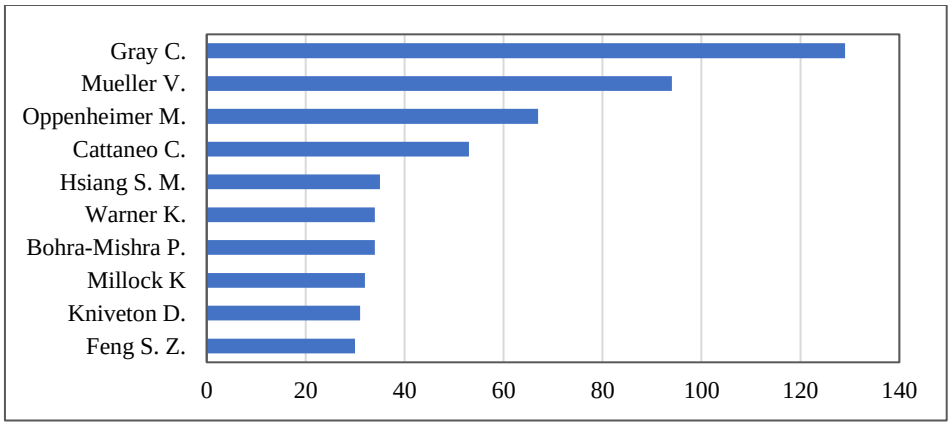
Figure 4: Most common authors by number of publications



Source: Own work

Sonja Ayeb-Karlsson was the most frequent author with eight articles on this topic (Figure 4). Clark Gray was the most frequently cited among the authors of this topic with a total of 129 citations (Figure 5). He was also one of the most prolific authors, with five of his papers in the sample. Similarly, K. Warner and D. Kniveton appear in both charts as both prolific authors and frequently cited references.

Figure 5: Most cited authors by number of citations



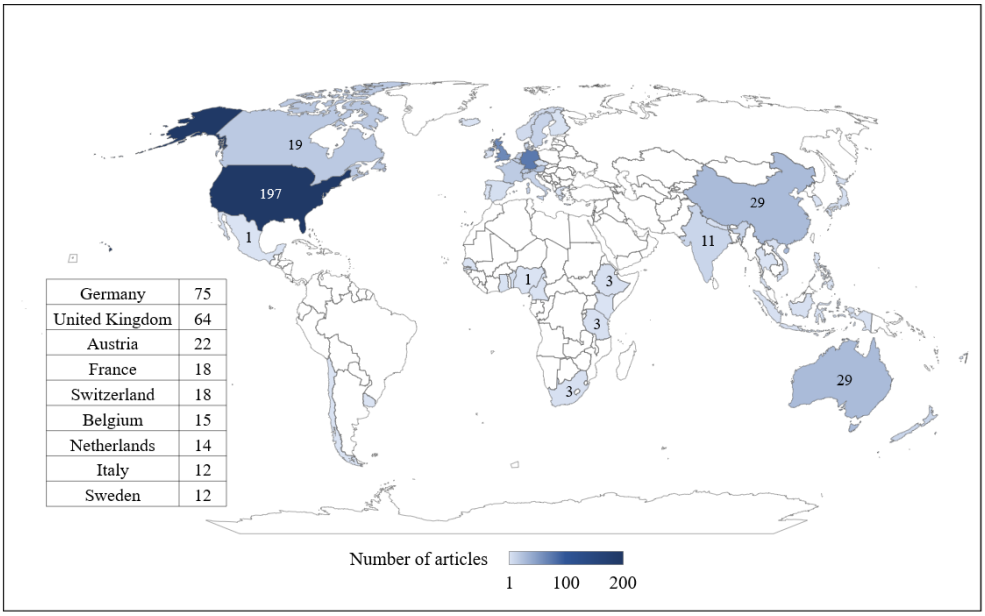
Source: Own work

The analysis of the distribution of scientific production around the world shows that the vast majority of publications come from Western industrialized countries (Figure 6). China is the only country in the Global South with a significant number of publications. However, this

does not necessarily mean that research itself does not focus on countries with fewer authors. It is most likely an effect of the concentration of researchers and funding in the wealthier economies that has brought this about.

The limitations of this analysis lie in the sample size and data collection methods, as only one search engine was used to obtain the database. The CliMig database of the University of Neuchâtel collects a large database of all articles on environmental migration, but EndNote software is needed to run it, which is not free to use and thus not available for this research. However, a study by Piguet et al. (2018) provides a bibliographic analysis of the database, the results of which are consistent with those of the present work. Therefore, this analysis will also provide useful insights into the topic.

Figure 6: Number of articles published by country



Source: Own work

To conclude, this topic generates more academic discussions every year and many different authors contribute. It is very relevant as last year saw the largest number of articles published to date. The focus is on the various natural disasters through which climate change can create mobility, as well as how it makes certain populations more vulnerable as some are forced to become refugees. Moreover, much research focuses on how migration can be interpreted as a form of adaptation and resilience in the face of global warming. This places our analysis within the framework of the most frequently asked research questions, such as what part of climate change forces different groups of people to migrate. However, the focus on internal migration in the EU is not so common in the literature and therefore offers a particularly important insight into decision-making for our future.

2.2 Migrations

There is no official international definition of the term "migrant", as each country decides for itself how to deal with this issue. The International Organization for Migration (2019) defines migrant as an umbrella term not defined in international law, reflecting the common lay understanding of a person who, for various reasons, moves temporarily or permanently away from their usual place of residence, whether within a country or across an international border. The term encompasses several legally well-defined categories of persons, such as migrant workers, persons whose particular types of movement have a legal definition, such as smuggler migrants, and persons whose status or type of movement is not specifically defined under international law, such as international students.

2.1.1 Types of migrations

Just as there is no official international definition of the term "migrant", categorizing the phenomenon is also difficult due to the complex and diverse nature of the migration experience. The various terms used to define and differentiate between types of migrants are the subject of academic debate, as none of them are able to fully capture the nuanced and diverse nature of the phenomenon (Talleraas, 2022).

The field is also highly interdisciplinary and different types of migration are often studied separately. For example, internal and external migration are usually studied independently, studies of migration in less developed countries tend to focus on the poverty aspect, and the research is often part of an area study and therefore unsuitable for a general, overarching analysis. In addition, the study of forced migration often focuses on the regulation and treatment of migrants in the North and the humanitarian issues in the South separately. All of this means that both definitions and theories of migration are disjointed and lack a coherent framework that can fully incorporate all aspects of migration (Castles, 2010).

The different divisions between migrants can be based on how long they plan to stay, their place of origin, the legality of their status and their volition in deciding to move (Table 2). The next division is commonly used in labour economics and is based on the migrant's education or skill level. The last subdivision focuses on the motivating factors for emigration.

Table 2: Types of migration

1.	Permanent			Temporary	
2.	Internal			External	
3.	Legal			Irregular	
4.	Forced			Voluntary	
5.	High skill			Low skill	
6.	Economic	Social	Political	Demographic	Environmental

Source: Own work

While these classifications may seem comprehensive, even they cannot capture the nuanced and often changing nature of migration. For example, poverty does not explicitly force people to move, but many feel they have no choice, so they are neither entirely forced nor voluntary. The distinction between legal and irregular migrants does not take into account asylum seekers whose status has not yet been determined. In addition, in places like the Sahara Desert, there are nomads who do not have passports and are born, live in, and pass between countries with unguarded borders, freely and unnoticed.

Moreover, migrants' abilities would better fit on a continuous scale rather than a discrete division. Finally, the sixth subdivision, while providing more information, does not take into account international students and amenities migrants, i.e. those who move only to improve their quality of life, e.g. moving from the city to the countryside to be closer to nature (Bartoš et al, 2008).

Another type of migrant that is important to define for the purposes of this study are internally displaced people (in continuing IDP). As defined by the UN Commission on Human Rights (1998) they 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 border." Thus, they are essentially refugees within their own countries. As a category, they are difficult to define and track effectively, as displaced people may become twice or even thrice displaced, for example, if a refugee camp where they are staying is struck and destroyed by a natural disaster.

There is no set rule or known pattern for how many refugees or IDPs a conflict or disaster can create. In Yemen, for example, there are almost 50 internally displaced persons for every refugee, while ethnic tensions in Myanmar result in 2 refugees for every 1 IDP. Although at first glance it may appear that the two populations are fleeing the same type of problem, in reality they may be responding to different issues and therefore require separate consideration and assistance (Cantor & Apollo, 2020).

2.1.2 Migration theories

The body of literature studying climate migration has grown considerably in the last two decades, yet the nature of the studies is predominantly based in data, not in theory (Šedová, Čizmaziová & Cook, 2021; de Sherbinin et al., 2022). Moreover, the theory is underdeveloped and incoherent, more of a collection of theories and conjectural relationships all explaining different aspects of migration and the reasons behind it (Carling et al., 2020). Thus, there remains a need for more research and a more developed theoretical literature.

Early migration theories can be classified as either migration optimism or migration pessimism. The two sides reflect similar paradigm differences in social and development

theory. In social theory, the pessimist side is aligned with the structuralists, who argue that the world is built on a system of inequality and that the system exacerbates these differences. In development theory, the pessimists align themselves with the paradigm of asymmetric development, according to which the world is unequal, and its inherent structures and dynamics further intensify these problems, so that development is only ever achieved and intensified in the dominant area.

These ideas reflect in different theories, which see people as trapped in a global system in which they make their decisions primarily on the basis of external factors. They also see migration as a self-perpetuating problem that has arisen due to historical (colonialism) and structural ties between the global North and South, which only creates further rifts between the developed and underdeveloped world (de Haas, 2010).

Table 3: Theories of migration

Theory of Migration	**Main Characteristics**	**Main Authors**	**Relevant for Climate Migration**
Neoclassical	People migrate due to rational income maximization	Smith (1776) Ravenstein (1889)	Yes
Historical-Structuralist	People migrate due to historical and structural ties between their countries	Wallerstein (1967) Massey et al. (1993)	No
New Economics of Labour Migration	Migration is a family profit maximizing decision	Thompson & Bloom (1985)	Yes
Migration Hump and Mobility Transition	Migration occurs as an endogenous process due to development	Zelinsky (1971)	No
Sustained Migration	Migration occurs due to previous migration	Massey et al. (1993)	No
Push-pull Framework	Migration is driven by push and pull factors and impeded by barriers	Ravenstein (1889) Lee (1966)	Yes
Aspirations and Capabilities	Migration is driven by aspirations and impeded or promoted by capabilities	de Haas (2010)	Yes
Climate Migration	Heterogenous households decide to migrate based on their impediments and five facilitators of migration which can all be affected by climate change	Foresight (2011)	Yes

Source: Own work

The optimist view is in line with functionalist ideas in social theory, which describe society as always tending towards stability. It is also consistent with balanced growth in development theory, in which the development of poorer regions can be achieved through

appropriate investment. Migration optimists therefore view migration as a mechanism for achieving wage equilibrium between two regions and as a means of investing in poorer regions. It is assumed that individuals have agency and make their decisions based on their own rationalisation and profit maximisation. The theory also predicts that migration will cease once equilibrium is reached as both regions are developed (de Haas, 2010).

The oldest theory to explain migration is the Neoclassical Model of migration. Its' beginnings can be traced back to Smith (1776) and Ravenstein (1889). It is an optimist model because at the micro level it views migrants as individual, rational actors who make their decisions based on a cost-benefit analysis and maximise their potential income. At the macro level, migration is due to differences in wages due to higher demand for labour in some countries. The result is that the movement of people from the low-wage area to the high-wage area creates downward pressure on wages in the high-wage area and vice versa in the low-wage area. This leads to an equilibrium in factor prices between the sending and receiving regions, which ultimately leads to a halt in migration flows (de Haas, 2008).

An extension of the model comes from Sjaastad (1962), in which migration is seen as an investment in human capital, which means that the actors are now heterogeneous (de Haas, 2008). In 1970, Harris and Todaro developed their influential extension of the model in relation to continuous rural-urban migration despite rising unemployment in the cities, which has since become the basis of Neoclassical Migration Theory (de Haas, 2021; Harris & Todaro, 1970).

The Historical-structuralist view of migration belongs to the paradigm of migration pessimism, which is inspired by the Marxist interpretation of capitalism. It was developed in response to the ahistorical and individualistic Neoclassical Model, which was thought not to take into account the deep historical and political ties as well as the structural need for migrant labour in developed economies. This view offers a less rigid but more comprehensive explanation of why people migrate and consists of the following three theories (Morawska, 2012).

The Segmented or Dual Labour Market Theory (Massey et al., 1993) explains why all developed economies have a demand for migrant workers. It assumes that capital and labour skills are unevenly distributed in all economies. Labour-intensive sectors in developed economies cannot find domestic workers who are willing to work for low wages because they are highly skilled. Therefore, the demand for low-skilled labour attracts migrants who are willing to take often seasonal, dangerous, and low-paying jobs (Morawska, 2012).

The Dependency Theory states that migration occurs when underdeveloped economies are integrated into the international capitalist system and the unequal distribution of cheap labour and its demand forces people to migrate. This theory offers a more comprehensive explanation of mobility than the Dual Labour Market Theory, but it is in some ways a more primitive and theoretically less sophisticated precursor to the next theory (King, 2012).

The World Systems Theory (Wallerstein, 1976) states that migration patterns follow international flows of goods and capital, but in the opposite direction. These flows are especially likely between former colonies and their colonisers, where their shared past has created lasting connections through culture, language, transportation, investment, and more. An example of a shared past would be international companies setting up factories, mines or other labour-intensive operations and attracting workers to their regional centres to meet labour needs. They offer low wages and insecure jobs and at the same time compete with the country's traditional production structures. This leads to a socially and economically uprooted population that is likely to emigrate to the country with which their culture is now deeply connected (de Sherbinin et al., 2022).

The New Economic Theory of Labour Migration elaborated by Stark and Bloom (1985) is more similar to the Neoclassical Model than the World Systems Theory, as it focuses on micro-level decisions and views people as rational actors who maximize their welfare, and thus belongs to the migration optimists' paradigm. It developed in parallel with the livelihood framework used by geographers, sociologists, and anthropologists. The main idea was that people cannot be seen as passive victims of the capitalist system, as they have agency and can work within their means to improve their lives.

The new economics of labour migration goes further than the Neoclassical Model as it considers migrants' families and their investment and risk management. Migration is seen as a group decision that also affects family members who have not emigrated. Another difference to structuralist theory is that it highlights the potential positive impact of migration on the economy of the country of origin. This effect is achieved through remittances, which are not taken into account in the previously discussed models. In the model, the family uses migration to increase income and to hedge against risks. Remittances are seen as an investment that promotes the further growth of the economy of origin (Massey et al., 1993; Stark, 1999; de Haas, 2008).

The Mobility Transition Theory by Zelinsky (1971) and the Migration Hump both argue that migration in societies is tied to their development. They belong to the pessimistic paradigm, claiming that migration is a consequence of structural factors and does not depend on the individual himself. In his Theory of Mobility Transition, Zelinsky argues that there are five phases of “vital transition” that all societies go through, where there is very little migration at the beginning and then, as countries develop, they experience significant rural-urban migration and become a source of international migrants. In the latter stages of development, the country becomes a destination for international migrants and most internal migration is urban-urban, as rural areas absorb only as many people as is necessary for optimal economic returns. The Migration Hump is an observation that refers to the shape of the migration curve being an inverted U-curve, with most people leaving the country as it enters the middle of its development path (de Haas, 2008).

Both theories were novel in that they took into account the fact that real-life data shows that migration initially increases with income in a country and later decreases again. However, they have been criticized for suggesting that the trend is so simply related to migration, when in reality it is a much more complex phenomenon. Furthermore, the view that people in the Middle Ages were a largely immobile workforce and were only prompted to migrate by the Industrial Revolution is not consistent with historical data (de Haas, 2008).

Theories of Sustained Migration or Cumulative Causation do not try to explain how migration began but focus on how it is maintained. They are pessimistic because they focus on structural processes that, once started, are self-perpetuating and generate even greater migration flows. The Social Network approach explains that an existing migrant flow reduces the costs and risks associated with moving for new migrants because people who have already migrated form a support network (Boyd & Nowak, 2012). Furthermore, Institutional Theory (Myrdal, 1957) assumes that pre-existing migration flows mean that there are more institutions to facilitate the move and transition to a new country and take care of the necessary bureaucracy. These may be non-profit organizations, for-profit companies or even illegal smugglers. Cumulative Causations Theory states that as migration begins, economic and social conditions change in both the receiving and sending countries, further encouraging the flow of migration. An example would be the accumulation of immigrants in a particular occupation, which then becomes an “immigrant occupation” that the natives do not want to do, increasing the demand for immigrants in that occupation (Massey et al., 1993).

The Push Pull Framework is more of an overarching framework rather than a clearly defined theory, nevertheless it is part of the optimist paradigm as it describes the various factors that motivate people to migrate. It is based on the 11 Laws of Migration proposed by E. G. Ravenstein in the 1880s, many of which still apply today (Gurieva & Dzhioev, 2015). Everett Lee (1966) revised these laws and proposed a framework in which the decision to migrate depends on factors of the area of origin, factors of the destination area, intervening obstacles and, finally, personal factors. They are grouped into “push” and “pull” factors, depending on whether they incentivize or disincentivize an individual to move. Lee also points out that it is not the actual factor, but the individual's perception and understanding of these factors that influences their decision to migrate. The decision to migrate is therefore never completely rational (Lee, 1966).

The Aspirations and Capabilities Framework was proposed by de Haas in 2010 and is an attempt to unite both the optimistic and pessimistic paradigms in a single theory. It proposes a framework in which external factors influence an individual's aspirations and abilities to move. A person's capabilities can be high or low, either due to external or internal factors, such as pre-existing networks in destination countries or physical incapacity due to age. Aspirations are people's desires to move, as some people do not want to leave their home country despite poverty. Aspirations can also be influenced by capabilities, as the more educated and capable of moving people are, the more likely they are to recognise the benefits

of moving. This framework also includes the concept of involuntary immobility, which refers to people who want to move but cannot, for example because they are too poor or because of strict migration policies in other countries (de Haas, 2021).

While most structuralist theories cannot explain migration in the wake of climate change, it is not too difficult to extend functionalist theories to theories of climate migration. For example, the Neoclassical Model could include environmental amenities in the utility maximization formula of individuals deciding on migration. The New Economics of Labour Migration is a theory often used to study environmental migration, as it is easy to see how migration away from a drought affected area is a risk mitigation strategy (de Sherbinin et al., 2022).

The Foresight Framework was proposed in 2011 and is one of the few theories that specifically focuses on environmental factors. It proposes that individuals' decision to migrate is affected by five drivers of migration. They are environmental, political, social, demographic, and economic and they can be influenced by environmental change, showing the indirect effect that climate change can have on migration. Furthermore, the decision to either stay or migrate is influenced by personal/household characteristics and intervening obstacles and facilitators. The framework points out the fact that it is not only strict environmental migrants that will be affected by environmental change, as the result will most likely be that it will exacerbate all the already present migration drivers (Foresight, 2011).

2.1.3 Theories of immigrant self-selection

Because immigrants have an important effect on the economy they enter, it is important to understand what kinds of people they are. Because immigration is a choice that not all people in a country make, these people must have some characteristics in common. Specifically, there is a need to understand whether the people who immigrate are more, or less skilled than the native population of their new country, in other words, do they exhibit a positive, or negative Self-Selection Effect.

Various studies have used Self-Selection Models, as well as human capital models. According to the latter, immigrants should self-select to be a more capable and skilled population than their native counterparts. The debate is specifically centred around the question of how income distribution in the source economy affects the self-selection of migrants. Borjas (1987) argues that a more unequal income distribution implies a lower general skill level of immigrants. Chiswick (1999; 2000) on the other hand, argues for the opposite, stating that when coming from a country with a more unequal income distribution migrants will be even more skilled than if not.

To conclude, there is consensus on the fact that migrants exhibit a positive skill self-selection bias, though there is debate regarding how large that bias is under different circumstances (Liebig & Sousa-Poza, 2004). Yet it is important to remember that these theories only apply

to people who have a choice to move. Those who are forced to move, due to conflict or in our case global warming have no choice.

2.1.4 Theories of economic effects of migration

Migration can affect the economy through many different, complex, and nuanced paths. There have been debates regarding their impact on long-run growth, technological endowments, possible externalities, wages, employment levels, income distribution, fiscal balance, innovativeness and more (Smith & Edmonston, 1997). To remain concise, the chapter focuses on only the most relevant, data-backed, and research-based topics.

The simplest model employed to study the labour market effects of migration is the Ricardo-Viner Model also called the Specific factors Model. It assumes a two-state, two-good and three-factor economy, where two factors are immobile and specific to their industry, while labour is assumed to be homogenous across all economies and mobile internationally and between sectors. The model shows that when the labour supply in a country increases, wages decrease, which creates a loss for native workers and a gain for foreign workers and capital owners. Together, this creates a sum gain which Borjas (1995) coined the immigration surplus (Feenstra & Taylor, 2014; Van den Berg, 2017).

Importantly, if it is assumed that migrants are a low-skill workforce, then their influx into the country raises the high-skill wages, since it makes them relatively rare, while it still lowers the wages of low-skill workers, since it makes them less rare. This means that even with the total sum gain, there is a part of the population that benefits and a part that loses (Bodvarsson & Van den Berg, 2013). It is important to note that the low skill workers will displace some of the native population who will have to move to the high skill sector, and while the model assumes this incurs no additional costs, this is not true in real life (Smith & Edmonston, 1997).

Another model commonly used to show how migration affects the labour market is the Heckscher-Ohlin Model. The model shows a two-state economy with one capital intensive good and one labour intensive good which are freely traded among states. The conclusion is that when capital is assumed mobile, wages do not change when the labour pool increases in one country. The Rybczynski Theorem adds on to this, stating that an increase in labour will increase the output of the labour intensive product, meaning that the whole migration shock is absorbed by the change in output (Feenstra & Taylor, 2014; Leamer & Levinsohn, 1995). Naturally, both models predict the opposite effects in the country where migrants originate from as their labour population becomes smaller.

An idea not accounted for by these models, is Say's Law of Immigration. It states that because immigrants begin to spend money in their destination economy before they start to partake in the labour market, they also increase labour demand, which they then themselves fulfil. This means that immigration should not influence the wage level, or at least make the effect less drastic (Van den Berg, 2017; Bodvarsson & Van den Berg, 2013).

It is important to note that the assumptions that these models make mean that they are not well suited to representing reality. As several authors note their conclusions either change or completely break down, depending on the assumptions made (Thompson, 1984; Quibria, 1993; Bodvarsson & Van den Berg, 2013). This inconsistency is however, in line with real world data, which is inconclusive about if and how immigration affects the labour market (Bodvarsson et al., 2008; Martin, 2015).

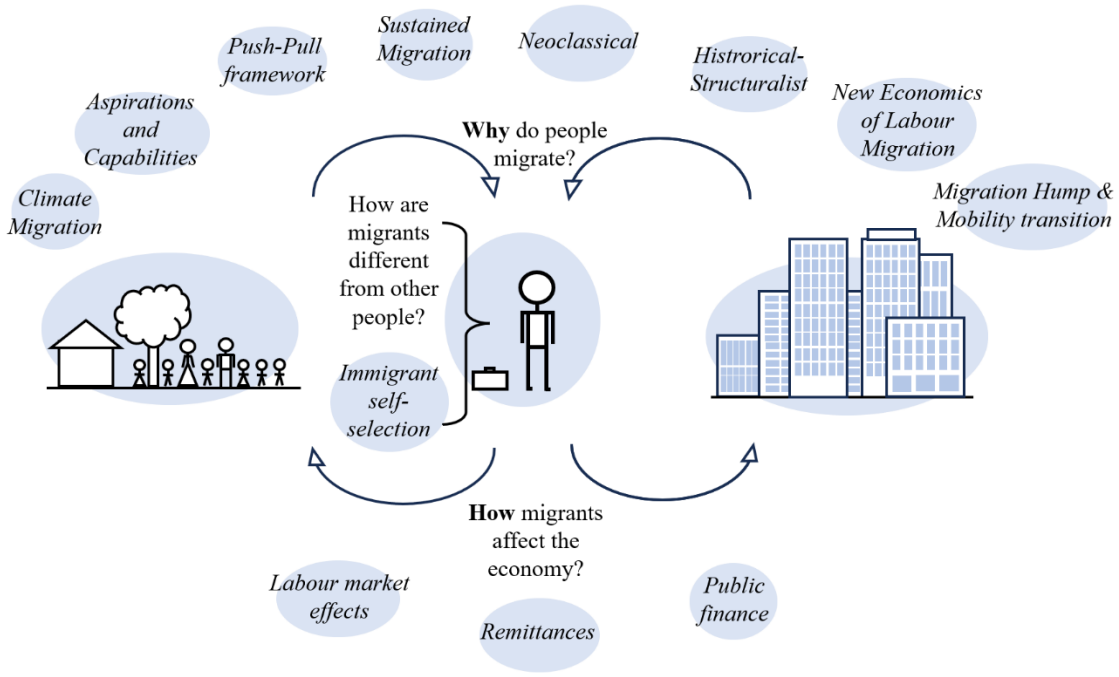
A popular argument regarding immigration is that immigrants take advantage of the social systems in the developed countries by paying less in taxes compared to the benefits they receive from the free services the country offers. This idea can be studied in a static model of public finance, like the models studying the effects of wages. A problem with this approach is that immigrants could introduce externalities that are harder to observe or measure. They could lower the quality of a public good by increasing congestion on public transport. Moreover, lifetime contributions to the tax system matter, which these models do not account for (Preston, 2014).

Dynamic models consider how immigration changes the demographic picture of the economy in the long run. Since most immigrants are of working age, they decrease the old-age-dependency ratio, which makes the pension system easier to fund. Moreover, should they have more children than the native population, they could increase population growth which would reinforce these effects in the future. This fact underlines the importance of understanding how immigrants assimilate into the population (Smith & Edmonston, 1997).

Remittances are the money that immigrants send to families in their home country. If the wage differences between the source and destination economy are high enough, then it is possible that immigrants can send back enough money to offset the loss to the economy they caused by leaving. It is however important to note that the way in which remittances are used matters. If they are used to purchase consumer goods, they will in the long-term benefit the economy less than if they were to be used to improve housing or for education (Bodvarsson & Van den Berg, 2013).

Some studies however point out that remittances might not always have a positive effect. Chami, Fullenkamp & Jahjah (2005) point to the potential moral hazard they may create. They explain how they might cause the family receiving them to behave more recklessly than they would otherwise, which can lead to a sum negative effect.

Figure 7: Summary of migration theories



Source: Own work

2.3 Climate change

The United Nations define climate change as "long-term shifts in temperatures and weather patterns". Data shows that the 1830s was the first decade that the trend of warming global temperatures began, though scientists initially only noticed it in the 1950s (Pidcock, 2016). There are many ways in which climate change can be observed in the world, with the most common being rising global temperatures, warming oceans, ice sheet, Arctic ice and glaciers shrinking, decreasing snow cover, rising sea levels, ocean acidification, and increasing frequency of extreme weather events (Earth Science Communications Team at NASA, 2023).

There is strong evidence that rapid-onset climate change events cause short-term involuntary migration and short-distance mobility (Cattaneo et al., 2019). This can be observed in events like floods where people are temporarily displaced to neighbouring towns and settlements, awaiting their return home. Additionally, research shows that slow-onset climate events cause long-distance internal displacement, more than short-distance or international migration (Kaczan & Orgill-Meyer, 2020). Finally, the impact of climate change is felt more strongly in cities and urban communities, with the poorest and most socially marginalized communities being most at risk (IPCC, 2022).

These events will influence the ways that people live around the world, the amount of energy they need to heat or cool themselves, the places where they can live, where and what kind of crops they can farm or animals they can raise. To provide a better understanding of where

people's livelihoods will be most at risk, and which types of risks these will be, the next chapter discusses the facts and research on this topic. It will begin with a global overview, and then a closer look at the outlook on the European continent.

2.3.1 Climate change migrations in the past

Though human-made climate change is a modern phenomenon, the earth's climate is not static. Early humans emerged in Africa and then later spread all over the globe, and scientists hypothesize that different climate cycles influencing sea levels and glacier sizes were what drove migrations (Timmermann & Friedrich, 2016). Another idea is that small natural changes in the orbit of the planet sometimes created a wetter and more habitable climate, in which humans could travel and live further north, and then adapted when the climate shifted again (Kreier, 2022).

In addition, there have been specific climate driven events, which have either enabled or disabled the human settlement of new territories. The flooding of Doggerland, the area of land that once connected the British Isles to mainland Europe happened due to rising sea levels, and geographically divided the population. Most likely, lower sea levels and larger ice sheets also helped people migrate from Asia into the Americas (Scarre, 2013).

Official Chinese records from different imperial dynasties also note how the nomadic pastoralists of the southern Mongolian grasslands migrated due to changing climate conditions (Smit & Yunlong, 1996). A more recent example would be the extreme drought and storms known as the Dust Bowl that struck the Great Plains of North America in the 1930s. The unfavourable climate conditions, the effects of the Great Depression, and governments unprepared to deal with and support the affected farmers, drove hundreds of thousands of North American families to migrate away from the area (Koser & Martin, 2011).

Though a shifting climate was often only one of the influencing factors that led to previous population migrations, clearly it influenced many of them. It did so by creating more habitable land where it previously did not exist, or by making other land less habitable. This often influenced people by affecting their living conditions, food security and ability to migrate.

Most recent examples of climate change migrations can be found in the seasonal labour migrations of younger members of pastoralist and agriculturalist families in the Sahel region. Research shows that rising seasonal labour participation is positively linked to household wealth, meaning that poorer families cannot afford to send their children to work far away. Some point to how the successfulness of a harvest might affect how far a family will send their children to work. A very good year might for example afford them to go to Europe, where remittances will be much higher, while they will stay closer to home in worse years (Brown, 2007; Deshingkar & Start, 2003).

Other authors point to another type of climate change migration which is a continuation of already existing trends. It is in accord with theories of sustained migration, where people will move to areas where they have already established social networks that they can rely on. In this case Europe could expect flows between former colonies and their colonizers, such as between France and French West Africa, and Great Britain and India, or Pakistan (Koser & Martin, 2011).

2.3.2 Key drivers of climate change migrations

Climate change most commonly affects migration decisions indirectly. Most commonly it works by affecting other factors such as social vulnerability, home ownership, poverty level, crop yields, etc. Parrish et al. (2020) provide a list of the various events through which climate change works, and divide them into physical, biological, and anthropogenic effects (Table 4). They also note that not all of them work on the same time scale. Some might work in slow, gradual changes, while others have more noticeable, immediate effects.

Table 4: Drivers of climate change migrations

Physical aspects
Changes in extreme or annual mean rainfall, resulting in a range of effects including droughts and floods
Increased extreme weather events
Land (including coastal) erosion
Sea level rise
Changes in average temperatures and temperature extremes
Biological/ecological aspects
Desertification
Deforestation
Soil degradation
Changes to freshwater ecosystems including fish and other aquatic populations
Changes to marine ecosystems including fish and other aquatic populations
Changes to terrestrial ecosystems including changes to flora and fauna and vector-borne disease spread
Anthropogenic aspects
Changes in crop yield and agricultural productivity
Changes in fishing catch
Changes in water availability and security

Source: Parrish et al. (2020)

Cattaneo et al. (2019) note that the difference between fast and slow onset events is that fast onset events like floods, hurricanes, and landslides create forced migration, typically only locally and that the displaced people try to return and rebuild their settlements as soon as possible. Meanwhile, slow onset events like desertification, droughts, and rising sea levels commonly have smaller effects on migration and typically work in tandem with other factors like political instability and poverty to create bigger migration movements. These

movements are gradually progressive, with more and more people moving away each year and these movements tend to be permanent. Though this type of mobility tends to be of a farther distance, they still typically stay within the borders of their country.

2.3.3 Climate change around the world

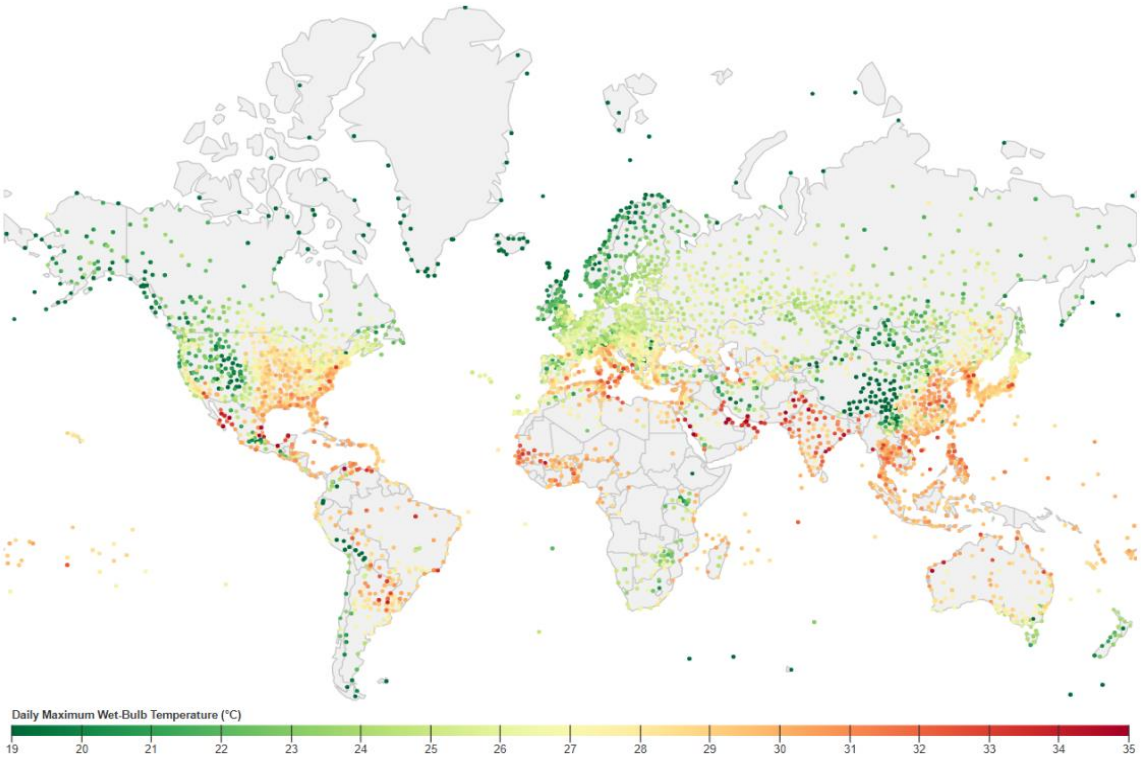
As our society continues to produce greenhouse gas emissions (GHGs), our planet continues to heat up. The 6th Intergovernmental Panel on Climate Change (in continuing IPCC) report estimates that in their intermediate scenario of emissions, the global surface temperature will increase to around 2.7°C by 2100. Their other scenarios predict a rise between around 1.4 and 4.4°C by 2100 (IPCC, 2021). All these scenarios will have an impact on our planet and the various natural systems that govern it. Among others it will impact the sea level, the average daily temperatures around the globe, the mean rainfall worldwide, etc. In turn these changes will affect other events as well.

The 6th IPCC report includes predictions regarding extreme heat and humidity events, which are both certain to increase in likelihood in the event of 2°C or more rise in mean global temperatures (IPCC, 2021). How much moisture is in the air changes how humans experience heat. Because humans need to keep our bodies around 37°C to stay alive and healthy, the body needs to perspire whenever the air around us reaches temperatures higher than that. But the efficiency of perspiration is determined by how well water can evaporate from our skin into the air. If the air is fully saturated with water, then none can evaporate and cool our bodies. In such an event, bodies that have reached a temperature higher than 37°C either due to physical activity, or the fact that the air around them is warmer than that, can no longer cool down. Clearly, extreme heat events that carry enough moisture thus become fatal even for healthy individuals who shelter in the shade and rest, since the air temperature is heating them up while even when remaining still, and too much moisture in the air prevents their bodies from cooling down.

Such events are best measured by wet-bulb temperatures, which combine the temperature and humidity of the environment into a single index commonly used for heat stress. In practice it is measured by reading a thermometer wrapped in wet cloth, which is less than the dry air temperature since water evaporation cools the thermometer down (Carter et al., 2020). The theoretical limit to human survivability is believed to be 35°C wet-bulb temperature, though other research shows that this point could be even lower, around 31°C wet-bulb temperature (Coffel et al., 2017).

Figure 8 shows the all-time daily highest wet-bulb temperatures between 1979 and 2017 around the globe. Certain areas have already experienced events near or even above the 35°C limit. The highest temperature was measured in Saudi Arabia at 36.5°C wet-bulb temperature. Other areas experiencing high heat and humidity events can be found in Central and South America, West and North Africa, southern parts of Europe, the Middle East, South, Southeast, and East Asia, as well as the north part of Australia.

Figure 8: All time daily maximum wet-bulb temperatures in °C around the globe 1979-2017

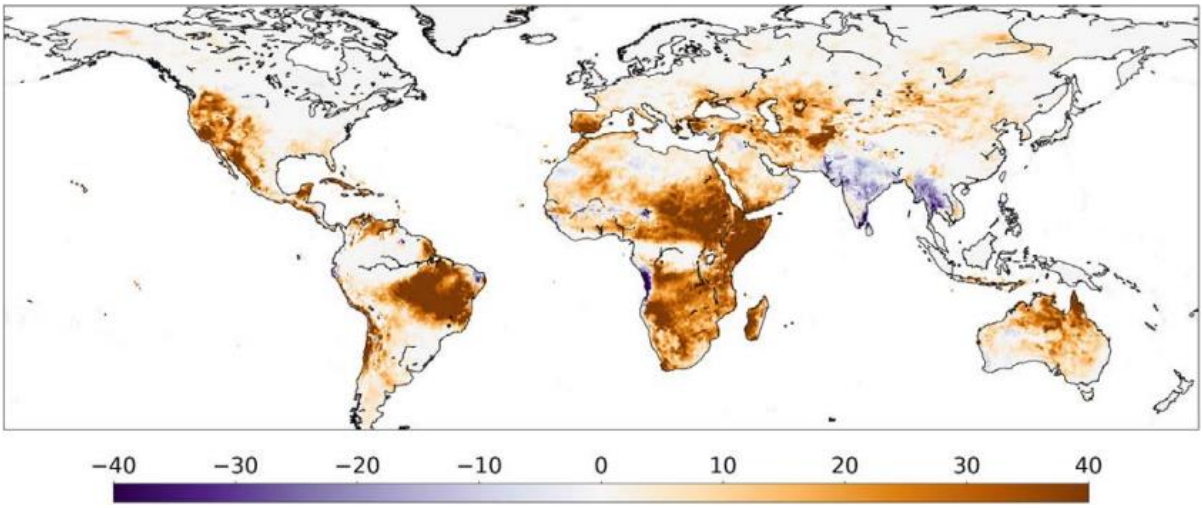


Source: Krajick (2020)

Research shows that extreme humid heat events have already more than doubled in frequency since 1979 (Raymond et al., 2020). While sea temperatures of 37.8°C on the coast of Florida, USA in the summer of 2023 support the validity of these measurements (Cabral, 2023). Moreover, analysis shows that humid heat events are more responsive to global warming than dry heat events, meaning that more extreme wet-bulb temperature events can be expected in the future. In addition to the fact that many of the areas most threatened by the events are also some of the most densely populated in the world, most likely at least some of the people living in those areas will move and seek refuge elsewhere (IPCC, 2021).

With the global climate warming up and extreme heat events becoming ever more common, large wildfires will also become more and more common. They are fed by a variety of factors and even longer rainy periods can increase wildfire intensity, as they stimulate growth and accumulation of fuel in the environment. Notably, not all wildfires are bad, as there are ecosystems which are adapted to low intensity fires and plants and animals which benefit from them. But the ever increasing severity, frequency, and longevity of fires around the globe means that fewer of them are beneficial to the environment and more and more are becoming destructive (OECD, 2023).

Figure 9: Change in the number of yearly fire weather days between 1979 and 2019



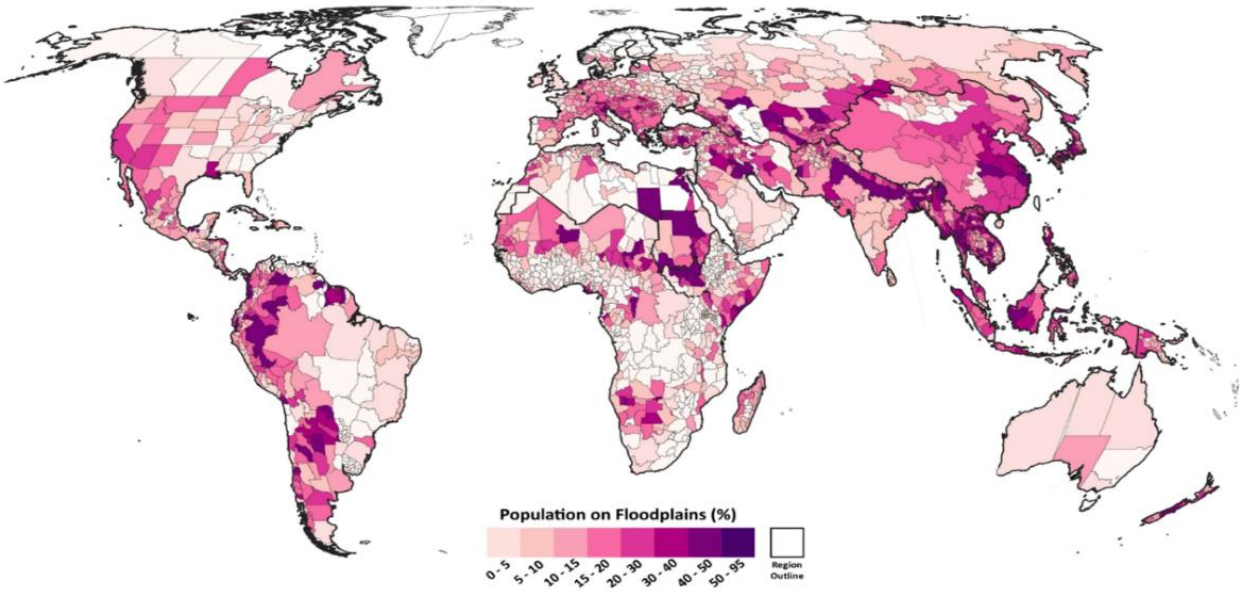
Source: OECD (2023)

Fire weather days refer to the index by Jolly et al. (2015) who count the number of days each year that the mean fire danger index of the US Burning Index, the Canadian Fire Weather Index and the Australian Forest Fire Danger Index is above half of its value range. Importantly, fire weather days reflect the type of atmospheric conditions that are most prone to creating wildfires, but it does not necessarily imply that a fire has occurred. The indices combine the effects of recent temperatures, precipitation, humidity, and wind on vegetation dryness. The number of fire weather days has increased worldwide since 1979 (Figure 9). Brazil, East, and Southern Africa are all very large regions experiencing a significant increase in the number of fire weather days. Other important regions include the West of North America, Central America, Chile, the Iberian Peninsula, Central Asia, and Australia.

Wildfires impact human livelihoods not only by burning their homes and forcing them to flee, but they also release carbon trapped in plants by burning them, and the smoke particles released can harm even organisms living far away (OECD, 2023). Furthermore, extreme wildfires can expose soil and make it prone to being blown or washed away, as well as directly burn the organic matter within it and thus reduce its quality and potential to sustain life (Amerh Agbeshie et al., 2022).

Floods can be caused by many different factors, and there are many ways to classify them. They can be caused by rivers overflowing their banks, drainage problems, tsunamis, tidal waves, storm surges, and so on. Together with sea level rise they threaten the lives of people all over the world, especially as societies have historically settled next to rivers and estuaries due to trade (Fang et al., 2018). Now climate change is predicted to increase the frequency of severe rainfall and storms, thus increasing the likelihood of more devastating floods (IPCC, 2022).

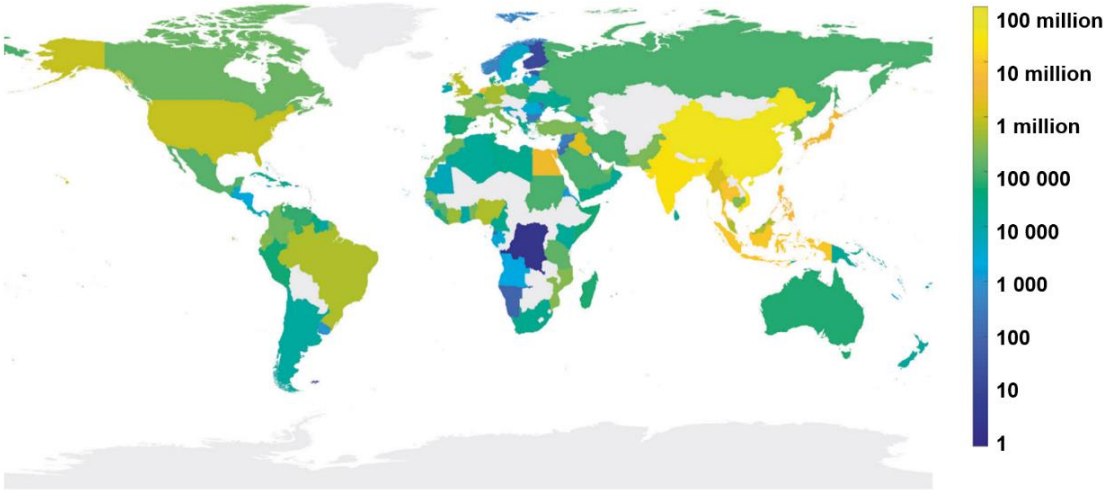
Figure 10: Percentage of population living in 1000-year flood plains



Source: Devitt et al. (2023)

River floodplains can be separated into groups based on how often the area is expected to become inundated. High frequency floodplains are shown to be less commonly inhabited, as opposed to low frequency but high intensity flood plains. Such areas carry a low chance but high potential for loss of human lives and economic damage (Figure 10).

Figure 11: Number of people per country living on land expected to be under the sea by 2100



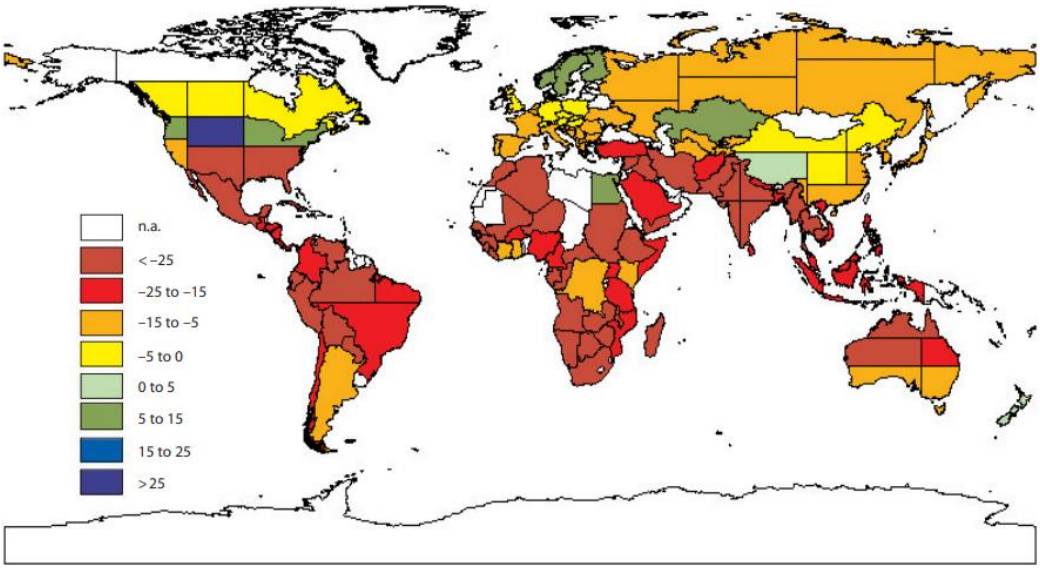
Source: Kulp & Strauss (2019)

Since the 1880s sea level rises of about 21 to 24 centimetres have been observed, due to glacial melt and thermal expansion of warming seawater. Most projections estimate that the

sea will rise to somewhere below two meters relative to preindustrial levels by the year 2100, though the trend will not stop even after net zero carbon emissions are reached.

Figure 11 shows how many people would live below the surface of the ocean today, if it were to rise to levels predicted for a 2°C warming by 2100, without considering ice sheet instability, which could raise sea levels even further. Iraq, Egypt, Japan, China and almost all Southeast Asian countries will have to move upwards of 10 million people. Moreover, low pressure weather systems can bring about storm surges, which are coastal flood events higher than tide levels, in the case of which even more people would find their homes flooded and their lives disrupted (Muis et al., 2016).

Figure 12: Impact of global warming on the % change of agricultural productivity



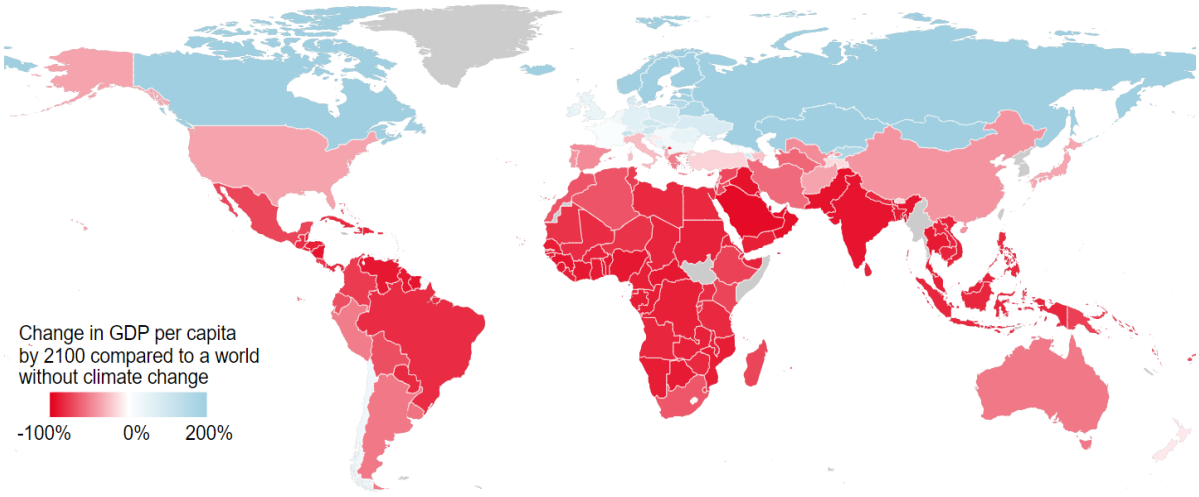
Source: Cline (2007)

With the warming planet and changing rainfall patterns agricultural productivity around the world will undoubtedly change, but not all the effects will be negative. Farm crop yields are some of the most difficult to predict as people can choose between a wide variety of seeds to grow. Additionally, some crops are hardier and more drought resistant and respond to different soils and fertilizers differently than others. Lastly, the various assumptions that models predicting this change make can vary widely, as it is not known how people will adapt to the changing climate by irrigating more land, or if the water to do so will even be available. Thus, accurate predictions in this area are difficult to achieve and can vary widely according to assumptions (Cline, 2007).

Higher temperatures and more common droughts in some areas will shorten the growing season, while melting permafrost may open new, previously non-arable land closer to the poles. The larger quantities of CO_2 will increase crops' ability to synthesize and retain water, which will help them grow faster, while higher temperatures may accelerate crop maturity (NASA's Scientific Visualization Studio, 2022).

The model of Cline (2007) predicts how agricultural productivity is expected to change due to climate change if the effects of increased concentrations of CO_2 in the atmosphere are not considered (Figure 12). This means that the likely consequences will not be quite as dire, yet the distribution of negative effects almost everywhere except parts of North America, Northern Eurasia and New Zealand is important to consider. Moreover, the connection of continents through global trade means that the negative effects in one country can spill over to others in the form of price increases for their imported products.

Figure 13: Predicted effect of global warming on % change GDP per capita



Source: Burke et al. (2015)

The last important path through which the lives of people will be affected is the economic damage from climate change. Burke, Hsiang & Miguel (2015) used historical data on temperature and GDP per capita changes to predict how global warming will affect GDP per capita around the world. Their research shows that the annual average temperature associated with the highest productivity is 13°C declining strongly at higher temperatures, a result that holds for both agricultural and industrial, and rich and poor countries. Almost all countries south of the northern 45° of latitude will have their economies negatively affected by global warming (Figure 13).

2.3.4 Climate change in the European Union

The 6th IPCC report (2022) reports four key risks due to climate change in Europe. They are listed in Table 5 from highest to lowest risk levels, and though this order of risk does not apply to migration risks, they are nonetheless important as they affect the liveability of our environments. The following chapter will go through these and other risks that affect migration in Europe.

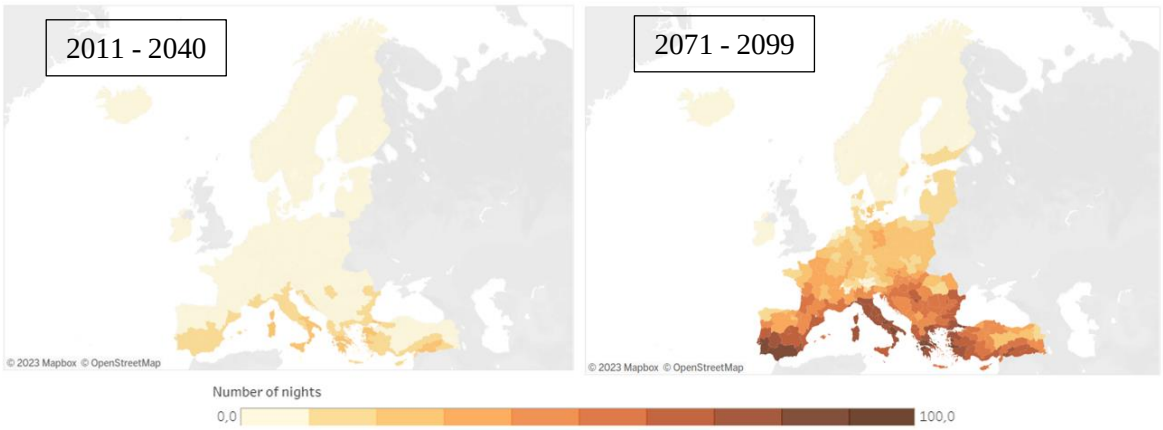
Table 5: Four key risks due to climate change in Europe

1.	Risks of Human Mortality and Heat Stress, and of Ecosystem Disruptions Due to **Heat Extreme** and **Increases in Average Temperatures**
2.	Risk of **Losses in Crop Production**, Due to Compound Heat and Dry Conditions, and Extreme Weather
3.	Risk of **Water Scarcity** to Multiple Interconnected Sectors
4.	Risks to People, Economies and Infrastructures Due to **Coastal and Inland Flooding**

Source: IPCC (2022)

Though 35°C wet-bulb temperature is the theoretical limit to human survivability, extreme heat and humidity begin to affect less than healthy humans much sooner than that. Researchers estimate that more than 60 000 heat related deaths occurred in Europe between the 30th of May and 4th of September 2022 (Ballester et al., 2023).

Figure 14: Predicted number of tropical nights 2011-2040 & 2071-2099 in case of RCP8.5



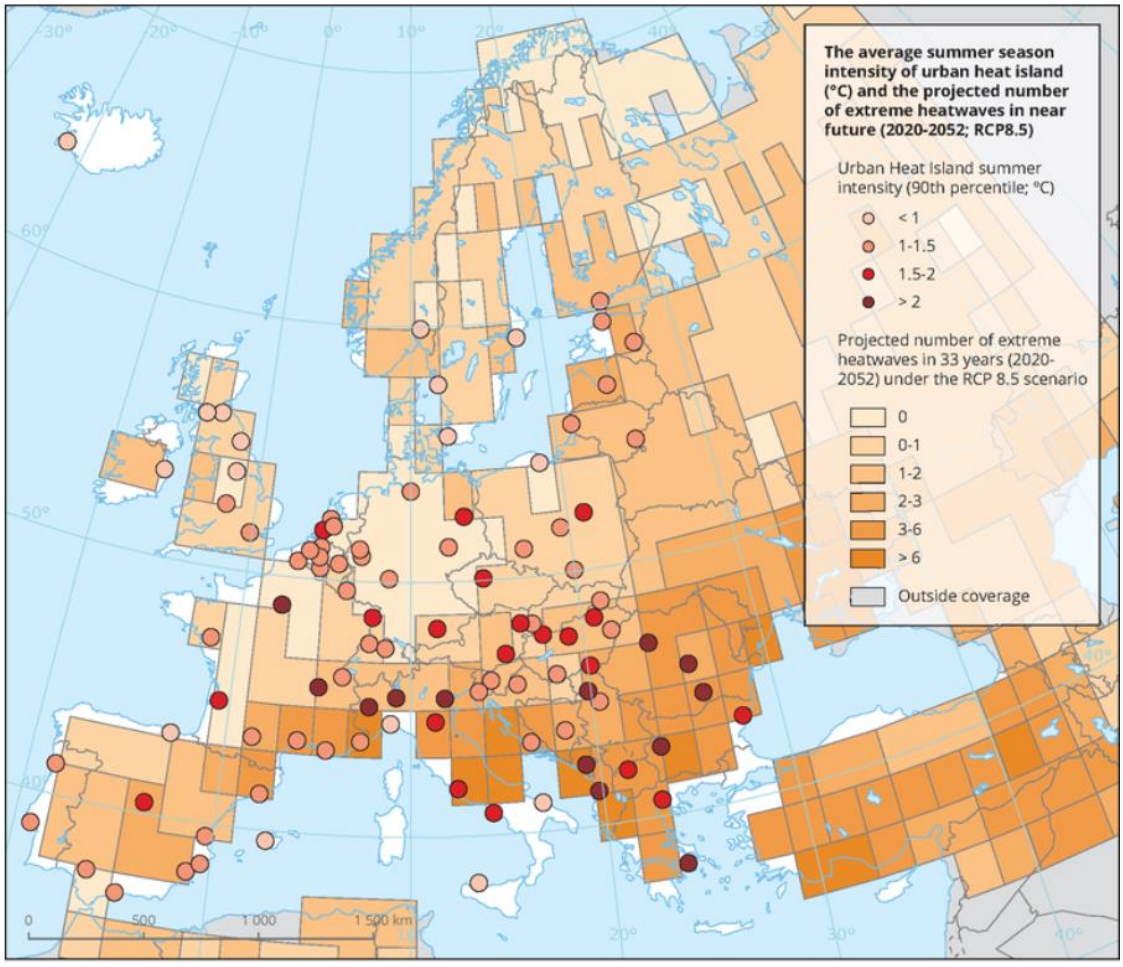
Source: European Environment Agency (2023c)

The predicted number of tropical nights (above 20°C) in the periods 2011-2040 and 2071-2099 in the case of RCP8.5 will increase to almost 100 per year in the southern-most part of Europe (European Environment Agency, 2023c). While this is the most pessimistic model of global warming released by the IPCC, despite some progress in bending the emissions curve, it remains a possible outcome (Schwalm et al., 2020). All regions beside the Mediterranean Sea will be adversely affected, as some will begin to experience more than 80 tropical nights per year, where they now experience less than 30.

The frequency of heatwave days, defined by the European Environment Agency (EEA) as a period of at least 3 consecutive days on which the daily maximum temperature exceeds the 99th percentile of the daily maximum temperature of the May to September season for the period 1971 to 2000. Figure 15 shows the projected increase in heatwaves in Europe in the RCP8.5 scenario. Though this is an extreme scenario, with no mitigation measures and CO_2

emissions continuing to rise through the 21st century, it is an important warning. In this case, much of southern Europe will experience up to or more than 6 heatwaves per season.

Figure 15: Urban heat islands and extreme heatwaves in Europe under RCP8.5



Source: European Environment Agency (2023e)

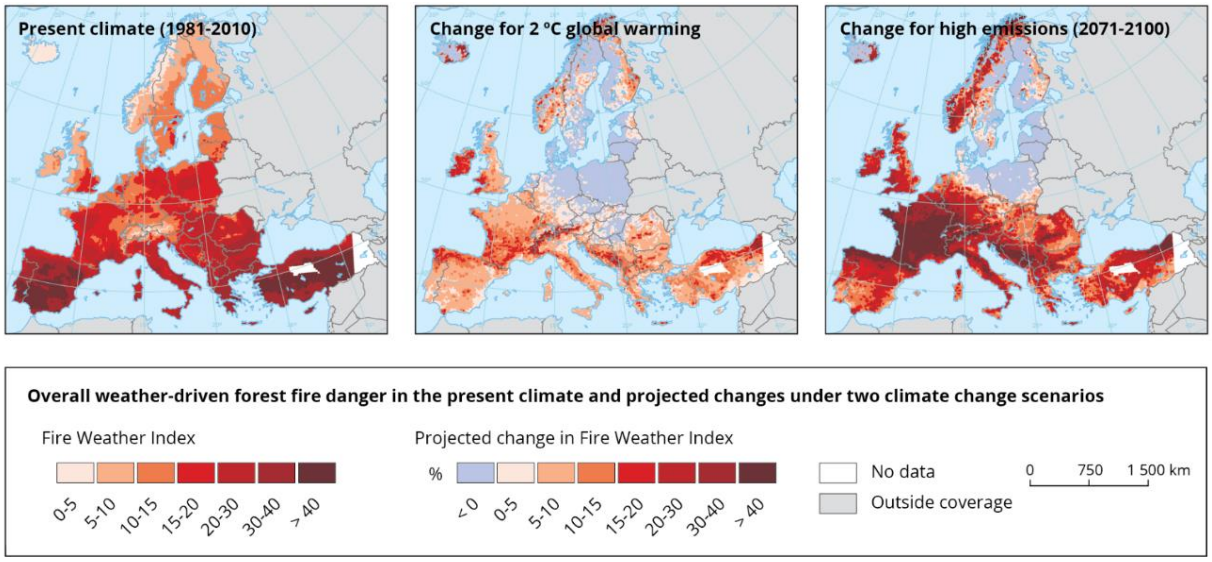
Much research has been conducted on the topic of which people are most affected by heat waves. Research is generally conclusive that the elderly, those with cardiorespiratory diseases such as asthma, and children are more commonly affected. Research on socio-economic characteristics, such as income and education level, home neighbourhood, occupation is more uncertain, yet some find that the more affected people are poor, uneducated, and or occupy manual labour jobs outside (Gronlund, 2014; Syah Arsad et al., 2022).

Additionally, the urban heat island phenomenon is a well-researched effect where urban construction and human activities are all clustered together, which significantly increases the temperature relative to neighbouring rural areas, especially at night. Meaning that people living in urban areas are more likely to be affected compared to rural residents (Phelan et al., 2015). Paris and Lyon in France, as well as larger cities in Northern Italy, along the Balkans,

and the Carpathians will experience the highest difference between urban and rural temperatures, due to the urban heat island effect (Figure 15).

With increasingly hot weather, and changing levels of rainfall, the European continent is experiencing more and more frequent and large wildfires. While climate change is far from the only reason behind wildfires, the severity of which can be greatly exacerbated by human activity, such as agriculture, bad forest management, and inappropriate land development. The EEA reports that burnt area has decreased in the EU since the 1980s, yet there are more reported wildfires, which speaks to the effectiveness of fire brigades around the continent (European Environment Agency, 2021).

Figure 16: Change in the EU Fire Weather Index in two climate change scenarios

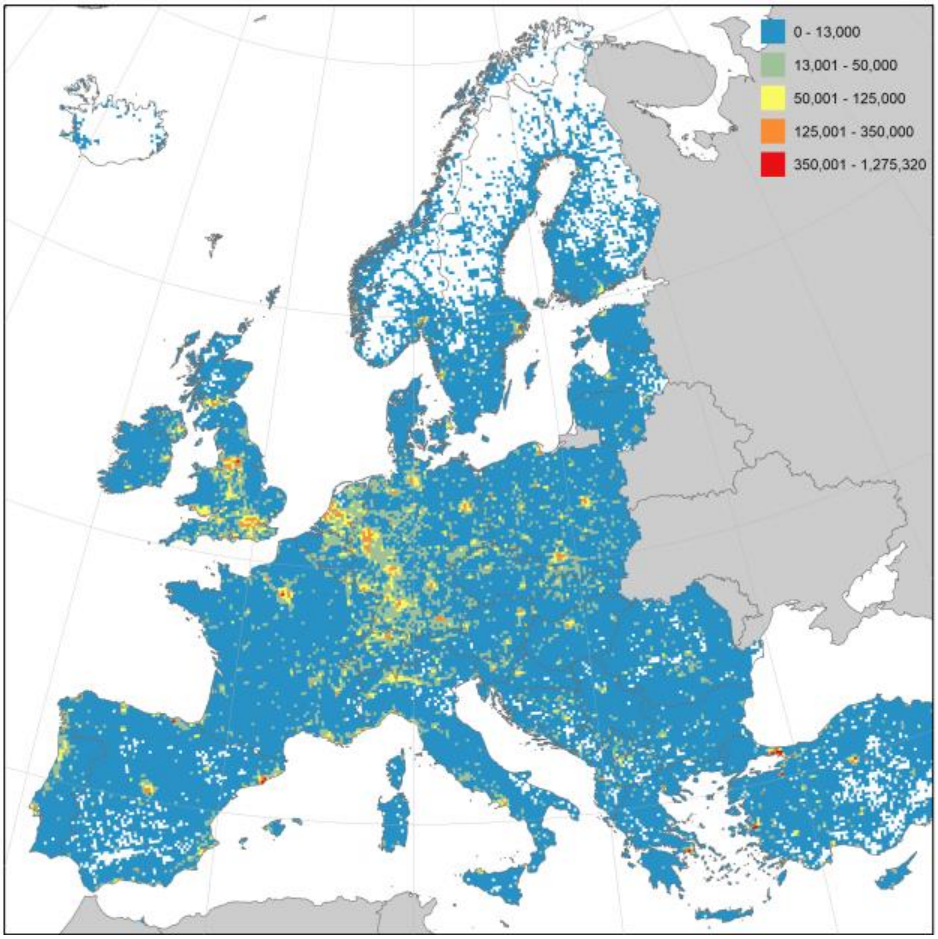


Source: European Environment Agency (2021)

The changes in fire weather around the EU will not be uniform. The territories that will experience the largest increase in a 2° C warming scenario are the alpine regions like the Pyrenees, the Alps, the Dinaric Alps, and the Apennines as well as Ireland (Figure 16). In the case of a high emissions scenario, the effects will be much more profound. The index is calculated using the Canadian Forest Service Fire Weather Index rating system (FWI) and is a representation of atmospheric conditions for forest fires. It does not include fuel availability or human ignition factors. Values between 21.3 and 38.0 are considered high danger, and very high danger between 38.0 and 50 (Climate Adapt, 2023a).

Even under the tamer emissions scenario, higher elevation areas in Europe, such as the Pyrenees, the Alps, and Dinaric Alps, as well as Ireland will all experience the greatest increases in the Fire Weather Index, while under the more severe scenario practically all but the most northern parts of Europe will see an increased wildfire risk.

Figure 17: Number of people living in proximity to Wildlife-Urban Interfaces



Source: Costa et al. (2020)

The fact that forest fires hurt the economy by damaging infrastructure, agricultural lands, water supplies, halting the tourism industry and so on is known (Stougiannidou & Zafeiriou, 2021). Additionally, smoke can even affect the health of people who do not live close to the fires. Children, pregnant women, the elderly, and those with pre-existing cardiovascular and/or respiratory conditions are most at risk (Climate Adapt, 2023b).

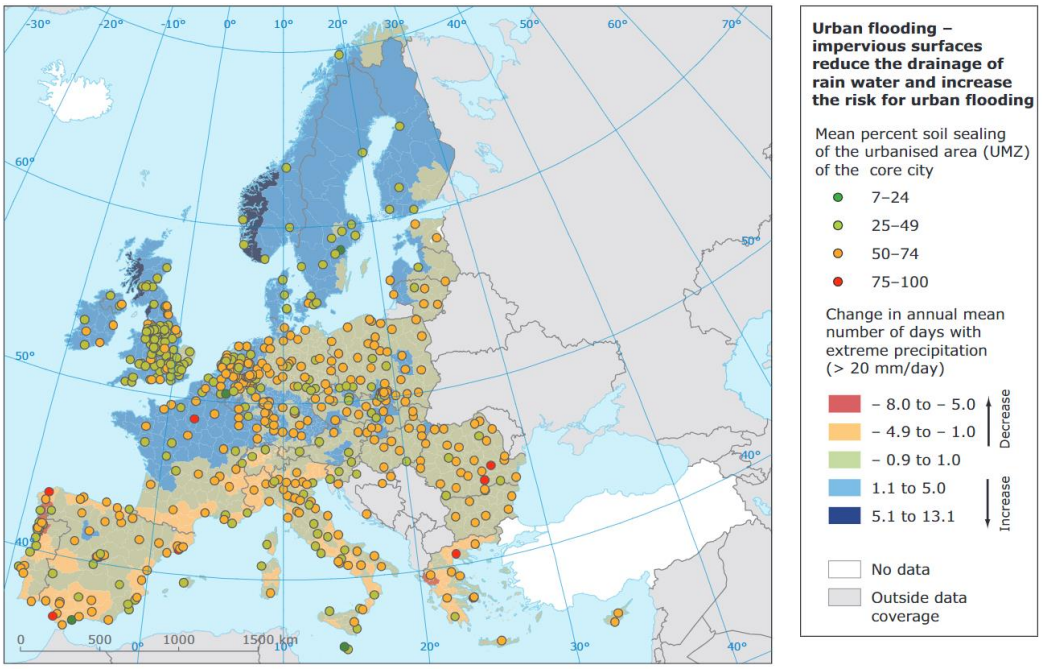
Literature on the socio-economic status of those most hurt by wildfire is however lacking. There is little data available regarding education and income levels, employment status, ethnicity, age, and other characteristics of the victims of wildfires. It can however be predicted which communities are most at risk since most wildfires are linked to human actions. Thus, areas where urban settlements meet wildlife are most prone to starting a fire. Consequently, people who live close to these so-called Wildlife-Urban Interfaces (WUI) are most at risk of fire (Costa et al., 2020).

Considering that wildfires are predicted to become more common further north in Europe, especially in the high emissions case, the European “blue banana” is a highly populated area at risk of wildfires (Figure 17). This is less common further south, where there are relatively

few hotspots of WUI areas, mostly around large cities such as Madrid, Barcelona, Napoli, Athens, Istanbul, and Izmir.

Floods are not a new occurrence in Europe, as the continent is riddled with large waterways and their tributaries. The past 30 years have seen some of the most frequent and intense floods of the past 500 years, and research shows that the surrounding circumstances of this period were unusually warm for such intense floods (Blöschl et al., 2020).

Figure 18:How impervious surfaces reduce drainage of rainwater and increase risk of flooding



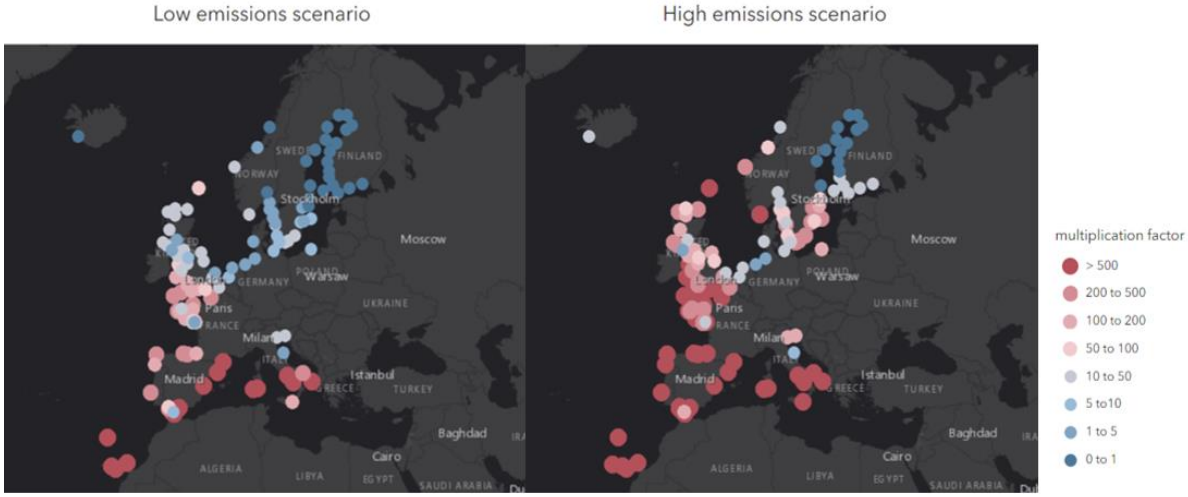
Source: European Environment Agency (2012)

Projections also show that this trend will continue and damages from river flooding are projected to increase three times at just 1.5 °C global warming levels (IPCC, 2022). Additionally, research by Devitt et al. (2023) shows that Europe has a higher percentage of population living in flood prone areas of frequent but low magnitude events compared to the rest of the world, which the authors propose is due to significant investment in structural defences against frequent flooding events.

People in many European cities live in potential river floodplains. This means that climate change will increase their potential exposure to inundation risk. Urban areas also see increased risk levels due to their constant expansion, which creates more impermeable surfaces and further strains sewer systems. In many cities these are already more than 40 years old and have the potential to create issues with transport disruptions, as well as health, and pollution impacts in case of sewage backing up onto the surface (IPCC, 2022). Paris is a notable city in Europe where impervious surfaces present a problem (Figure 18).

In Europe, some 200 million people live in coastal areas. Since preindustrial times, the mean global sea level has risen by some 13 cm. This process has accelerated since the 1990s and together with changes to the frequency and severity of storms, sea level rise now threatens littoral populations around the continent (Vousdoukas et al., 2020).

Figure 19: Projected change in frequency of coastal flooding events between 2010 and 2100



Source: European Environment Agency (2023a)

Frequency of coastal flooding events is expected to increase in a lower and higher emission scenario (Figure 19). In both, there is a relatively low increase in the Baltic Sea, which is due to post-glacial rebound in that area. Meaning that due to the glaciers melting the continental shelf is rising as there is now less weight pressing it down. Additionally, the Mediterranean Sea is projected to experience more frequent coastal flooding events, extending up the Atlantic coast of France in the more severe scenario as well (European Environment Agency, 2023a).

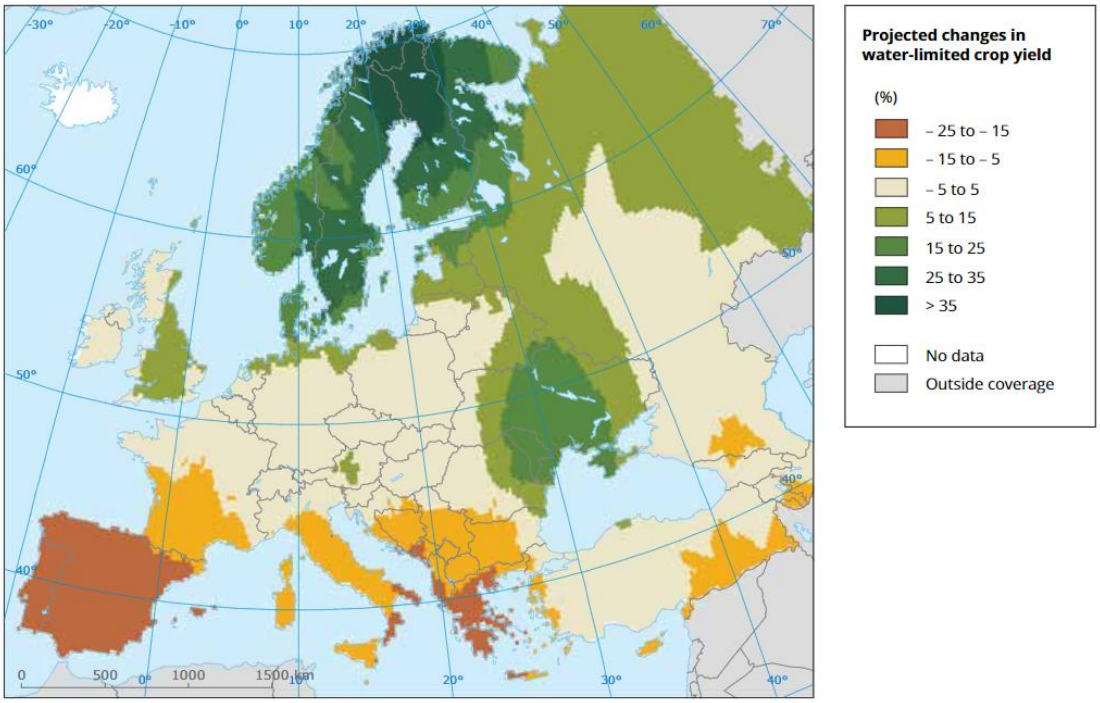
There are different mitigation strategies that countries can utilize to protect their citizens against floods, such as building dykes and early warning systems, floodproofing infrastructure, and accommodating flood risk. There are also more natural solutions that prevent coastline degradation and calm sea waves, such as mangroves, reefs, and sea grass, many of which however have limited applicability in Europe (Vousdoukas et al., 2020).

Neumann et al. (2015) find that in the year 2000 there were 50 million people in Europe living in Low Elevation Coastal Zones, defined as a contiguous and hydrologically connected zone of land along the coast and below 10 m of elevation. People living in these areas are at risk of constant flooding due to sea level rise, or less frequent yet still very damaging storm surge floods, or coastal erosion, etc. The researchers estimate that there will only be 6 million people more living there by 2060 due to low population growth, but 40%

of them will be in urban areas. Additionally, 32.4 million of these people will be living in the 100-year flood plain by 2060.

The effects of climate change on farm crop yields are hard to predict because they are affected by temperature, water availability, and atmospheric CO_2 concentration, as well as other factors which are themselves affected by climate change, such as diseases, pests, pollinators and more. Moreover, different crops have different water and temperature needs, thus while some crops such as maize are expected to become less productive, others like wheat will become more productive. Crops can also be watered using only rain, or irrigated, in which case people can create artificial conditions that do not reflect the actual state of the climate (European Environment Agency, 2019; Gray, 2021).

Figure 20: Projected change in water limited crop yield for 2050



Note: The map shows the mean relative changes in water-limited crop yield simulated by the ClimateCrop model for the 2050s compared with the period 1961–1990 for 12 different climate model projections under the A1B emissions scenario. The simulation assumes that the irrigated area remains constant, and the results combine the response of the key crops wheat, maize and soybean, weighted by their current distribution.

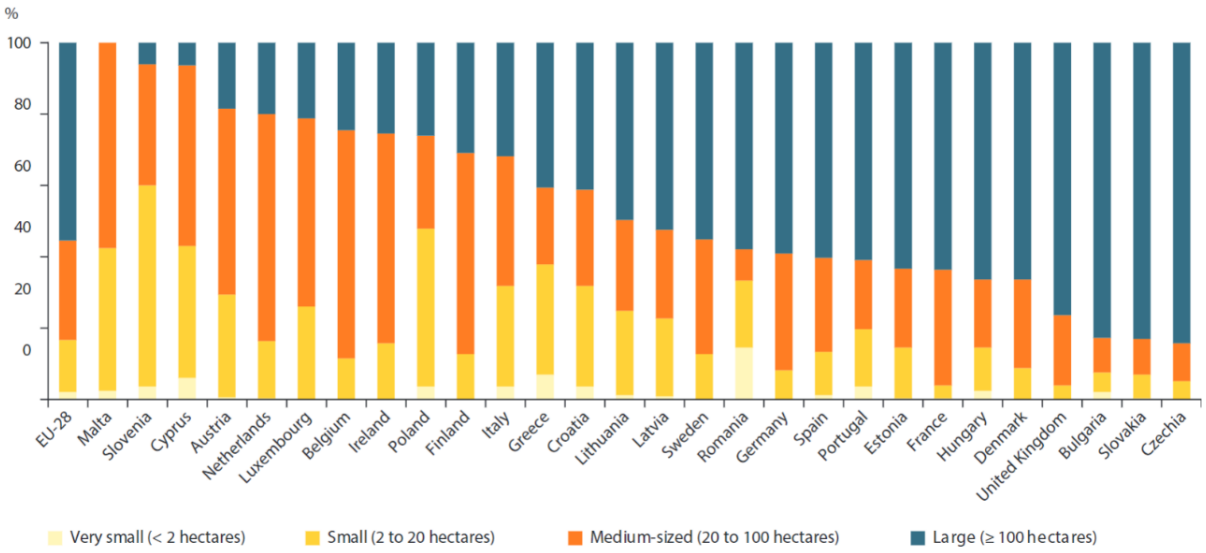
Source: European Environment Agency (2017)

Figure 20 shows the projected change in water-limited crop yield, meaning that the irrigated area and the crop distribution are assumed to remain constant throughout the period. Southern Europe will experience a significant decrease in yield, a continuation of the already present trend. The Baltic states will on the other hand benefit as warming temperatures lengthen their growing period.

Other researchers on this topic, like Iglesias et al. (2012), have come to similar conclusions. Their several projected scenarios in Europe, differing based on the assumed CO_2

concentration, average global temperature, population size, and model type all exhibit southern crop yield degradation, and northern improvement. Their models all allow crop distribution to change, as farmers adapt to new growing conditions. However, these simulations placed no restrictions on water available for irrigation and the use of nitrogen fertilizers, the use of both of which could be restricted by a future society more focused on the wellbeing of the environment. The area where the agreement of different projections is low is central Europe, as some project an increase and others a decrease.

Figure 21: Share of farms by farm size in Europe



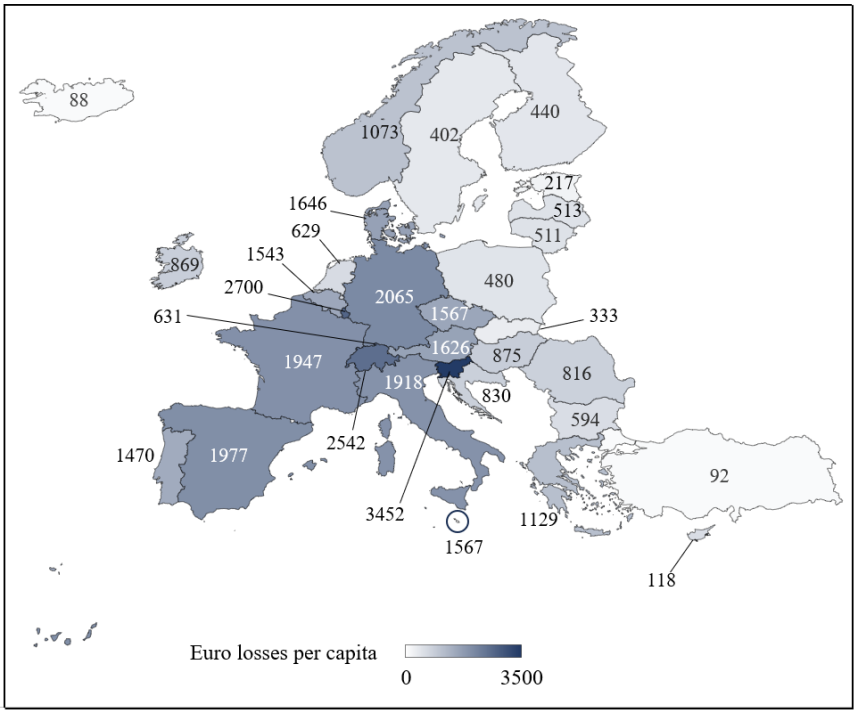
Source: European Environment Agency (2019)

Lastly, the structure of European farm sizes is an important factor to consider. Countries like Romania, Greece, Cyprus, Slovenia, Italy, Croatia, and Portugal have the largest shares of very small farms with less than 2 hectares (Figure 21). This is relevant because small scale farms are less able to adapt to climate change as they have fewer assets to fall back on in case of extreme weather events ruining their harvests. Additionally, they are often a family business, thus the whole family loses income, not just one of them, making them very vulnerable to climate change. In the EU on average around 95% of the total workforce on very small and small farms (less than 8000 EUR of standard output) is provided by the holders and their families (Eurostat, 2013). These small farms which provide product diversity, regional identity, and employment opportunities are on the decline in Europe, due to unfavourable demographic trends, market pressures, and weather extremes (Rossi, 2023). The need to increase their resistance is thus ever more present.

Economic damage from climate change is commonly presented through destruction of critical infrastructure, productivity loss, lower consumption, and investment, reduced global trade flows, and more. The EEA has found that a relatively small share of events are responsible for the largest share of damage, making variability in losses high throughout the years. Approximately 5% of the most damaging events caused 59% of total damages.

Despite the variability, they found that losses have been on a positive trend since 1980, with 2021 and 2022 incurring the most damages since then (European Environment Agency, 2023b).

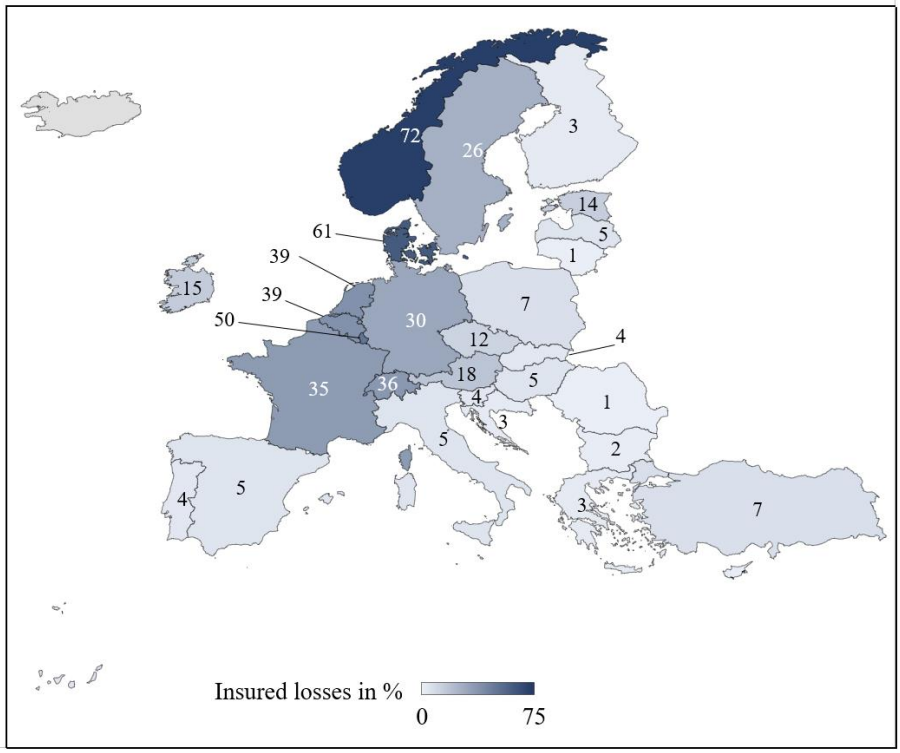
Figure 22: Economic losses caused by climate related extreme events 1980-2022 in euros per capita



Source: European Environment Agency (2023b)

The EEA (2023) reports that most of the damages from climate-related extreme events between 1980 and 2022 came from floods or storms (Figure 22). Slovenia experienced the largest losses here, but as discussed with the high variability of very costly extreme weather events, this does not necessarily imply that they experienced more of these events than other areas. Additionally, the relatively small population of only 2 million people can make relatively small total losses seem larger by comparison. Some of these economic losses are borne by the state, or compensated for by insurance companies, but for most the cost is borne by private citizens (Figure 23). This means people who live and work in affected areas, such as close to the sea or in flood plains, or in agriculture that gets ravaged by hail, can lose their houses or income. And if they are not financially able to cover the costs, it is likely that they will have to leave their homes and move elsewhere in search of other income.

Figure 23: Economic losses from climate related extreme events that were insured 1980-2022 in %



Source: European Environment Agency (2023b)

Our planet's climate has always driven the movement of people around the globe. Fast onset events like floods and landslides tend to create short-term migration to near-by locations, while slow onset events like desertification and sea level rise, create more permanent and long-distance migration. Today climate change is already affecting everyone in the world, as storms increase in severity, summers become warmer, and rainfall patterns change. Around the world countries closer to the equator feel the consequences of global warming most severely, but the issues reverberate through our trade-connected world. In Europe, countries in the South experience the worst effects of climate change. The rising mean and extreme temperatures are the most pressing issue as it has profound effects on many other systems as well (IPCC, 2022).

3 EMPIRICAL ANALYSIS

This section of the thesis will investigate migration around the world, with an in-depth analysis of the trends in the European Union. Which continents and countries produce the most migrants, and which attract the most. What distance do migrants typically move, and how many of them are asylum seekers. Within Europe, their age, sex, and education structure will be investigated with a distinction between migrants of EU origin and those from outside. Additionally, data on internally displaced people will be analysed, to understand which

countries face this issue the most, and what kind of events are most commonly the cause of displacement.

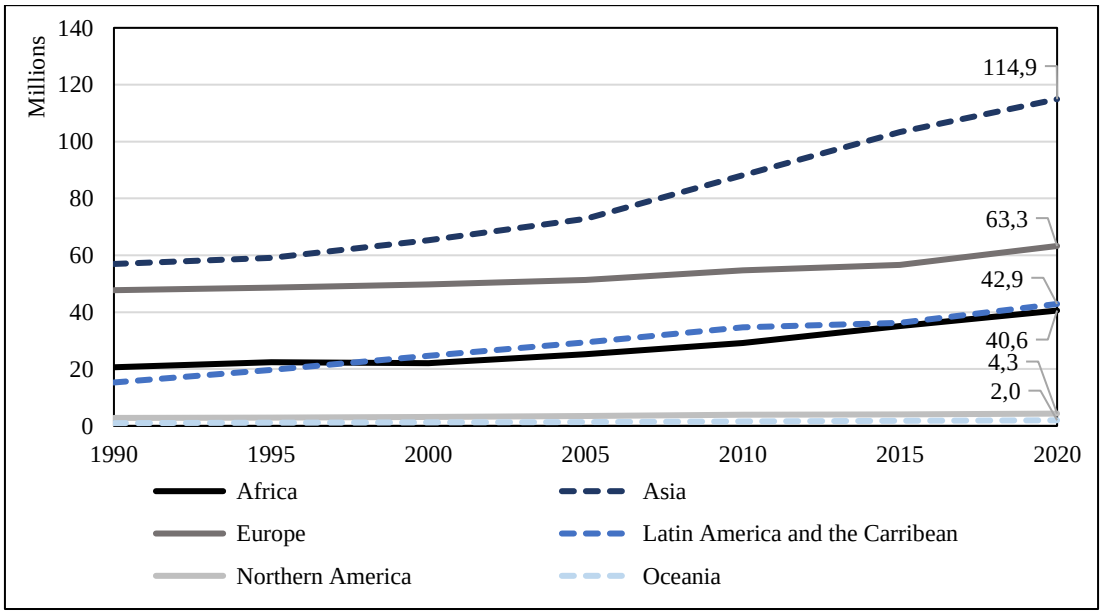
The structure of the chapter follows the third and fourth research questions by answering (Q3) How has climate change affected global migration? And (Q4) How has climate change affected international and domestic migration in the European Union?

The primary sources of data will be the United Nations database for the world overview, and Eurostat for the focus on the EU. The data on internal displacement comes from the Internal Displacement Monitoring Centre, while the research on climate change is a collection of many articles from scientific journals. For research on climate change in the EU, many of the findings come from the European Environment Agency.

3.1 Global migration trends

In 2020 there were around 281 million international migrants around the world, which equates to about 3,6% of the total population. Though this was a year of Covid-19 lockdowns and travel restrictions, it is still on trend with the rising percentage of people on the move globally, which has increased from 2,87% in 1990 (United Nations DESA Population Division, 2020).

Figure 24: Total stock of migrants by origin since 1990

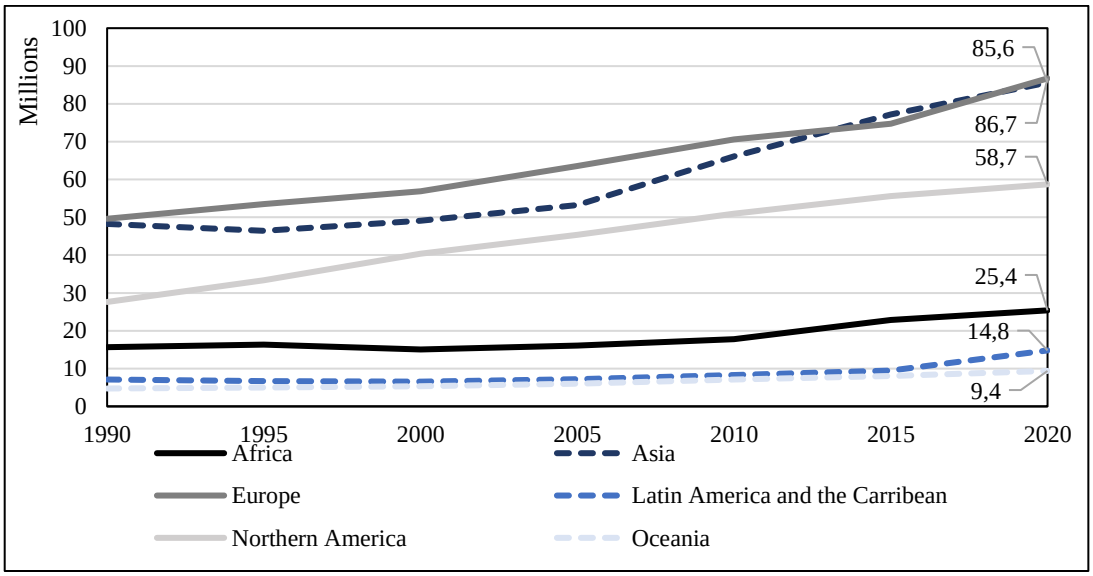


Source: United Nations DESA Population Division (2020)

Most of the total international migrants today originate in Asia, followed by Europe, Latin America and the Caribbean, and Africa, while very few come from either Northern America or Oceania (Figure 24). It is important to note that the data is regarding cumulative migrations and not yearly flows. Thus, the figure also includes people who migrated years

ago, not just newly arrived people. Additionally, the number of migrants originating in Northern America is underrepresented, as people who move within the USA do not count in this statistic.

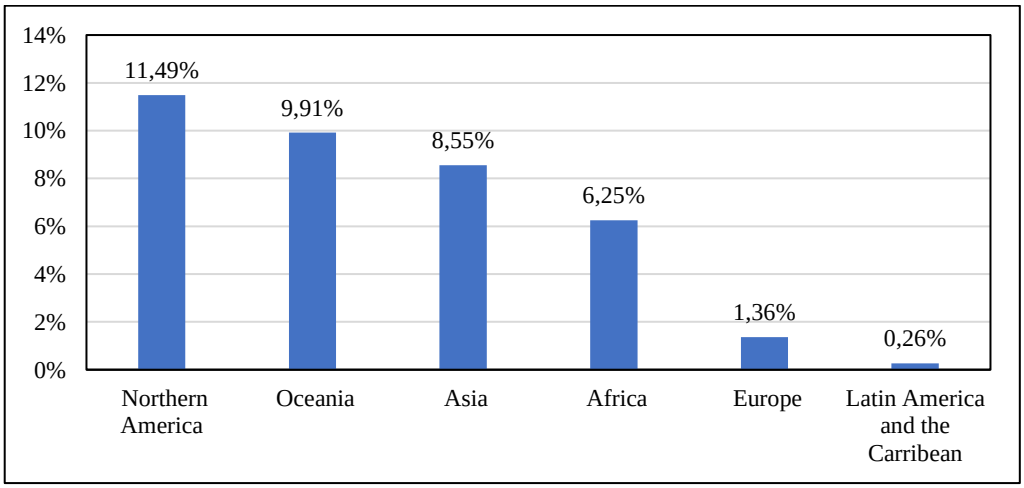
Figure 25: Total stock of migrants by destination since 1990



Source: United Nations DESA Population Division (2020)

An overview of migrants by destination shows that though few migrants originate from Northern America, many more choose to emigrate there (Figure 25). Asia and Europe can be seen to be both large destination and source regions, since many people move within continents, rather than between. Additionally, Oceania is a much bigger destination compared to the origin region, due to New Zealand and Australia attracting many migrants.

Figure 26: Stock of migrants by origin relative to the origin population in 2020



Source: United Nations DESA Population Division (2020); United Nations DESA Population Division (2022)

Dividing the stock of migrants by the populations of their continent of origin shows which people are most migratory (Figure 26). Northern America with almost 12% has the largest share of their population having migrated away. Though this number is severely defined by the large number of Canadian immigrants in the USA. The next continent with the largest share of its population having moved away is Oceania. The value is again greatly defined by the movement of people between Australia and New Zealand, though a part of it is due to the migration of Australia and New Zealand's population to the UK. This showcases the historical ties between the two regions, due to the centuries of British colonial rule (United Nations DESA Population Division, 2020; 2022).

An important fact about migrants is that most who choose to leave their country do not travel far. This could already be observed in Figure 26, as just mentioned, the two most migratory continents, owe this status in large to people moving to the next country over. Additionally, Table 6 shows a similar story as most send the largest share of their migrants to their own continents, with some notable exceptions. Central and South Asia send more people to North Africa and West Asia than to themselves. This is because the Gulf states attract many foreign labourers to their cities.

Table 6: Shares of stock of migrants by their region of origin in 2020 in percent

From / To	Sub-Saharan Africa	N Africa and W Asia	C and S Asia	E and SE Asia	Lat Am and the Caribbean	Oceania	Australia and New Zealand	Europe and N America
Sub-Saharan Africa	63%	3%	0%	0%	0%	0%	1%	1%
N Africa and W Asia	8%	51%	37%	11%	0%	0%	1%	4%
C and S Asia	0%	1%	22%	5%	0%	0%	0%	7%
E and SE Asia	0%	0%	4%	40%	1%	0%	6%	1%
Lat Am and the Caribbean	0%	0%	0%	1%	26%	0%	0%	4%
Oceania	0%	0%	0%	0%	0%	12%	2%	0%
Australia and New Zealand	2%	1%	2%	6%	0%	57%	50%	5%
Europe	18%	37%	23%	10%	13%	3%	27%	67%
N America	9%	6%	11%	27%	60%	28%	13%	12%

Source: United Nations DESA Population Division (2020)

Latin America and the Caribbean have sent 60% of their total stock of migrants to North America. This is a well-known migration route for people trying to reach the United States.

Oceania has sent 57% of their total stock of migrants to Australia and New Zealand, which are the two closest large countries in that region. Out of all the people who migrate from North America and Europe 67% go to Europe. This is a particularity of the fact that the EU enjoys open borders due to the Schengen area and so people are able to move more freely than elsewhere.

The Internal Displacement Monitoring Centre (in continuing IDMC) is an organisation that monitors and records data regarding internally displaced people (in continuing IDP) around the world. They publish a dataset, which records displacement events around the world and how many people had to leave their homes because of them. The data is divided into those displaced by conflict and by natural disasters. They furthermore provide the specific hazard that caused the displacement, as shown in Table 7.

Table 7: Types of natural disasters by IDMC

Geophysical	Weather related	Other
Earthquake, volcanic activity, mass movement	Drought, erosion, extreme temperature, flood, storm, wave action, wildfire	Oil spill, unknown

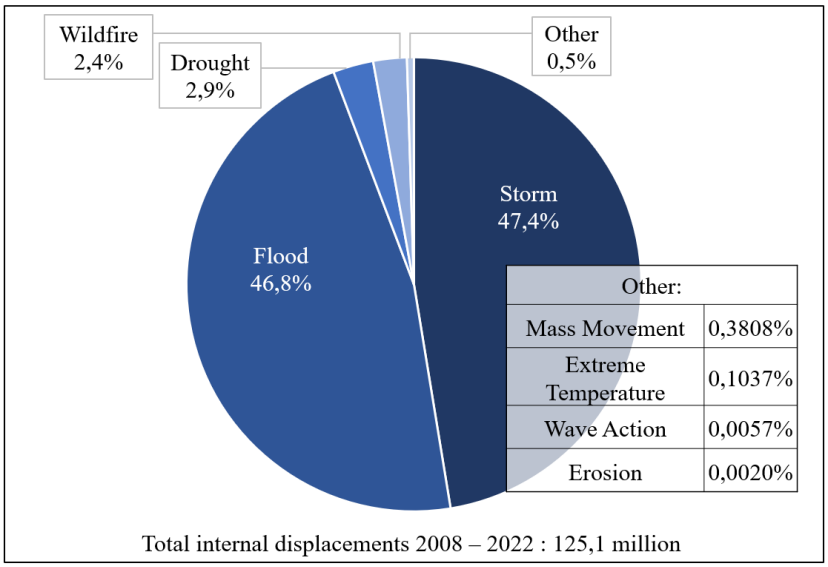
Source: Internal Displacement Monitoring Centre (2023)

IDMC (2023) provides data on both currently and newly displaced populations. Since many people can return to their homes when a threat like a wildfire or war passes, so not all must permanently relocate. Thus, if a flood displaces a thousand people in a year they may not show up in the currently displaced figures if they are all able to return to their homes in the same year. An analysis of the data will reveal how often displacement events occur, what is their cause and which world hotspots produce the most internally displaced people.

This is relevant to our analysis since the trend all over the world is for people to move into cities, where urban poverty and unemployment often push them to move to bigger urban centres or even abroad. Today around 55% of the world's population lives in a city. In 1950 it was only around 30% while it is projected to become 60% by 2030 (International Organization for Migration, 2022).

An analysis of the database shows that in total between 2008 and 2022 around 125,1 million people were displaced due to natural disasters, excluding volcanic activity, earthquakes, and dam release floods (Figure 27). Storms were by far the most common cause as they displaced almost half of all people. Together with floods, droughts, and wildfires they make up more than 99% of all natural disaster displacement events.

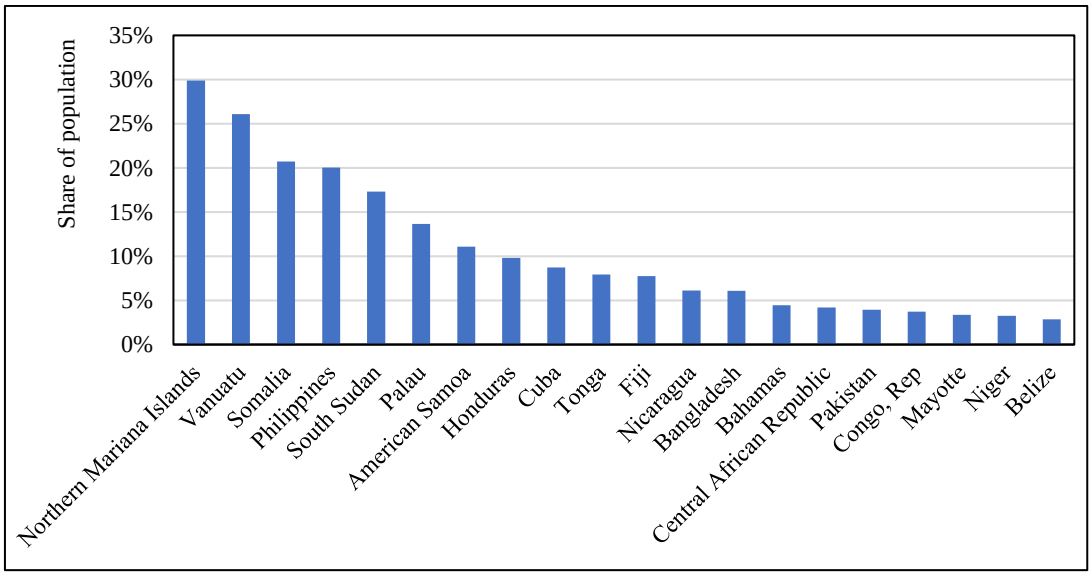
Figure 27: Total disaster IDPs globally by hazard type 2008-2022



Source: Internal Displacement Monitoring Centre (2023)

Many of the territories with the highest shares of internally displaced populations due to natural disasters are small islands (Figure 28). Due to their low elevation and tropical location, they are more susceptible to sea level rise and storm surges, and when disaster strikes their small size typically implies the whole island is affected and people have nowhere to retreat. Among the largest nations with large percentages of displaced people are the Philippines, where the most common threats were storms, as well as South Sudan, Somalia, and Cuba, for whom the most common threats were floods.

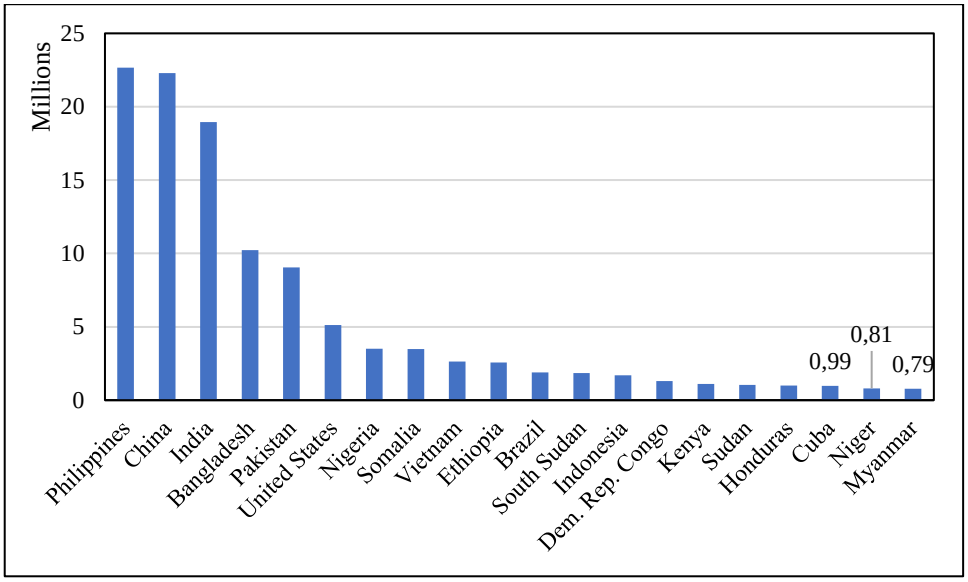
Figure 28: Countries with largest shares of population displaced between 2018 and 2022



Source: Internal Displacement Monitoring Centre (2023); United Nations DESA Population Division (2022)

The Asian continent produces the most internally displaced people (Figure 29). The Philippines, China, India, Bangladesh, and Pakistan had the five highest numbers of total displaced people, all countries where some of the highest densities of people per square kilometre in the world can be found. Interestingly, the United States is sixth on this list and of their 10 largest displacement events, seven were storms and three were wildfires.

Figure 29: Countries with the largest total new disaster displaced people 2018-2022



Source: Internal Displacement Monitoring Centre (2023)

To conclude, the flow of migrants around the world is on an upward trajectory. Asia is both the largest source and destination economy, while Oceania is the smallest in both categories. The distribution of world migration flows shows us that people prefer to move to countries that are either close to them, or they have historical, cultural, economic, or often colonial ties between them. This was seen in the fact that a large share of Australian and New Zealand migrants leave for the United Kingdom, even though they are geographically far apart. Another example is the Central and South Asians moving to the Gulf states, showcasing the economic ties between the regions.

The analysis of internal displacement events around the world shows that floods are the most common reason for people being forced to move, followed by storms and earthquakes. Countries that have the highest shares of their population internally displaced are mostly small island nations together with the Philippines, South Sudan, Somalia, and Cuba. Most of the largest total displacement events due to natural disasters occur in Asia, with the first five countries being the Philippines, China, India, Bangladesh, and Pakistan. Interestingly, the USA is sixth on this list, by far the highest among highly developed nations.

3.2 Migration in the European Union

One of the defining characteristics of the European Union is the free movement of people and goods between its member states. If it were a single country, it would be the third largest by population, behind China and India. On January 1st, 2022, there were an estimated more than 446 million people living in the EU, 23,8 million of whom were non-EU. Of all EU citizens around 13,7 million were living in a member state other than their home country. Consisting of 27 member states as of 2020, the continent is diverse, with many nationalities and languages all participating in a common market. It both attracts and creates large migration flows within and outside its' borders.

This part of the paper will focus on the demographic characteristics of the European Union and the migration flows it attracts and creates. Beginning with an overview of external migration flows, meaning where the people are coming from, and which countries they are moving to. Followed by an investigation of the nature of their arrival in the EU, namely did they come as asylum seekers or regular migrants, and how the two groups differ from each other. A further analysis of their age, education, sex structure, reasons for entering the EU, and duration of stay in the EU will conclude.

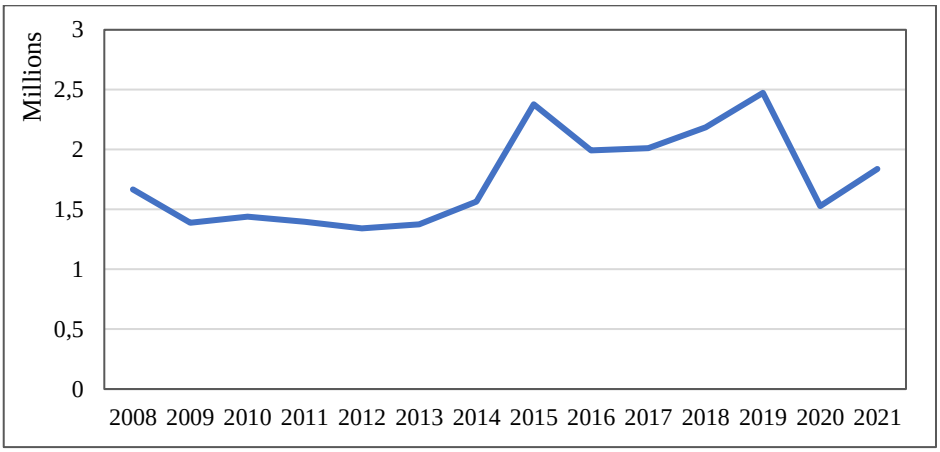
The next focus will be on internal migration flows between member states. The changing level of urbanization and people moving to cities will be investigated, as well as which sex, how old, educated, and why the Europeans who move are. The conclusion is an overview of statistics on internally displaced populations, where they were most common and which events caused their displacement.

3.2.1 External migration in the European Union

The European Union experienced large migration inflows around 2015 with the escalation of conflicts in the Middle East. Many countries started to reinstate border checks against the policy of free movement of people which they promised upon entering the Schengen Area. Additionally, the sentiment towards migrants in the EU became much more negative (Bermúdez, 2020). Though the migration of most of these people, and all the others entering in different years cannot be directly attributable to climate change, it is nonetheless important to understand and quantify it due to the numerous ways that climate change can indirectly impact them.

The number of non-EU citizen migrants entering the EU since 2008 has varied through the years (Figure 30). Two significant events can be observed in 2015 and 2020. The first was the migrant crisis of people coming from the Middle East, though this event will be much better seen in Figure 31. Then in 2020 the effect of the pandemic lockdowns and travel restrictions can be seen significantly decreasing the number of arriving migrants. Though there is an observable upward trend in the number of arrivals since 2008, it had not yet managed to return to pre-pandemic levels by 2021 which is the last available data point.

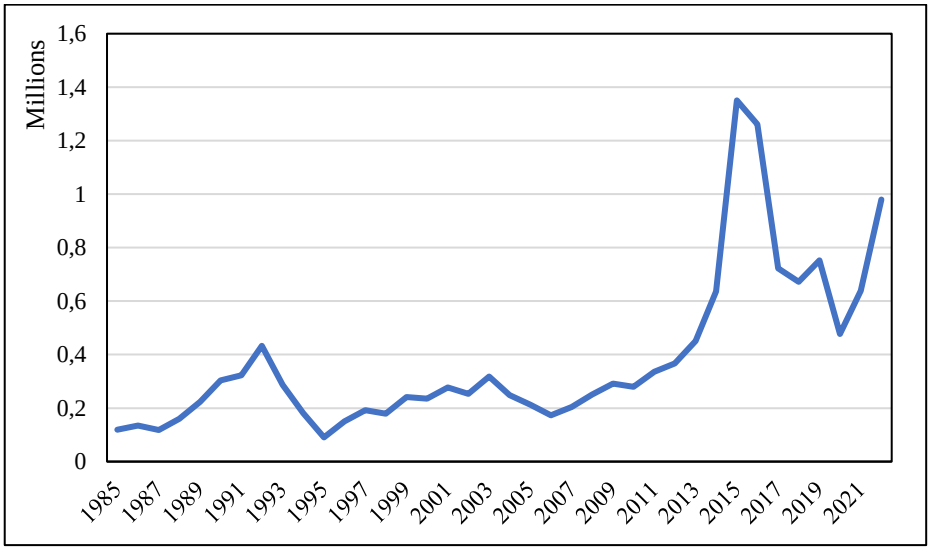
Figure 30: Number of immigrants arriving in the EU between 2008 and 2021



Source: Eurostat (2023d)

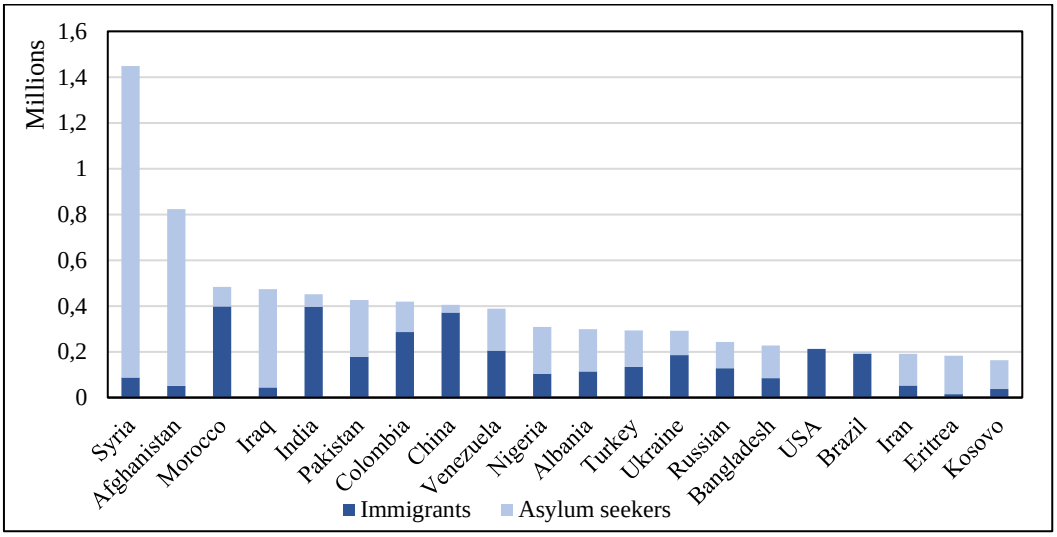
The data on asylum seekers provided by Eurostat (2023) goes back to 1985, and Figure 31 includes the data of all current member states of the EU even in years when they were not yet member states. A significant jump in the number of applications in 2015 and 2016, as well as a decrease in 2020 are both reflections of previously mentioned world events. It is important to note that this graph overrepresents the number of asylum seekers who entered the EU in this period. Because a person may, in case they were initially denied, submit subsequent applications, thus a period with a higher share of denials than previously can seem to have more applicants.

Figure 31: Number of all asylum applications in the EU between 1985 and 2022



Source: Eurostat (2022); Eurostat (2023a)

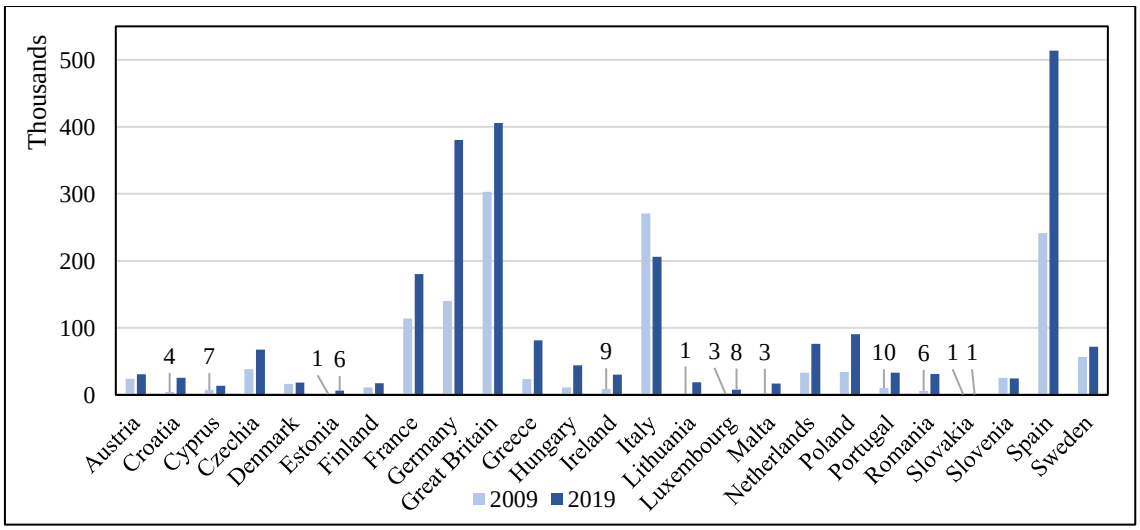
Figure 32: Sum of immigrants entering EU and first time asylum applications between 2017 and 2021 by country of origin



Source: Eurostat (2023a); Eurostat (2023d)

A further analysis of immigrants and first-time asylum seekers by nationality shows that by far the largest influx of people in the past five years came from Syria, followed by Afghanistan, Morocco, Iraq, and India (Figure 32). Out of these, people from Syria, Afghanistan, and Iraq came mostly as asylum seekers, while Moroccans and Indians came as regular migrants. The next three largest suppliers of migrants were China, Colombia, and the US. It seems that countries where significant amounts of people are affected by war and conflicts produce predominantly refugees, while other more stable ones produce regular migrants.

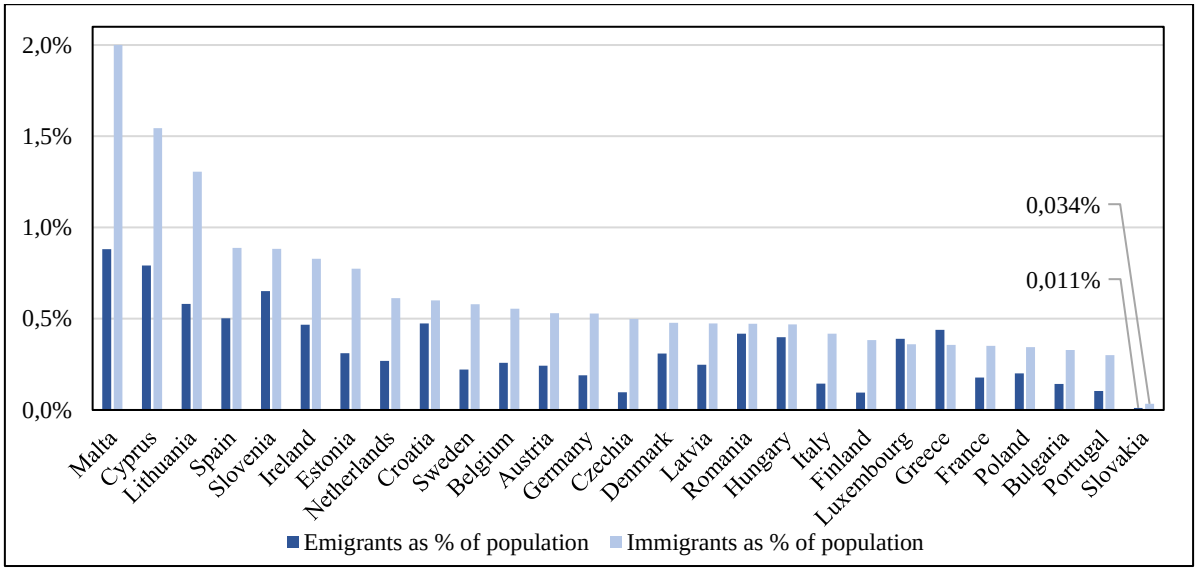
Figure 33: Change in number of immigrants arriving in EU countries 2009 – 2019 (in thousands)



Source: Eurostat (2023d)

Additionally, the popularity of destination countries within the EU has changed over time (Figure 33). In this analysis the year 2019 was chosen as the last observed year as it was the last year before the pandemic, which could have influenced the data. All countries except Italy experienced at least a slight increase in the number of arriving immigrants. Countries that experienced the largest increase were Spain, Germany, Great Britain, and France.

Figure 34: Immigration and emigration from non-EU countries as % of population 2021

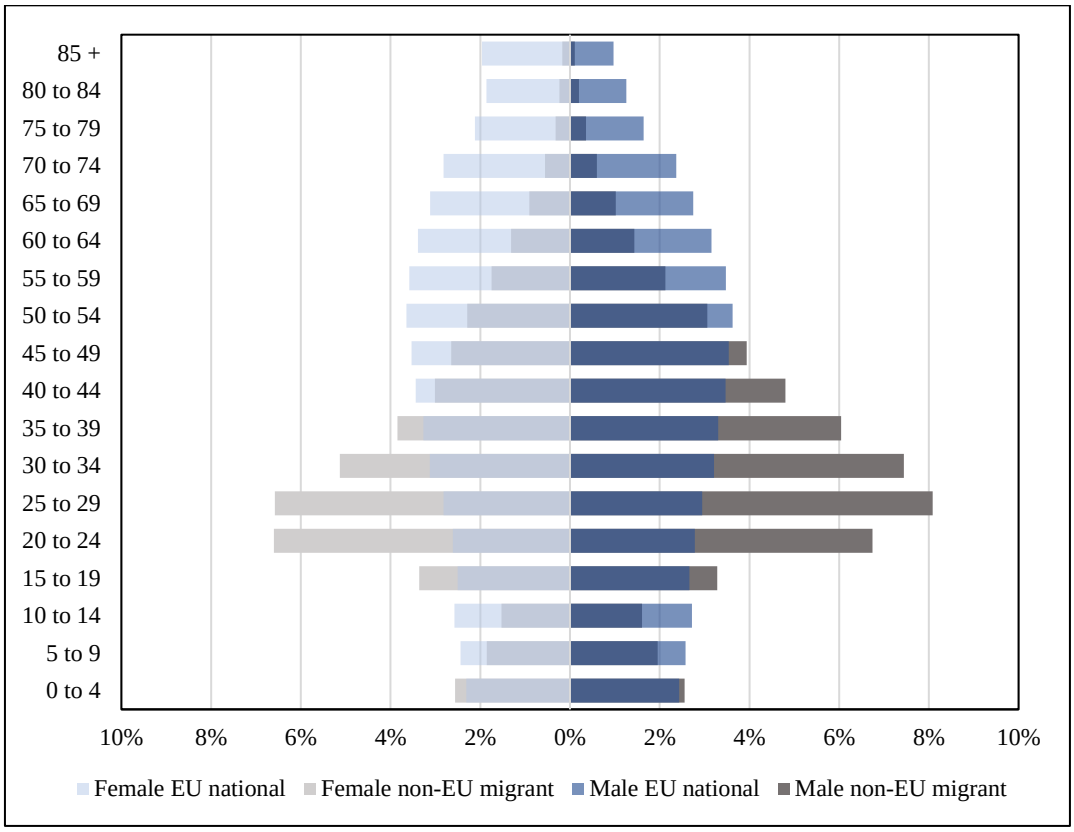


Source: Eurostat (2023e); Eurostat (2023h)

Comparing immigration and emigration to and from non-EU countries to the EU in 2021 by shares of population (Figure 34) shows that countries except Luxemburg and Greece experienced net positive external migrations. The countries experiencing the largest per capita flows were Malta, Cyprus, Lithuania, Spain, and Slovenia, while Slovakia had by far the least amount of per capita external migrations.

Comparing the population pyramids of all non-EU and EU citizens in the EU in 2021 shows their differing age structures (Figure 35). The European population is much older than the migrants. The largest share of their population is represented by people aged 50 to 54, around 10 to 15 years away from retirement. The migrant population on the other hand, is significantly younger. The largest share of their population is aged 25 to 29 and makes up a whole 18% of their population. Among EU citizens, no age group takes up more than 8% of the total population.

Figure 35: Demographic pyramid of non-EU citizens, compared to EU citizens in 2021



Source: Eurostat (2023d); Eurostat (2023h)

The data on the age structure of asylum seekers (Table 8) provided by Eurostat is much more limited, as there are only five major age groups provided, with the 18 to 64 bracket only divided into two groups, 18 to 34 and 35 to 64. Nonetheless, the main difference is that the age bracket of children below 14 years of age contributes more than 20% of their whole population, while 18 to 34 represents more than 50% of the population. Asylum seekers are much younger in age compared to the natural population or regular migrants, and they are about 70% male compared to the much more evenly distributed migrants.

Table 8: Age structure of asylum seekers in EU 2021 in percentage

Age	Female	Male	Total
0 to 13	11.0%	11.6%	22.6%
14 to 17	1.6%	5.8%	7.4%
18 to 34	11.0%	39.9%	50.9%
35 to 64	6.3%	12.1%	18.4%
65 +	0.4%	0.3%	0.7%
Total	30.3 %	69.7%	100%

Source: Eurostat (2023a)

Table 9: ISCED 2011 categories for educational attainment at 1-digit level

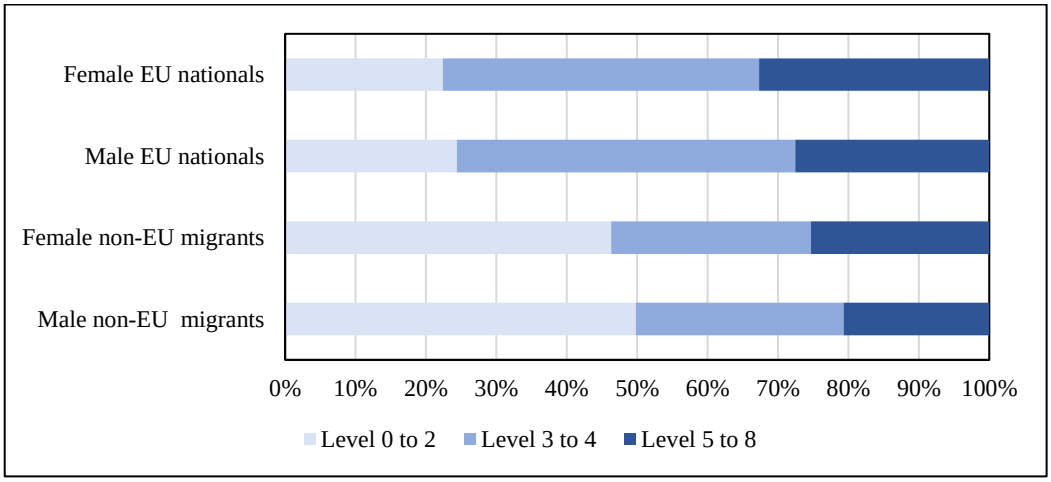
ISCED 2011 categories for educational attainment at 1-digit level:
Level 0 – Less than primary education
Level 1 – Primary education
Level 2 – Lower secondary education
Level 3 – Upper secondary education
Level 4 – Post-secondary non-tertiary education
Level 5 – Short-cycle tertiary education
Level 6 – Bachelor's or equivalent level
Level 7 – Master's or equivalent level
Level 8 – Doctoral or equivalent level

Source: Eurostat (2024)

Eurostat also provides data on the educational attainment of the population, along with the urbanization level of their residence and their nationality. Providing a means to examine how educated non-EU citizens are compared to EU nationals. The educational attainment level data are based on the International Standard Classification of Education (ISCED), explained in Table 9. For purposes of clarity, we also define the following three terms:

1. EU national will be used to describe people with EU citizenship, who live in the country of their citizenship
2. EU migrants will be used to describe people with citizenship of an EU country but who do not necessarily live in their EU country
3. Non-EU migrants will be used to describe people without citizenship in any EU country who live in the EU

Figure 36: Educational attainment of EU nationals and non-EU citizens 2021

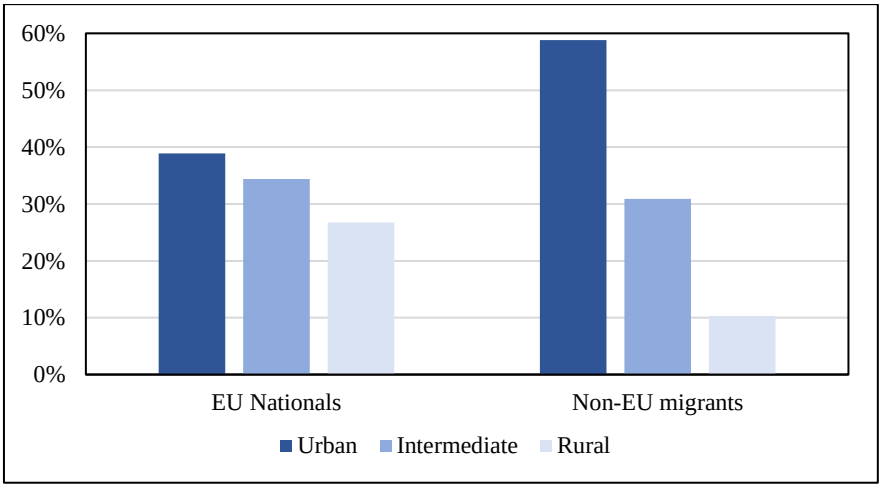


Source: Eurostat (2023f)

The educational attainment level of EU citizens aged 15 to 64 compared to those who have non-EU citizenship at the same ages (Figure 36) shows that in both cases women have higher shares of at least tertiary education. However, comparing EU to non-EU nationals still shows that migrants are on average less educated, with men having less than 21% with tertiary or above education. Women with EU citizenship are the best educated, among them more than 30% have at least a tertiary education.

Comparing EU nationals to non-EU migrants aged over 15 years shows that migrants are much more likely to live in cities than in the countryside (Figure 37). In 2022 almost 60% of them lived in urban areas, compared to less than 40% of nationals. Similarly, only 10% of foreigners lived in rural areas, compared to around 25% of EU nationals. Overall, the tendency of foreigners to move to cities when coming to the European Union is clear. The employment structure of EU nationals on the other hand, is very similar to that of non-EU migrants. The most notable difference is that migrants have less people inactive, most likely due to them being generally younger. A larger share of non-EU migrants are unemployed compared to EU nationals (Eurostat, 2023g).

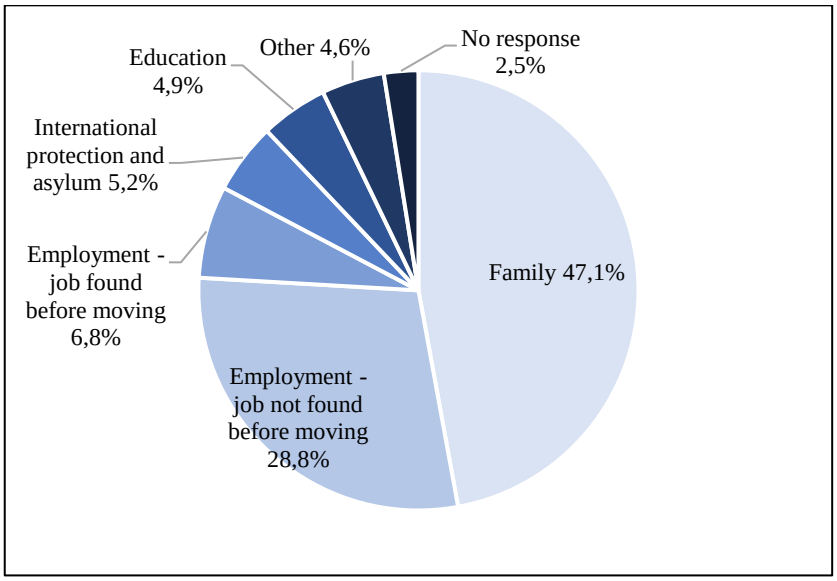
Figure 37: Distribution of 15+ population between urban, intermediate, and rural areas between EU nationals and non-EU migrants 2022



Source: Eurostat (2023g)

Eurostat also provides data on the employed foreign-born population in the EU and their self-reported reasons for the decision to come. While the option of climate change is not presented, and thus offers no insight into such choices directly, it is still important to see the distribution of other factors that climate change can affect indirectly. In 2014, of the immigrants who came to the EU from non-member countries, almost half came for family reasons (Figure 38). Employment was the second most important reason, of which less than 20% secured a job before migrating. Though this is quite old data, it is provided due to the lack of more recent publications on the matter.

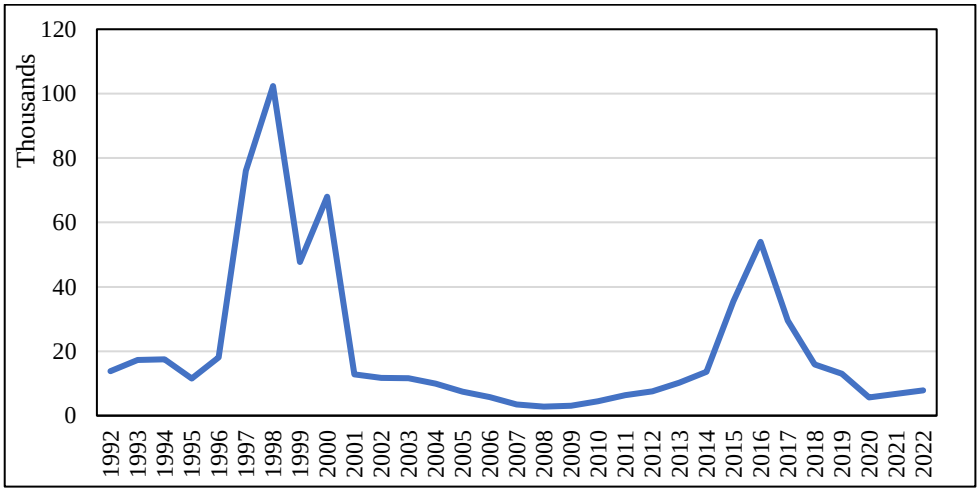
Figure 38: Self-reported main reason for migrating of employed non-EU migrants 2014



Source: Eurostat (2023c)

To better understand the lives of migrants who come to the EU, it is also important to understand that many of them do not stay here forever. Though Eurostat does not collect data on the emigration of foreign born people, some national statistics offices like those of Germany and the Netherlands do. The Dutch statistics office CBS states that of the people who immigrated to the Netherlands between 2007 and 2012, 58% no longer lived there after 10 years. Destatis (2024) published that the average duration of stay for all immigrants was 14.3 years in 2022. Additionally non-EU migrants left Germany faster than EU migrants (Statistisches Bundesamt, 2024; CBS, 2024).

Figure 39: Number of voluntarily returned migrants through the programme REAG/GARP



Source: BAMF (2023)

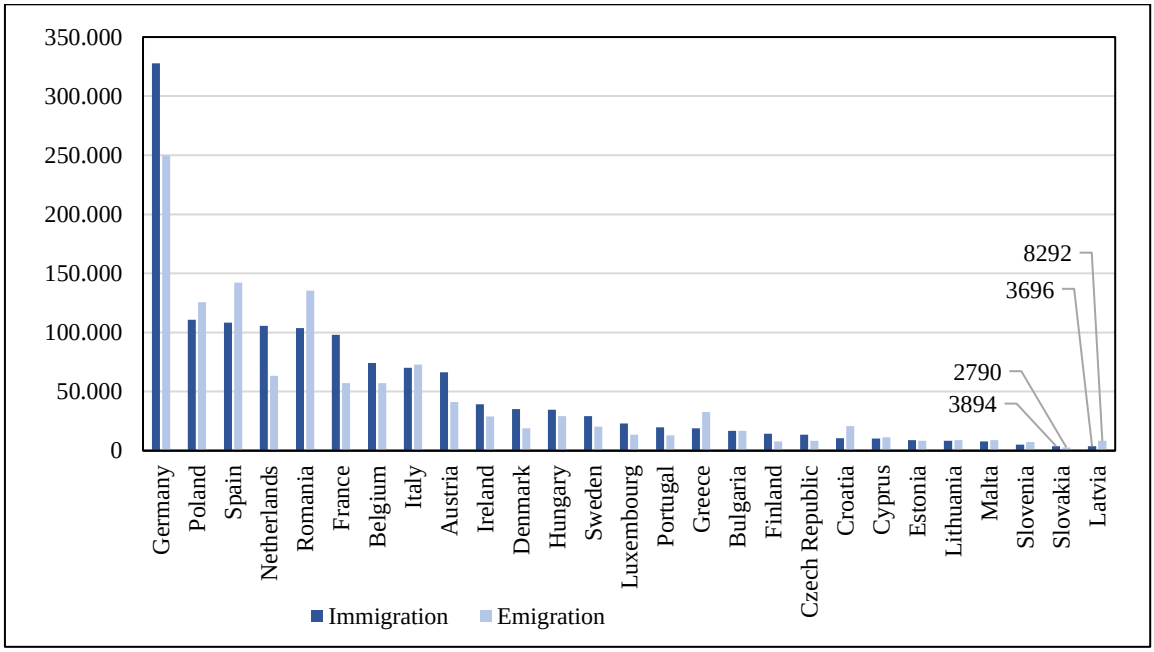
Additionally, the German Federal Office for Migration and Refugees publishes data on their voluntary return migration programme REAG/GARP run by the International Organization for Migration (in continuing IOM). Many people have been provided with assistance with emigrating since 1992 (Figure 39). The high values between 1997 and 2000 are due to the end of the conflicts in the Balkans. The peak between 2015 and 2017 is due to the return of some of the people who came during the refugee crisis in 2014 (BAMF, 2023).

To conclude, the number of people entering the EU has increased over the last few decades. Most of them come as regular migrants and their most popular destination economies are Spain, Great Britain, Germany, and France. On average they are much younger and a higher proportion of them are men compared to the EU population. They have a higher tendency than nationals to live in urban areas, and they are on average less educated though like the domestic population, women are more educated than men. Most enter for family or work reasons, while a few enter seeking asylum.

3.2.2 Internal migration in the European Union

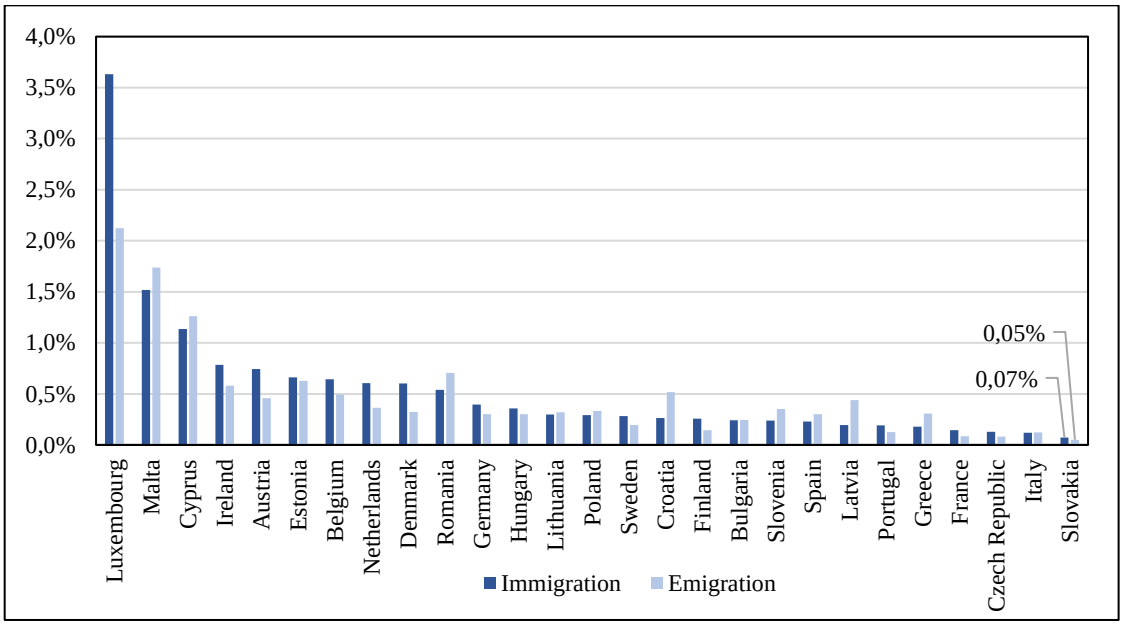
Most EU countries send and receive a similar number of migrants to and from the EU (Figure 40). Germany, the Netherlands, France, and Belgium have net positive EU migration rates, while Poland, Spain, Romania, and Italy have negative net EU migration rates.

Figure 40: Total internal immigration and emigration EU 2021



Source: Eurostat (2023e); Eurostat (2023b)

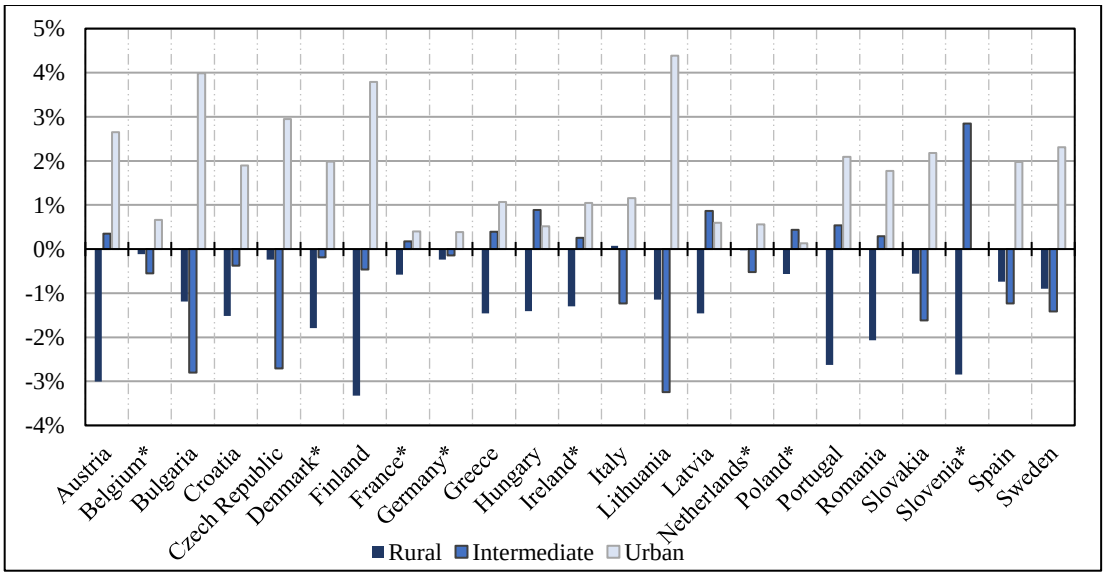
Figure 41: Internal immigration and emigration as percent of population EU 2021



Source: Eurostat (2023e); Eurostat (2023e); Eurostat (2023h)

Small countries such as Luxemburg, Malta, and Cyprus have the largest EU migration flows as shares of their population (Figure 41), while the Czech Republic, Italy, and Slovakia have the smallest flows.

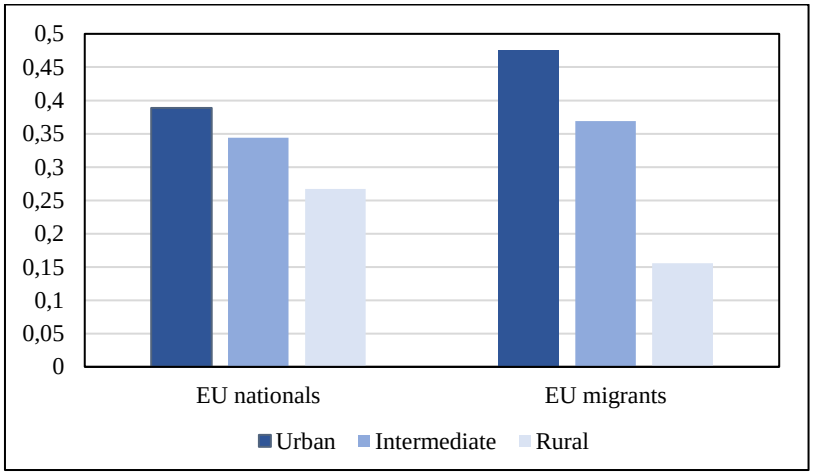
Figure 42: Percentage change in percentage of EU population living in rural to urban areas, 2002 to 2022



*Note: Countries marked with * take for their first value of comparison the first year that data is available, between 2003 and 2014*

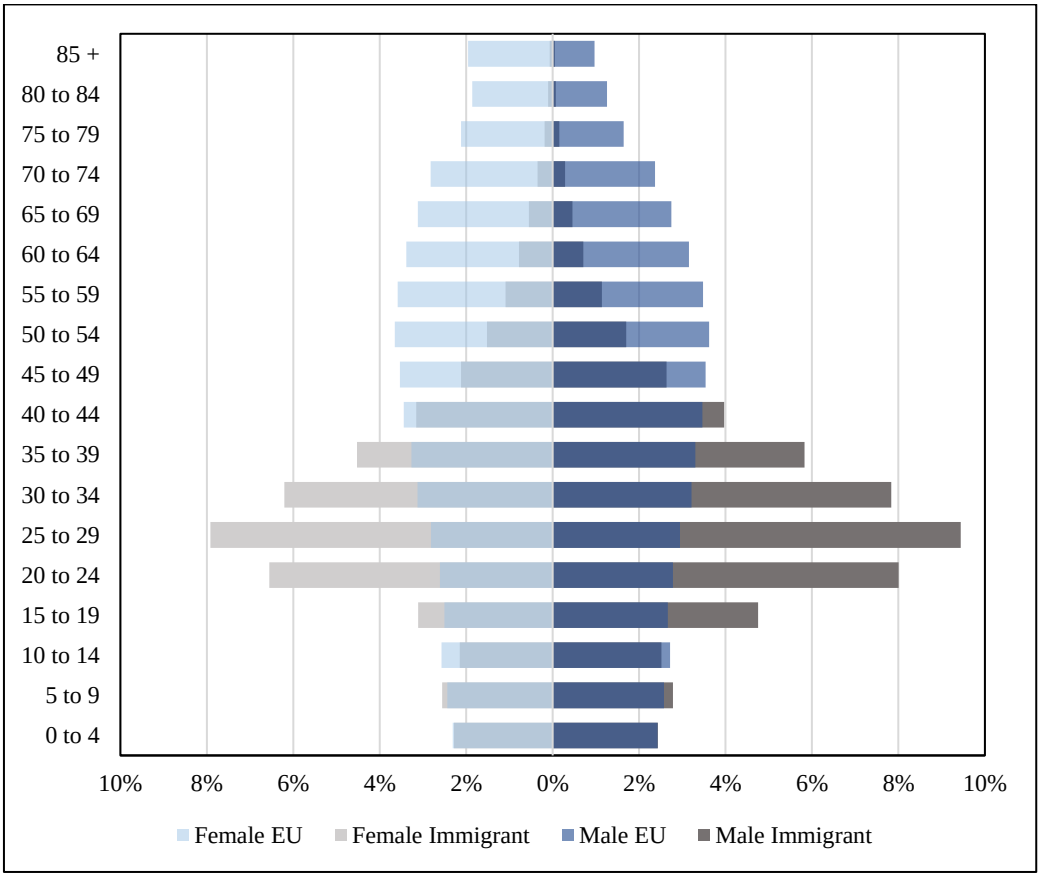
Source: Eurostat (2023i)

Figure 43: Distribution of 15+ population between urban, intermediate, and rural areas for EU nationals and EU migrants 2022 in %



Source: Eurostat (2023g)

Figure 44: Population pyramids of EU migrants and EU nationals in 2021



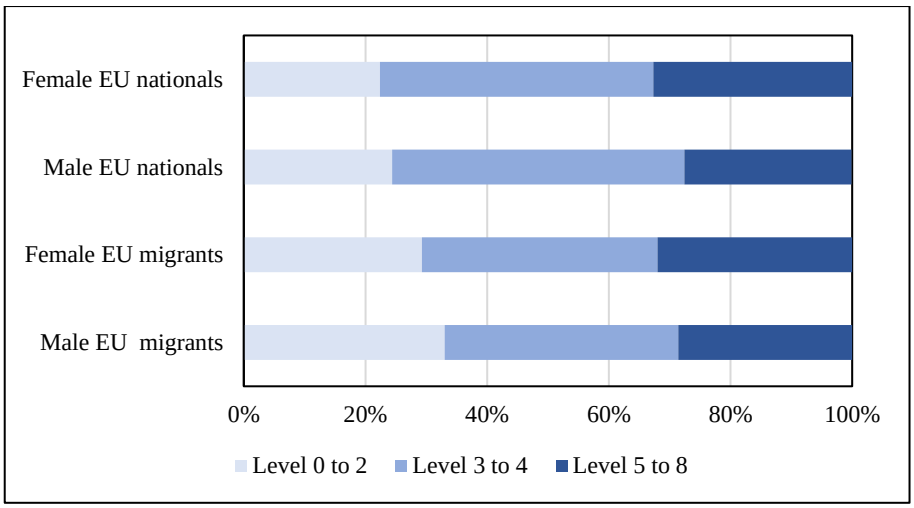
Source: Eurostat (2023d)

Within the EU countries themselves, the continent has been experiencing a trend of urbanization since the 1950s much like the rest of the world. The World Bank states that in

1960 41% of the EU population lived in rural areas, while this number has dropped to 25% today (World Bank, 2023). Between 2002 and 2022 every EU country which has regions classified as urban, has seen their population grow relative to other regions in the country (Figure 42).

Besides Italy, every country's rural population shrank compared to the rest of the country. Slovenia saw comparably high growth in population in intermediate regions, but this is because there is no region classified as urban in Slovenia, thus it was the intermediate one that saw most growth. Luxemburg, Malta, and Cyprus are not included in the analysis because they have only one region at this classification level and thus no relative change could be reported.

Figure 45: Educational attainment of nationals and EU foreigners 2021



Source: Eurostat (2023f)

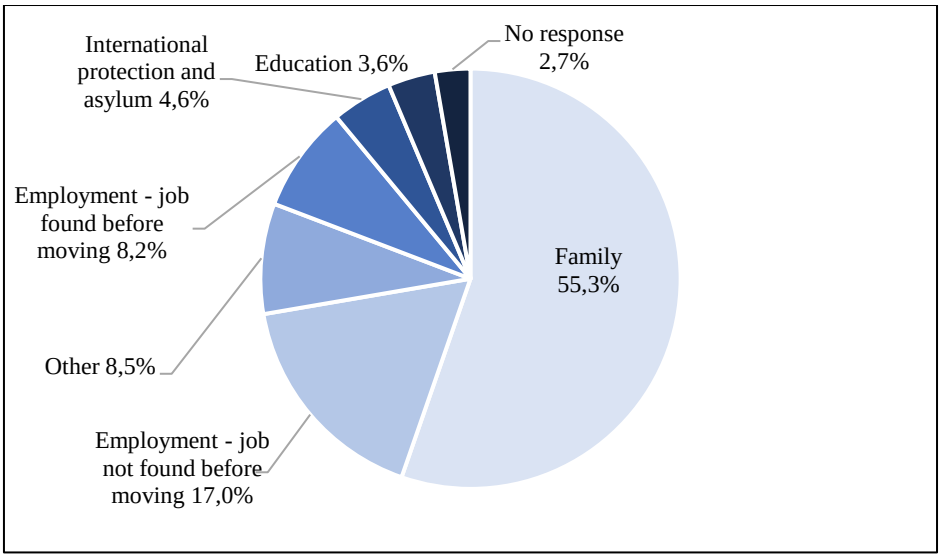
Figure 43 which is importantly not the same as Figure 37 compares the destination of EU migrants to the distribution of the national population and yields similar but less extreme results. As for non-EU migrants, they have a higher tendency to move to urban areas and are less likely to move to rural ones. While there is an already present trend within all European countries of a declining population in rural areas, people who migrate within the EU are contributing as well since they more often choose to move to urban areas.

People migrating within the EU have a similar age structure to those who arrive from outside the union (Figure 44). The choice to move across borders is made more often by young people, with the most common age group among men being 25 to 29 and 20 to 24 among women. The width of the pyramid at its widest point is not as extreme as with non-EU citizens, as Europeans migrate slightly more at older ages as well.

Comparing the educational attainment level of EU migrants and EU nationals aged 15 to 64 as well as differences based on sex shows similar results as before (Figure 45). Migrants are

less educated on average and in both cases women have higher shares with at least tertiary education compared to men, but compared to non-EU migrants, EU migrants are more like the EU nationals population.

Figure 46: Self-reported main reasons for migrating of employed EU born migrants in 2014



Source: Eurostat (2023c)

More than half of EU born migrants self-reported moving due to family reasons in 2014 (Figure 46). Comparing this to its non-EU born counterpart Figure 36, the shares of each reason between the two groups are similar. They follow the same size order if the Other and No response categories are excluded. The only difference is that for EU born migrants, Family and Employment - job found before moving comprise a slightly larger share than they do for non-EU born migrants.

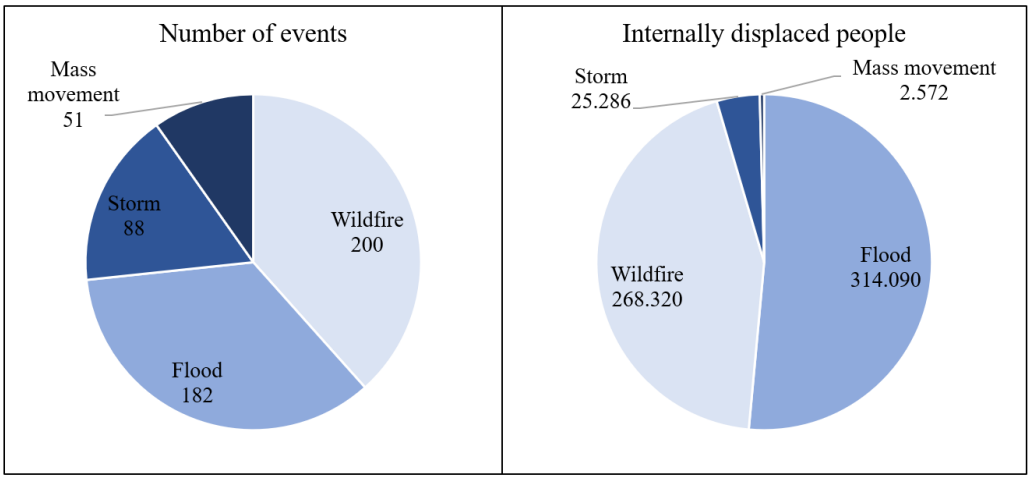
To conclude, internal migrants in the EU seem to possess the same characteristics as external migrants but to a lesser degree, as they are more like the rest of the Europeans who live in their countries. Their most popular destination for internal migration is Germany, and Luxembourg both sends and receives the largest share of its population as migrants. People who choose to move are on average younger and less educated than the rest of the population. They move to cities more frequently, and their main self-stated reason for migrating is family.

3.2.3 Internally displaced people in the European Union

According to data from the Internal Displacement Monitoring Centre, since 2008 the countries of the EU have experienced 568 separate internal displacement events, due to different weather and geophysical related events. Though the centre monitors also events

related to volcanic activity, earthquakes and tsunamis, they are not included in this analysis, since they do not occur due to climate factors.

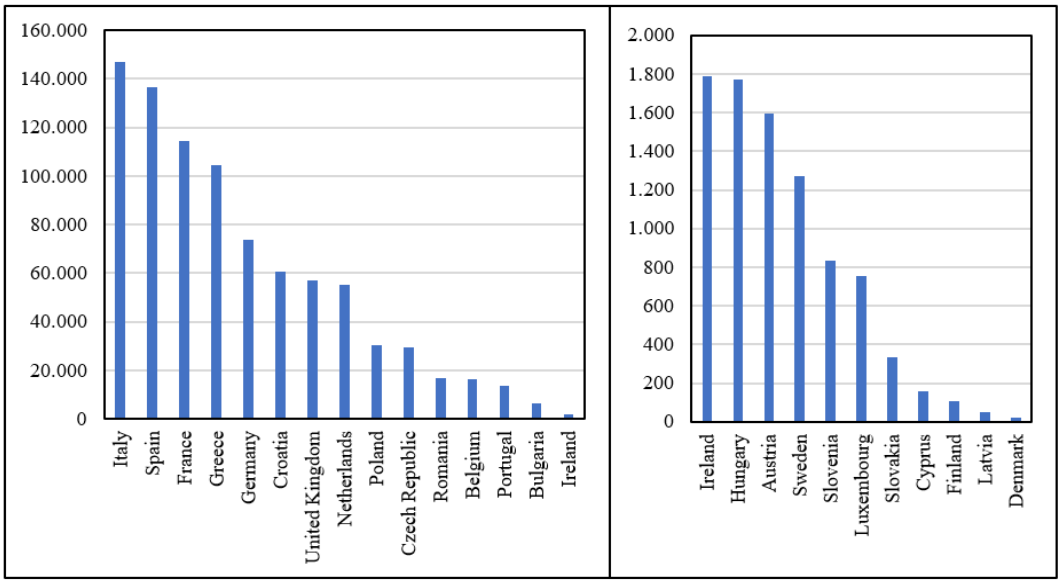
Figure 47: Internal displacement events and people in Europe 2008-2022



Source: Internal Displacement Monitoring Centre (2023)

The most common cause of displacement events in Europe between 2008 and 2022 was wildfires with 200 events followed closely by floods with 182 events (Figure 47). Despite this, floods caused more people to become displaced compared to wildfires. Nonetheless, both were the more devastating type of event on the continent, as they created a larger share of displacements, compared to their relative share of occurrences.

Figure 48: Internally displaced people by natural disasters in EU between 2008 and 2022



Source: Internal Displacement Monitoring Centre (2023)

Since 2008 most people in the EU were displaced, in decreasing order, in Italy, Spain, France, Greece, Germany, and so on (Figure 48). With Italy and Spain both having more than 11 thousand people displaced. Cyprus, Finland, Latvia, and Denmark experienced the least amount of internally displaced people, all with less than 200 throughout the period. Notably, Lithuania and Estonia are not included in the dataset. The largest single event in Europe since 2008 were the 2013 European floods, which forced 80 thousand people in total to evacuate their homes, two thirds of whom were living in Germany, with others in the Czech Republic, Austria, and Hungary.

The next largest displacement event was the 2021 wildfire in Greece, which displaced 52 thousand people. Since the database does not yet include the year 2023, it means that the wildfires that Greece experienced again that year do not yet show up. Relevant to this, different news sources report the fires which burned near Alexandroupolis to be the largest fires ever recorded in EU history (Joint Research Centre, 2023).

Though this dataset only reaches back to 2008 and thus cannot be a reliable source as to the frequency of climate change affected events, other studies have pointed out that extreme weather events are already becoming more common (Zhang et al., 2022; Katz & Biem, 2022; Lehmann et al., 2015). This trend is very likely to continue at least for the near future, thus the number of displaced people is expected to keep increasing over the years. Though the EU countries are developed economies, with significant response capabilities, if the homes of our citizens are destroyed, they will be forced to relocate.

3.3 International treaties concerning migrants' rights

Both national and international migration policies are matters decided by individual states, and while there are international rules and conventions governing various principles, no state can be forced to ratify an agreement or treaty. Thus, rules regarding the movement of people can vary widely from state to state and outside entities have little effect on them. Moreover, even when they do, there is often no real leverage that can be applied to force countries to implement the policies. Additionally, since there are many possible policies and actions one can use to control migrations, a state can still interfere with migrations by using various other instruments while following the directives regarding the others.

Domestic migration policies are mostly a matter of state sovereignty and besides the Universal Declaration of Human Rights (UDHR), which is not legally binding, and the International Covenant on Civil and Political Rights (ICCPR), which is, there aren't many international documents regarding the issue. Article 13 of the UDHR states that: "Everyone has the right to freedom of movement and residence within the borders of each state." Which was the basis for article 12 in the ICCPR that states: "Everyone lawfully within the territory of a State shall, within that territory, have the right to liberty of movement and freedom to choose his residence." It does however provide the exception: "The above-mentioned rights shall not be subject to any restrictions except those which are provided by law, are necessary

to protect national security, public order (ordre public), public health or morals or the rights and freedoms of others, and are consistent with the other rights recognized in the present Covenant." Meaning that if climate change were to affect any of those conditions, people's rights to freedom of movement and choice of residency can be taken away (Martin S. , 2010; United Nations General Assembly, 1948).

There are no international conventions or treaties concerning environmental migrants moving across borders. However, environmental migrants often fall into other migrant categories because climate change can exacerbate political, social, and economic instability creating refugees, which can be covered by other international treaties. Such examples would be the International Labour Organization (ILO) Convention Concerning Migration for Employment (Revised) No. 97, and the Convention Concerning Migrations in Abusive Conditions and the Promotion of Equality of Opportunity and Treatment of Migrant Workers No. 143. The number of states that ratified the convention is 53 and 29 respectively (International Labour Organization, 2023a; 2023b; Martin, 2010).

Environmental migrants who use irregular means of entry may be covered under the Protocol to Prevent, Suppress and Punish Trafficking in Persons, Especially Women and Children and the Protocol Against the Smuggling of Migrants by Land, Sea, and Air, both of which supplement the United Nations Convention Against Transnational Organized Crime, each with 117 and 112 parties respectively (United Nations, 2023a; 2023b). Lastly, some may be covered by the 1967 Protocol Relating to the Status of Refugees with 147 parties (United Nations, 2023; Martin S., 2010). However, it is important to note that many states party to the treaties do so with reservations to various clauses or territories, thus even these rights are not always guaranteed.

The European Union as it exists today is a political and economic supranational union. Yet this development is quite recent in nature, and it was previously more of a regional organization of states bound by various treaties and multilateral agreements. Consequently, the member states have always maintained a large degree of autonomy when it comes to deciding sovereign matters. The handling of refugees, asylum seekers and migrants has been a long standing example of this principle.

The first common policy regarding the issue was introduced in 1992 with the signing of the Treaty of Maastricht which also formally created the EU. This change formally integrated asylum and immigration policies into the legal framework of the European Union, yet still only the visa policy was integrated into the regular decision making process of the EU, while the rest was still left up to individual states. Most recently, an asylum system reform was accepted in February of 2024, which will introduce border procedures and expand the concept of a "Safe Third Country" which relates to deportation standards for rejected asylum seekers (Niebauer & Urbitsch, 2024).

3.4 Migration policies

There are many different policies a country could enact to try to influence migration. They can differ depending on the tools used, the intended area of focus, or the group of people it is intended to impact. The DEMIG POLICY database is according to De Haas et al. (2018) the largest to-date publicly available migration policy database. Though it is focused on European countries between the years 1945 and 2013, it nonetheless provides a good break down of all the different types of migration policies (Table 10).

It is however important to keep in mind that there might be a difference between what is written in law or "de jure" and the actual migration tools and procedures people face, or "de facto" migration policies. The diligence with which policies are enforced is not always clear, and it is possible that in corrupt systems or those under pressure perhaps from overloaded capacities, official procedures begin to break down.

Table 10: Breakdown of migration policies according to DEMIG POLICY

Magnitude	Major change; Mid-level change; Minor change; Fine-tuning change
Level of Legislation	National policy; Multi or bilateral policy
Policy Area	Border and land control; Legal entry and stay; Integration; Exit
Policy Tool	Access to citizenship; Access to justice and political rights; Access to permanent residency; Access to social benefits and socio-economic rights; Action plan, Strategy, Report; Carrier liabilities; Contextual elements; Employer liabilities; Entry visa/stay permit; Expulsion; Free mobility rights/agreements; Identification documents; Institutional capacities; Language, housing and cultural integration programmes; Other sanctions; Quota/target; Readmission agreements; Reintegration/return programmes; Resettlement programmes; Surveillance technology/control powers; Travel visa/permit; Work visa/permit
Target Group	All migrant workers; All migrants; Diaspora; Family members; International students; Investors, entrepreneurs, and businesspeople; Irregular migrants; Low-skill workers; Refugees, asylum seekers and other vulnerable people; Skilled/high-skilled workers
Target Origin	All; All foreign nationals; Citizens; EU citizens; Specific nationalities
Specific Nationalities	*"List of all nationalities"*
Restrictiveness	Change in restrictiveness cannot be assessed; Less restrictive; More restrictive; No change

Source: de Haas et al. (2018)

4 DISCUSSION AND POLICY APPROACH

Our society will experience many changes to our climate, ecosystems, economy, and society because of climate change. If our society wants to make good decisions regarding our future, a discussion of the best possible measures is necessary. In line with (Q5) this chapter provides a discussion on the topic of policy approaches to climate migration. An analysis of the practices currently in use, how they can be improved and implemented elsewhere, as well as what more is needed.

Most climate migrations currently occur within countries. There is indeterminate evidence regarding the effects that climate change will have on international migrations because people may become involuntarily stuck due to decreasing incomes because of global warming (IPCC, 2022). Additionally, the issue of international migration in the European Union is highly politicized. Thus, the focus of this discussion is internal migration within and between EU member states. Specifically, questions about how to prevent the need for migration and how to ease the negative consequences of migration will be answered. This is also important because the wellbeing of our citizens and making their livelihoods more resilient to climate change is a priority.

Extreme heat and humidity is a problem because people will move away from areas where summer heat can kill, working conditions become unbearable, or work disappears due to a changing climate. This issue is more acutely felt in cities than in the countryside, and communities most socially and economically marginalized are most affected (IPCC, 2022). The urban heat island effect is what makes heatwaves in cities particularly dangerous, especially when cities are projected to grow as more people move there in search of jobs. Thus, infrastructure planning to mitigate the negative effects is essential.

Table 11: Solutions to the Urban Heat Island Effect

Urban Greening	Urban forests (more trees and parks)
	Community gardens
	Green roofs
Urban Fabric Modification	Cool roofs (roofs made from reflective materials)
	Cool pavement (absorbs less heat)
	Public transport
Urban Structure Modification	Building orientation (to promote wind flow in the streets)
	Passive cooling methods

Source: adapted from Ruddell et al. (2020)

Ruddel et al. (2020) propose three types of solutions cities can implement (Table 11). Though they mention neither public transport under urban fabric modification nor passive cooling methods under urban structure modification. The first can help by reducing heat emitted by personal vehicles, while the second is a group of technologies or design features

that use minimal or no energy to cool buildings. Though not all these methods are always economical or practically possible, a deeper analysis of these options is important (Oropeza-Perez & Østergaard, 2018).

Another issue caused by extreme heat and humidity is the danger it poses to labour intensive outdoor activities such as construction, manufacturing, and agriculture. There have been calls to institute an EU-wide policy regarding maximum working temperatures, but none is currently in place (ETUC, 2022). In terms of migration this law would be particularly important to Southern countries and people in rural areas, so they continue to have access to fair and humane employment conditions, not prompting them to move elsewhere.

Lastly, higher winter temperatures will hurt winter tourism in many low lying small skiing towns where people rely on the influx of tourists to sustain their livelihoods. Though summer seasons may improve due to better temperatures in the other half of the year, it will make the incomes of people highly seasonal and thus unreliable (Steiger et al., 2022). A possible way of mitigating the issue is diversification of income into different activities, though the highly localized and specific nature of each town makes it difficult to provide a one-for-all-solution.

Large wildfires are an issue which affects migration from rural areas because people can have their house burn down, if they work in agriculture their means of living may be destroyed. Even people who do not live on the fire frontlines may have their health affected by smoke and ash in the air. Possible solutions are fire prevention and suppression. Prevention is the better option due to significantly lower risks to human lives and no smoke negatively affecting the population, though the best results may be achieved by using both strategies (Khabarov et al., 2014).

Reduction of biomass that could burn in case of fire is thus good practice. This can be done manually by cutting down forests, or through prescribed burning. A policy already in place in certain regions in Portugal, Spain, and Italy is incentives for farmers to graze their goats and sheep to keep biomass fuel levels low. These incentives can be in the form of tax exemptions on products produced by the grazing animals, such as milk and cheese, or by allowing the animals to graze without the need to pay a fee on the land (Ascoli et al., 2023). Additionally, research shows that between 2006 and 2010 in Southern Europe, 95% of known fires were caused by humans in either accidents, negligence, or deliberate actions (Ganteaume et al., 2013). Thus, education and awareness campaigns may be a good policy proposal.

Active firefighting efforts can be much more costly and dangerous but may in some cases be necessary to protect critical infrastructure and the homes of people. Even in this case effective infrastructure planning can be a crucial effort. Laschi et al. (2019) point out that fire trucks must be able to pass each other frequently, there should be minimal dead-end

roads, or they should have a turning area at the end. Additionally, the area surrounding the roads should be cut down to form a fuel-break line.

Floods are the reason for most internal displacement events in the European Union. Research shows that our continent has a higher percent of our population living on land exposed to low intensity but high frequency events, most likely due to investment in protection infrastructure (Devitt et al., 2023). The EU faces difficulties with this threat through sea level rise and through mainland flooding. It is important to prepare our coastlines and cities so that people need not fear having their homes and work flooded or swept away.

The four most commonly proposed solutions to flooding are strengthening dykes, creating retention areas, implementing damage reduction measures to infrastructure, and relocation of critical infrastructure. Other solutions include improving early warning systems, or urban drainage systems, as well as more natural solutions like river re-naturalization, or sea grass and reefs to prevent coastline erosion. The measures all have their own levels of feasibility and cost-to-benefit ratios, though research shows that creating retention areas is the most effective measure throughout Europe (Dottori et al., 2020; 2023).

Another important aspect of vulnerability to floods in Europe comes from cities. Research shows that they will experience significant increases in the risks of flooding. However, this is not solely due to climate change, as urbanization and expansion of impermeable surfaces play a role too (Skougaard Kaspersen et al., 2017). In many cities, the flooding risk is exacerbated by their position on the coast of an estuary, making them prone to issues of sea level rise as well as pluvial or fluvial floods.

There are many possible solutions to flood management ranging from prevention measures to interventions during the floods themselves. Today the focus on cities is on implementing "green" flood infrastructure. Examples include rain gardens, bioswales, retention and detention basins, constructed wetlands, and green roofs. All are designed to slow down the speed of water runoff and absorb as much as possible, thus reducing the load on drainage systems, along with additional positive benefits for the city such as added green areas and a decrease in noise and water pollution (Csóka et al., 2021; Prokić et al., 2019).

The effect that climate change will have on farm crop yields in Europe is uncertain, nonetheless the more extreme weather expected in the future will affect the success of a season, as either too much or too little rain or sun, hail, wind, frost, and disease can all damage plants. While food prices are important to all Europeans, sustaining crop yields is particularly important to small farmers, where whole families rely for their income on the success of a harvest.

There are many changes a farmer can make to adapt to climate change. They can shift their sowing and harvest dates, expand, or decrease production, change irrigation, crop rotation, chemical protection, fertilizers, or even change the crop variety (van Tilburg & Hudson, 2022). Considering that the potential to diversify and hedge against risk in agriculture is

great, one of the most important factors to increase resistance is education and awareness among farmers. In south European regions where rainfall is predicted to decrease, the government could use infrastructure to provide additional irrigation possibilities to farmers. An example would be how treated wastewater is used for irrigation in Valencia, Spain (Jodar-Abellan et al., 2019).

Climate change will cause economic damage through income divergence across individuals, sectors, and regions, adjustment in energy markets, increased inflation variability, financial markets stress, increased migration, and rising public debt (Breckenfelder et al., 2023). These issues will be most felt by the poorest who will have to move, when they can no longer pay their mortgages, their jobs let them go, or they lose their home or income in a natural disaster, like fire or flood.

Tools of income redistribution are not novel in our society. Progressive taxation, cash transfers, subsidies, employees' social security payments and more can all be used to help the poorest individuals in the economy. Climate change mitigation is not taking place via the market (Krogstrup & Oman, 2019). Consequently, the market will not solve the issues pressuring people to migrate. It is the role of the government and local authorities to do so.

Housing affordability in cities is an issue that will be exacerbated by the migration of people to cities. Research shows that housing affordability has worsened in the EU in the last 10 years, most notably during the pandemic. A major increase in housing stock in many large European cities is needed, which would be a good long-term solution. There are also policies which would help in the short term, such as expansion and improvement of critical infrastructure like public transport which would allow people to live farther but still work in the city (Frayne et al., 2022).

Other ways that the issue of housing affordability can present itself is in the ever later age at which young people move away from their parents, increased sharing of accommodations, and reductions in homeownership. Research shows that in Europe home ownership and the proportion of young people living away from their parents have dropped in the last 10 years. Home ownership rates are an important indicator because it is predominantly rich people who own their houses (Hick et al., 2022). These issues will be exacerbated by the further pressures that environmental migration will put on cities.

This is a complex and varied set of problems, none of which are universal on the European continent, as each region faces its own set of challenges. Wildfires are a common issue in Southern Europe, while floods are the most serious threat in central Europe and some coasts. Heatwaves are most problematic in cities, while farm crop yields most directly impact the livelihoods of farmers in rural areas. To address all issues properly, local populations need to be considered and incentives to help them must be put in place. This is best done by promoting more regional governance and increasing public participation in decision making and governance.

Increasing the authority of local governing bodies would give them the ability to better focus on the issues in their regions (Table 12). Importantly, there should also be a focus on education for people who could benefit from knowing how to choose different seeds to plant in case of drought, people who want to protect their houses from wildfires through their landscaping, or the elderly who need to know how to act in case of severe heat waves. People who cannot help themselves need to be protected by the government through social income transfers, so that the marginalized are not pushed even more into isolation. Moreover, academic research to help with decision making regarding infrastructure and planning should be encouraged. People need to be educated on the issues they are dealing with, and properly incentivized to find sustainable local solutions.

Table 12: Conclusion on problems and solutions for climate migration

Problem	**Proposed Solutions**
Extreme heat and humidity	Urban forests, community gardens, green roofs, cool roofs, cool pavement, public transport, building orientation, passive cooling
Large wildfires	Manual biomass reduction, prescribed burnings, livestock farming, active fire suppression, fuel break lines, road infrastructure planning
Floods	Dykes, retention areas, damage reduction measures, relocation of critical infrastructure, early warning systems, urban drainage systems, river re-naturalization, sea grass and reefs against coastline erosion, rain gardens, bioswales, constructed wetlands, green roofs
Farm crop yields	Sowing and harvest date shift, expand or decrease production, change irrigation, crop rotation, chemical protection, fertilizers, change the crop variety, education and awareness of farmers, irrigation infrastructure
Economic damage	Progressive taxation, cash transfers, subsidies, employees' social security payments
Housing affordability	Increase in housing stock, expansion, and improvement of public transport
CONCLUSION: Increasing the authority of local governing bodies, education, social income transfers, academic research	

Source: Own work

5 CONCLUSION

The issue of climate migration is becoming an ever more popular discussion as the effects of global warming become apparent around the world. The number of research articles on the topic is on an upward trend, with this year set to be the most prolific yet. One of the main points of discussion of climate migration is how this is a form of adaptation or risk mitigation for poor families.

Economic theories of migration offer different views on what motivates people to move. The two more traditional views are regarding whether people have agency and make decisions based on a personal income maximization strategy, or they are just victims of historic circumstances trapped in an economic trend. Theories have more recently begun to also include climate change as a factor in migration. The agreement is that climate change can create migration, but only indirectly, by affecting other factors which in turn affect migration themselves.

Five aspects of climate change affecting migration are extreme heat and humidity, large wildfires, floods, farm crop yields, and economic damage. In Europe, extreme heat and humidity, large wildfires, decreasing farm crop yields, and economic damage will be more common in the south. Floods on the other hand affect central Europe and coastal cities the most.

People move around the globe in search of better jobs or to be closer to family. They predominantly do not move far though, most stay within their continent. The only exceptions are when countries have a historical, cultural, often colonial tie between them, like the UK has with Australia or India. Another type of tie would be economic, like the Gulf states have with South Asian countries where they import most of their manual labour from.

Migration to the European Union is increasing. Some people come as regular migrants, and some as asylum seekers. The largest sources of asylum seekers are war-torn countries like Syria and Afghanistan. The largest sources of regular migrants are Morocco, China, and India. The most popular destination within the EU is Germany. Compared to the EU population migrants are more commonly men, younger and less educated. They move to cities more commonly than EU natives and cite family to be the most common reason for their move. The demographic characteristics of EU migrants are somewhere between the EU native population and external migrants.

Climate change can cause forced displacement by destroying homes and critical infrastructure. In Europe floods are the most common reason for such displacements, followed closely by wildfires. There are countless policies that could be implemented to increase the resilience of those who are most at risk of losing their homes, jobs, or lives. It is most often those who are already most marginalized that are most at risk of these problems. Considering that every country in the EU has different laws and government procedures, the only policy suggestion that is applicable to all is to promote local governance. Provide insight and academic research into the specific problems a region is facing, and then work with the local population to find sustainable solutions that will serve today and in the future. The aim should be to improve the livelihoods of the population, so that people are not forced to move elsewhere in search of better living conditions. And for those who choose to do so anyway, offer ways in which their new environments can be improved upon as well. People need to be given the chance to make informed decisions as active members and participants in our economy.

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APPENDIX

Appendix 1: Slovenian summary

Naslov: Vpliv klimatskih sprememb na svetovne in evropske migracije

Magistrska naloga raziskuje, kako so klimatske spremembe vplivale na migracije v preteklosti in kako se razvijajo tokovi migracij danes. Razdeljena je na uvod, teoretski in empirični del, ki jima sledi še razprava o ekonomskih politikah reševanja problemov ter zaključek.

Teoretski del prvo predstavi bibliometrično analizo teme, iz katere je razvidno, da postaja vedno bolj aktualna, saj se število izdanih člankov vsako leto povečuje. Nato sledi pregled teorij migracij kjer je podrobno predstavljen razvoj teorij o vzrokih migracij, o samo selekciji migrantov, ter o ekonomskih učinkih migracij. Glavne ugotovitve so, da so imigrantski tokovi posledica maksimizacij osebnih funkcij koristnosti, tako kot del eksogenih dejavnikov zgodovine, kulture in družbe. Samo selekcija kaže na to, da migranti imajo nekatere skupne lastnosti, ki jih ločijo od njihovih skupnosti, vendar te niso nujno jasne. Ekonomske posledice migracij pa so lahko tako negativne kot pozitivne v prejemajoči in pošiljajoči državi. Odvisno je od nivoja spretnosti migrantov, kakšne službe prevzamejo in ali pošiljajo denarna nakazila svojim družinam v prejšnjo državo.

Teoretski del o klimatskih spremembah prvo preuči, kako bodo klimatske spremembe skozi visoke temperature in vlažnost, velike požare, poplave, nižje kmetijske donose in gospodarsko škodo vplivale na nagnjenost ljudi k migracijam po svetu. Podrobneje se iste teme razišče tudi na področju Evrope, kjer vidimo, da bodo visoke temperature in požari pustili najhujše posledice na jugu Evrope, medtem ko bodo poplave več opustošenja povzročile po srednji Evropi. Visoke temperature in poplave bodo bolj prizadele mesta, požari in nižji kmetijski donosi pa podeželja.

Empirični del naloge analizira trenutne tokove migracij po svetu in v Evropi. Razvidno je, da večina ljudi, ki se preseli v drugo državo, ostane na istem kontinentu. Edine izjeme nastanejo, ko obstajajo med gospodarstvi globoke zgodovinske, ekonomske in kulturne povezave, pogosto v primeru preteklega obdobja kolonializma. Analiza podatkov za notranjo razseljenost kot posledica naravnih nesreč kaže, da na svetu največ ljudi razselijo poplave in nevihte. Države z majhnimi števili prebivalcev utrpijo največje procente notranje razseljenosti državljanov zato, ker so to pogosto majhne otoške države, ki jih večje nevihte lahko močno prizadenejo. Filipini, Kitajska in Indija so med 2008 in 2022 na svetu utrpele največje enkratne dogodke prisiljenega razseljevanja zaradi naravnih nesreč.

Poglobljena analiza v EU kaže, da se tokovi imigracij z izvirom izven EU povečujejo tako na račun rednih ekonomskih migrantov kot iskalcev azila. Največ rednih ekonomskih migrantov v EU, med 2017 in 2021, je prišlo iz Maroka, Indije in Kitajske, največ iskalcev azila pa iz Sirije, Afganistana in Iraka. Ti migranti so največkrat za cilj izbrali Španijo, Nemčijo, Italijo in Francijo. Od evropskih prebivalcev so mlajši manj izobraženi in se bolj pogosto odločijo nastaniti v urbanih okoljih. Kot najpogostejši razlog za prihod navedejo

družino. Analiza migracij znotraj EU kaže, da Nemčija, Nizozemska, Francija in Avstrija prejmejo največje število imigrantov v primerjavi s številom emigrantov. Analiza demografskih značilnosti evropskih migrantov pa kaže, da so tako kot izven-evropski migranti tudi ti mlajši, manj izobraženi ter se bolj pogosto naselijo v urbana naselja, vendar vse te značilnosti izkazujejo manj močno kot tuji migranti. Torej so nekje vmes med tujimi migranti in domačimi prebivalci EU. Najpogostejši vzroki za prisiljeno notranje razseljevanje prebivalstva so bili med 2008 in 2022 požari, vendar so poplave prisilile večje število ljudi v razseljevanje. V istem obdobju je bilo največ ljudi razseljenih v Italiji, Španiji in Franciji, najmanj pa na Finskem, v Latviji in Danski. Na koncu sledi še pregled mednarodnih sporazumov glede pravic migrantov in politik migracij.

Zaključno poglavje se osredotoča na možne rešitve petih predstavljenih klimatskih spremenljivk, ki bodo vplivale na nagnjenost ljudi k imigriranju. Dodatno se predstavi tudi nekatere rešitve za problem stanovanjske krize, ki ga bodo tokovi migracij, ki večinoma vodijo v mesta, še dodatno otežila. Zaključek poglavja je, da so ti problemi številčni in razširjeni čez veliko ozemlje, kar pomeni, da ne obstaja ena sama rešitev. Potrebno je povečanje avtoritete lokalnih upravnih organov, da na podlagi znanstvenih raziskav in aktivne participacije lokalnega prebivalstva najdejo najboljše rešitve za prihajajoče probleme.