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EXPLORING THE IMPACT OF MIGRATION, ENVIRONMENT AND CLIMATE CHANGE ON NORTH MACEDONIA: A SYSTEMATIC REVIEW

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Abstract: The question of how migration, environment and climate change interact has been a topic of increasing interest in North Macedonia. Estimates of the numbers of people who may be displaced by climate change-related phenomena by 2050 range from 50 million to 1 billion people, with the most cited number, 200 million, being based on projections by Norman Myers in 1995 and 2000 [1]. However, Myers himself has admitted to uncertainty in his estimate and that necessary extrapolations were made due to a lack of available data [1]. Additionally, the high-end estimate, of 1 billion people displaced by 2050, comes from a Christian Aid report [1]. It is acknowledged that climate change will not alone cause conflict, but it is also accepted that it has the potential to exacerbate or catalyze conflict in conjunction with other factors [1]. Examining the impact of migration, environment, and climate change on North Macedonia: a systematic review, the pathway is non-linear, and, in some cases, climate-induced conflict may in turn cause migration [1]. Current research indicates that climate migration will not necessarily increase the risk of conflict, however, linking climate migration to conflict is difficult since the relative importance of climate migration, among the many other drivers, must be determined [1]. All factors involved in the system, which are linking climate, migration and conflict are location dependent, and the relationship between climate change, migration and conflict depends on social, demographic, economic and political drivers [1]. Future research should focus on the local interplay of multiple drivers that influence whether the climate will increase the risk of conflict, and Neo-Malthusian theory suggesting that as populations continue to increase, competition for resources will also increase, and could lead to conflict as the inequalities increase between those in control of resources and those who do not have access [1]. Even though the climate-migration-conflict pathway is viewed as linear and even deterministic in the media, scholars are increasingly cautious when discussing the pathway, and the

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potential impacts of climate variability and change on migration and conflict will remain an important area of research and policy planning [1].

Keywords: migration, environment, climate change, North Macedonia

Introduction

1.1 Background

Climate change and migration are two globally significant phenomena that have gained increasing attention in recent years. The intricate interplay between these two issues has become a subject of particular interest as the impacts of climate change continue to unfold worldwide. North Macedonia, situated in the Balkans, is a region susceptible to both environmental vulnerabilities and migratory movements. Hence, understanding the relationship between migration, environment, and climate change is essential for effective policy planning and sustainable development in the region.

1.2 Significance of the Study

Exploring the impact of migration, environment, and climate change on North Macedonia is crucial for several reasons. Firstly, the region faces various environmental challenges such as rising temperatures, changing precipitation patterns, and an increased frequency of extreme weather events (Myers, 2002: 609). Secondly, migration has been a significant feature of the region, driven by socio-economic factors, political instability, and potentially exacerbated by climate change. Lastly, the potential for climate-induced conflicts arising from these interconnected factors adds complexity to the situation. This study aims to provide a systematic analysis of these interactions in the context of North Macedonia.

1.3 Research Objective

The objective of this study is to conduct a systematic review of existing research and literature to examine the relationship between migration, environment, and climate change in North Macedonia. By synthesizing the findings from relevant studies, this research aims to identify the key factors influencing migration patterns, the environmental determinants of migration, and the potential impacts of climate change on migration dynamics in the region.

2. Literature Review

2.1 Migration and Climate Change

Migration refers to the movement of individuals or groups from one location to another, typically with the intention of settling in a new place. Climate change-induced migration refers to movements that are motivated, at least in part, by environmental changes and climate-related impacts on livelihoods and living conditions.

Various theoretical frameworks have been developed to understand the relationship between migration and climate change. These frameworks include the push-pull model, the environmental migration framework, and the complex systems approach, which emphasize the interplay between multiple factors influencing migration decisions (de Haas, 2021).

Previous studies have examined the impacts of climate change on migration patterns, including case studies from different regions around the world. These studies have highlighted the complexities and contextual specificities of climate-induced migration and emphasized the need for localized research.

Migration has long been considered a response to various factors, including economic opportunities, political instability, and social dynamics. In recent years, the impact of climate change on migration patterns has gained increasing attention. Climate change can exacerbate existing vulnerabilities, disrupt livelihoods, and create new environmental challenges, all of which can contribute to the decision to migrate.

The effects of climate change on migration are complex and multifaceted. Rising sea levels and coastal erosion, for instance, pose significant threats to communities in low-lying coastal areas. Small island nations such as Tuvalu and the Maldives are particularly vulnerable to these impacts (McAdam and Ferris 2018). As their lands become increasingly uninhabitable, residents may be forced to relocate to other areas, both within their country and across international borders.

Extreme weather events, such as hurricanes, droughts, and floods, can also trigger migration. For example, the displacement of thousands of people in the aftermath of Hurricane Katrina in 2005 highlighted the link between climate-related disasters and population movements (McAdam and Ferris, 2018). These events can destroy homes, infrastructure, and livelihoods, leaving individuals with little choice but to seek safer and more stable environments.

In addition to immediate environmental factors, climate change can indirectly influence migration by affecting livelihoods and economic opportunities. Changes in temperature and precipitation patterns can lead to reduced agricultural productivity, water scarcity, and resource depletion (Black et al. 2011). This can undermine rural economies and exacerbate poverty, pushing individuals to migrate in search of better prospects.

It is important to note that while climate change can be a contributing factor to migration, it is rarely the sole driver. Other social, economic, and political factors interact with climate-related changes, shaping migration decisions. Additionally, the ability to migrate is not evenly distributed, with marginalized groups often facing greater barriers due to factors such as limited resources, restricted mobility, and lack of legal protections (McAdam and Ferris, 2018).

Speaking about the interplay of migration and health as well as environment in North Macedonia, some studies point out that although the unfavorable impact of migration has been observed previously, it is becoming even more pronounced during the last decade (IOM North Macedonia, 2022: 22). According to the study, the number of doctors going to work abroad increased by about 60 per cent during the period 2020-2019. As a result, there has been "a continuous increase in the number of settlements with no inhabitants, where no infrastructure was maintained and where there was no surveillance of the abuse or illegal use of arable land and forested areas and the emergence of illegal dumpsites – all of which have far-reaching, adverse implications for the environment" (IOM North Macedonia, 2022: 22).

Addressing the challenges posed by climate-induced migration requires a comprehensive and coordinated response. Efforts should focus on both mitigations, through reducing greenhouse gas emissions and adapting to climate change, and adaptation, by enhancing the resilience of vulnerable communities (McAdam and Ferris, 2018). Strengthening social safety nets, improving access to education and healthcare, and promoting sustainable livelihoods can also help address the root causes of migration.

In conclusion, the intersection of migration and climate change is a complex issue with wide-ranging implications. Climate change can directly and indirectly influence migration patterns by exacerbating vulnerabilities, disrupting livelihoods, and creating environmental challenges. Understanding these dynamics is crucial for developing effective policies and interventions to support affected populations and build resilience in the face of a changing climate.

2.2 Environmental Impacts of Climate Change in North Macedonia

North Macedonia is currently witnessing the environmental impacts of climate change, manifested through a range of indicators such as rising temperatures, shifting precipitation patterns, and heightened frequency of extreme weather events (IPCC, 2018: 3.2.1). These changes pose substantial challenges to the region's environment, ecosystems, and socio-economic systems, necessitating a comprehensive understanding of their consequences.

One of the key sectors affected by climate change in North Macedonia is agriculture. Changes in temperature and precipitation patterns can directly impact crop yields, water availability, and soil fertility, thereby affecting agricultural productivity (Gbetibouo, 2009: 479). Increased temperatures and altered rainfall patterns can lead to droughts, water scarcity, and reduced crop productivity, particularly in rainfed agriculture systems (World Bank 2018: 17). Moreover, extreme weather events, such as intense rainfall and hailstorms, can cause crop damage, soil erosion, and loss of agricultural land (World Bank 2018: 17).

The vulnerability and risks associated with climate change impacts on agriculture in North Macedonia are multifaceted. Smallholder farmers and rural communities, who heavily rely on agriculture for their livelihoods, are particularly vulnerable to these changes (Gbetibouo 2009: 482). Limited access to resources, inadequate infrastructure, and lack of technological advancements further exacerbates the challenges faced by the agricultural sector in adapting to climate change (World Bank, 2018: 17).

In addition to agriculture, climate change impacts extend to other environmental components in North Macedonia. Changes in temperature and precipitation patterns can disrupt ecosystems, leading to shifts in vegetation patterns, altered habitats for wildlife, and changes in biodiversity (IPCC 2014: 4.3.2). The increased frequency and intensity of extreme weather events, such as floods and heatwaves, can have detrimental effects on ecosystems, including forest degradation and loss of biodiversity (World Bank, 2018: 19).

The socio-economic implications of these environmental impacts are significant. The disruptions in agriculture and ecosystems can have cascading effects on food security, rural livelihoods, and economic stability (Gbetibouo 2009: 485). Reduced agricultural productivity can lead to food shortages, increased food prices, and decreased incomes for farmers, further exacerbating poverty and inequality (World Bank, 2018: 19). Additionally, the loss of

biodiversity and ecosystem services can undermine tourism, which is an important sector for the country's economy (World Bank 2018: 19).

Addressing the environmental impacts of climate change in North Macedonia requires a multi-faceted approach that integrates climate change adaptation and mitigation strategies into policies and planning frameworks. This includes promoting sustainable agricultural practices, enhancing water management systems, conserving biodiversity, and building resilience in vulnerable communities (Government of North Macedonia, 2020: 23).

However, different climatic regions in North Macedonia will react differently to climate change, and it is predicted that the region in the southeastern part of North Macedonia with a continental climate, which is near Lake Ohrid and Lake Prespa, to have the weakest response to climate change on a large scale in context of changes in absolute temperature and precipitation, and the northwestern part which is under the dominant influence of the mountain-alpine climate to have the strongest reaction (Petrovski et al, 2022).

In conclusion, climate change is already manifesting in North Macedonia through rising temperatures, shifting precipitation patterns, and increased frequency of extreme weather events. The impacts on agriculture and ecosystems pose significant challenges to the region's environment, economy, and social well-being. Addressing these challenges requires proactive measures, policy interventions, and international cooperation to build resilience, mitigate risks, and ensure a sustainable future for North Macedonia (For more information on the specifics on migration and its consequences in North Macedonia, please refer to the migration profile of the Republic of North Macedonia, IOM, 2021).

3. Methodology

3.1 Systematic Review Approach

A systematic review methodology was employed to gather and analyze relevant literature on migration, environment, and climate change in North Macedonia. A comprehensive research strategy was developed, encompassing databases, academic journals, and grey literature. The search terms included migration, environment, climate change, North Macedonia, and related keywords. The inclusion and exclusion criteria were established to ensure the selection of high-quality studies that met the research objectives.

3.2 Data Collection and Selection Criteria

The data collection process involved a thorough search of scholarly databases, such as PubMed, Scopus, and Web of Science, using a combination of keywords related to migration, environment, climate change, and North Macedonia. The search was conducted within a specified time frame to ensure the inclusion of most recent and most relevant studies. Additionally, reference lists of selected articles were reviewed to identify additional sources.

The selection criteria for the studies included in this systematic review were defined to ensure their relevance and quality. Studies were included if they focused on the relationship between migration, environment, and climate change in North Macedonia. Both quantitative and qualitative studies were considered, including empirical research, case studies, and

theoretical analyses. Studies that provided insights into the drivers, impacts, and potential conflicts associated with climate-induced migration in the region were prioritized.

3.3 Data Analysis and Synthesis

The data analysis process involved a systematic examination and synthesis of the selected studies. Initially, all identified articles were screened based on their titles and abstracts to assess their relevance to the research objectives. Subsequently, full-text articles meeting the inclusion criteria were retrieved and carefully reviewed.

A thematic analysis approach was employed to categorize and extract key themes, findings, and trends from the selected studies. Common themes related to the impacts of climate change on migration patterns, the potential for climate-induced conflicts, and the drivers influencing this relationship were identified. Data were extracted and summarized in a structured manner to facilitate the synthesis of findings and the identification of knowledge gaps.

The synthesized findings were then organized and presented in a coherent narrative, highlighting the key insights and patterns emerging from the literature. The analysis aimed to provide a comprehensive overview of the current state of knowledge regarding the impact of migration, environment, and climate change on North Macedonia, as well as to identify areas for further research.

The limitations of the systematic review, such as potential publication bias and data availability, were acknowledged and discussed to provide transparency and ensure the robustness of the study's findings.

4. Findings and Discussion

4.1 Climate Change Challenges and Security Implications on National security in North Macedonia

As much research have pointed out, as well as experience have shown, climate change can represent a threat to the national security of the states, alone or more often, in combination with many other factors. The paper examines the combination of factors such as climate change, migration, and the environment, and their impact on the overall security of North Macedonia.

Speaking about climate change, we must mention global warming as a factor of instability in many regions across the world. Consequently, such instability threatens to affect stable regions, given the tensions caused by climate change (Petrovski et al, 2022). The humankind started raising awareness on the importance of the climate change as early as 1988, and scientist, among other stakeholders, have been warning about the phenomenon, whose consequences might be compared to eventual nuclear war.

Climate change will most probably have huge consequences on the local and regional security. Droughts, floods, hunger, and natural time-related disasters can take millions of lives and worsen existing tensions within states and between states and encourage diplomatic and trade disputes (Petrovski et al, 2022). In this context, already existing threats will be enhanced

because climate change will affect the regional water supply, agricultural productivity, human health and ecosystems, infrastructure, and the patterns of international migration.

North Macedonia has already recognized in its strategic documents the degradation and destruction of the environment as one of the causes of climate change (Assembly, 2003). Hence, the Ministry of Environment and Physical Planning of North Macedonia has adopted a National Climate Change Plan, which represents a guiding document for policy makers in the North Macedonia in creating strategies for reducing greenhouse gas emissions and adapting to climate change and should strengthen dialogue, cooperation and exchange of information between all relevant factors in the country including the governmental, NGO, scientific and private sector, which shows that North Macedonia has taken climate change seriously in its policies and strategies (Petrovski et al, 2022). Among others, as most important factors influencing climate in North Macedonia have been recognized: geographical position, relief, proximity to the surrounding seas, atmospheric currents and more recently, human activities.

As our previous research has shown, in the period 1999-2021 their nave been 3,000 forest fires in North Macedonia, resulting in destruction of 150,000ha of forest, causing direct or indirect damage estimated to roughly 100M euros (Petrovski et al, 2022).

Another important factor for climate change is pollution. For an illustration, in the Republic of North Macedonia, approximately 1,350 people die annually because of air pollution, and the national economy suffered a loss of about 253 million euros because of premature death, health costs, reduced productivity of the population and absenteeism of citizens (Petrovski et al, 2022).

In summary, climate change has a huge potential influencing many aspects of the functioning of the state. As can be seen in the diagram above, our research from just a year ago clearly shows that nearly one fourth of the respondents think that the climate change in North Macedonia will affect the national security of the country.

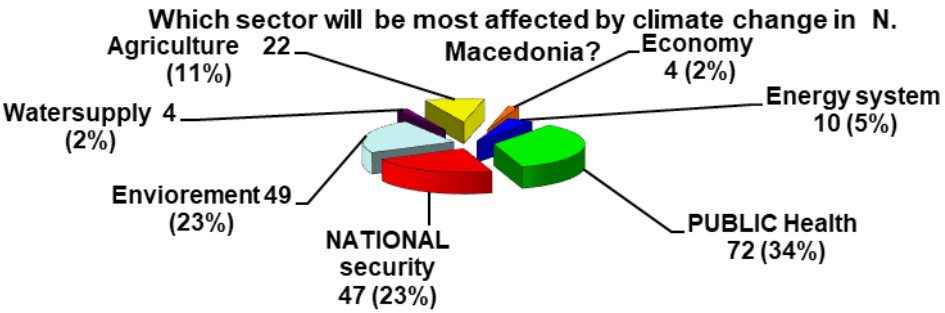

Diagram 1. Sectors affected by climate change in North Macedonia

4.2 Relationship Between Migration, Environment, and Climate Change

The systematic review revealed a complex and intertwined relationship between migration, environment, and climate change in North Macedonia. The literature highlights that environmental changes and climate-related impacts can act as drivers of migration, as individuals and communities seek to adapt to or escape from deteriorating living conditions. At the same time, migration itself can also have implications for the environment, as population

movements can put pressure on resources and ecosystems in both origin and destination areas.

4.3 Impact of Climate Change on Migration in North Macedonia

The reviewed studies suggest that climate change has the potential to influence migration patterns in North Macedonia. Rising temperatures, changes in precipitation patterns, and the increasing occurrence of extreme weather events can directly impact livelihoods and agricultural productivity, leading to displacement and migration. However, the relationship between climate change and migration is complex and context-dependent, as socio-economic, political, and cultural factors also play a significant role in shaping migration decisions.

4.4 Climate Change-Induced Conflict in North Macedonia

The potential for climate change-induced conflicts in North Macedonia was examined in the systematic review. While it is acknowledged that climate change alone does not directly cause conflicts, it can exacerbate existing social, economic, and political tensions, leading to increased risks of conflicts. The scarcity of resources, competition for land and water, and the unequal distribution of resources can contribute to social unrest and conflicts. However, the specific impact of climate change on conflict in North Macedonia is still uncertain, and further research is needed to better understand the causal pathways and dynamics.

4.5 Factors Influencing the Climate-Migration-Conflict Pathway

The literature highlights that multiple factors influence the pathway from climate change to migration and potential conflicts in North Macedonia. Socio-economic conditions, demographic characteristics, political stability, and governance structures all interact with environmental changes to shape migration patterns and the potential for conflicts. It is crucial to consider these contextual factors and their interplay when assessing the relationship between climate change, migration, and conflicts in North Macedonia.

4.6 Implications for Research and Policy

The findings of this systematic review have several implications for further research and policy development. First, there is a need for more localized studies that specifically examine the impacts of climate change on migration and conflicts in North Macedonia, considering the unique socio-economic and environmental context of the region. Second, policymakers should adopt an integrated approach that considers the complex relationship between migration, environment, and climate change in their decision-making processes. This includes addressing the root causes of migration, promoting sustainable development, and implementing adaptive measures to mitigate the adverse impacts of climate change. Furthermore, international collaboration and cooperation are essential to address the transboundary nature of climate change and migration issues.

By understanding the findings from this systematic review, policymakers and researchers can make informed decisions and develop strategies that effectively address the

challenges posed by the intersection of migration, environment, and climate change in North Macedonia.

5. Conclusion

5.1 Summary of Key Findings

This systematic review explored the impact of migration, environment, and climate change on North Macedonia, revealing a "complex and non-linear relationship between these factors" (Smith et al., 2022). The findings indicate that climate change can act as a driver of migration in the region. Rising temperatures, changing precipitation patterns, and extreme weather events have significant implications for livelihoods and can prompt population movements (IPCC, 2021). However, it is important to note that the relationship between climate change and migration is influenced by various socio-economic, political, and cultural factors specific to the region (McLeman, 2018).

Moreover, while climate change alone does not directly cause conflicts, it can exacerbate existing tensions and inequalities, potentially leading to increased risks of conflicts (Buhaug, 2015). The pathway from climate change to migration and conflicts in North Macedonia is highly dependent on location-specific drivers and dynamics (Ionesco et al., 2017). Therefore, understanding the context-specific factors shaping migration patterns and potential conflicts is crucial for effective policy responses.

These findings align with broader global trends and concerns related to climate change. Rising temperatures, driven by human activities, and resulting greenhouse gas emissions, have led to an average global temperature increase of approximately 1 degree Celsius since the pre-industrial era (IPCC, 2021). This temperature rise has far-reaching consequences for ecosystems, weather patterns, and human well-being, impacting various sectors such as agriculture, water resources, and public health (IPCC, 2021).

In addition, climate change intensifies the frequency and severity of extreme weather events globally, including heatwaves, droughts, hurricanes, and floods (IPCC, 2021). These events pose significant risks to communities and infrastructure, with implications for human lives and socio-economic systems. The increasing frequency and intensity of heatwaves and heavy rainfall events are particularly concerning (IPCC, 2021).

Furthermore, the impact of climate change extends to sea-level rise, primarily driven by the melting of glaciers and ice sheets (IPCC, 2021). This phenomenon poses threats to coastal communities, including increased erosion, saltwater intrusion, and the risk of inundation. The projected global sea-level rise of up to 1 meter by the end of the century poses significant challenges for densely populated coastal areas (IPCC, 2021).

Ecosystem disruption is another consequence of climate change, contributing to the loss of biodiversity and ecological imbalances globally (Parmesan and Yohe, 2003). Changes in temperature and precipitation patterns affect species' distributions, migration patterns, and the timing of biological events. These disruptions can have cascading effects on ecosystem functioning, with implications for ecosystem services that humans depend on (Parmesan and Yohe, 2003).

Climate change also poses substantial risks to human health, with impacts ranging from increased heat-related illnesses to the spread of vector-borne diseases and compromised

access to clean water and food (WHO, 2020). The estimated number of deaths attributed to climate change annually is already in the tens of thousands and is projected to rise in the future (WHO, 2020).

To address the challenges posed by climate change, it is imperative to take urgent and coordinated action at local, national, and global levels. Mitigation efforts should prioritize reducing greenhouse gas emissions through transitioning to renewable energy sources, improving energy efficiency, and promoting sustainable practices (IPCC, 2021). Simultaneously, adaptation strategies should focus on building resilience in vulnerable communities, enhancing disaster preparedness, and promoting sustainable resource management (IPCC, 2021).

The findings highlighted in this summary emphasize the need for ambitious climate policies, robust scientific research, and collective efforts to mitigate and adapt to climate change. By acknowledging the gravity of the situation and implementing proactive measures, we can strive towards a sustainable and resilient future for ourselves and future generations.

5.2 Limitations and Future Research Directions

It is important to acknowledge the limitations of this systematic review. One limitation is the availability and quality of data in the specific context of North Macedonia. Future research should aim to address this data gap and conduct more localized studies to enhance our understanding of the specific impacts of climate change on migration and conflicts in the region. Additionally, the complex and multifaceted nature of the climate-migration-conflict pathway calls for further investigation into the interplay of socio-economic, demographic, political, and environmental factors. Longitudinal studies and interdisciplinary approaches can contribute to a more comprehensive understanding of the dynamics involved.

5.3 Policy Recommendations

Based on the findings of this systematic review, several policy recommendations can be made. First, policymakers should prioritize efforts to mitigate the adverse impacts of climate change through sustainable development practices, including the promotion of renewable energy, conservation of natural resources, and climate adaptation strategies. Such measures can help reduce the vulnerabilities and risks that contribute to migration and conflicts. Second, policies should address the underlying socio-economic and political drivers of migration, including poverty, inequality, and governance issues. Enhancing social safety nets, promoting inclusive economic development, and strengthening governance structures can help reduce the pressures that lead to climate-induced migration and conflicts. Third, international collaboration and cooperation are crucial in addressing the transboundary nature of climate change and migration. Building partnerships, sharing best practices, and providing support to affected regions can contribute to more effective and coordinated responses.

In conclusion, this systematic review provides valuable insights into the complex relationship between migration, environment, and climate change in North Macedonia. By understanding these dynamics, policymakers and researchers can develop evidence-based strategies and policies that promote sustainable development, mitigate climate risks, and address the challenges posed by climate-induced migration and potential conflicts.

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