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Beyond Socio-Economic Migration Dynamics: Climate-Environmental Drivers in the Western Balkans

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Abstract

Climate change is one of the most pressing global challenges, profoundly impacting ecosystems, human health, and economic stability. Its intersection with migration has gained increasing attention, revealing the complex ways environmental changes influence human mobility and expose population vulnerabilities. While climate change significantly influences migration patterns, the relationship is complex; not all environmental changes lead to displacement, as migration can also serve as an adaptive strategy.

The research conducts an in-depth analysis of the interrelation between environmental challenges and socio-economic factors in influencing migration flows from the Western Balkans, applying a gravity model to evaluate data from 2009 to 2022.

The final result is expected to point out a significant relationship between migratory flows and indicators that influence them, including the difference in greenhouse gas emissions, thereby highlighting the environmental impacts on migration decisions, alongside key socio-economic variables such as GDP per capita, unemployment rate or corruption perception index.

Keywords: migration, Western Balkans, environmental factors, socio-economic drivers, gravity model

INTRODUCTION

The Western Balkan countries (Albania, Bosnia and Herzegovina, North Macedonia, Montenegro, Serbia, and Kosovo) have a longstanding history of emigration driven by economic, political, and social factors. In recent years, environmental changes have emerged as an additional and increasingly influential factor prompting migration.

Climate change presents a critical global challenge, profoundly impacting ecosystems, human health, and economies, thereby necessitating informed policymaking and effective adaptation strategies. The intersection of climate change and migration is particularly significant as it demonstrates how environmental changes can influence human mobility and highlights the vulnerabilities faced by affected populations. As climate change subjects' communities worldwide to increasingly hazardous conditions, identifying high-risk areas is essential for managing associated risks and ensuring public health (Hess, Malilay, & Parkinson, 2008).

While climate change significantly influences migration patterns, the relationship is complex. Not all environmental changes lead to displacement; migration can also serve as an adaptive strategy. Addressing the socio-economic factors contributing to vulnerability is crucial for developing effective policies that respond to

the climate-migration nexus and support affected communities in navigating these challenges (Piguet, Pécoud, & de Guchteneire, 2023)

This paper examines the intersection of climate change and migration, focusing on the challenges that arise in combination with key socio-economic indicators.

LITERATURE REVIEW

The literature from the past few years underscores the complex interplay between climate change and migration, emphasizing the importance of considering environmental factors alongside economic, social, and political conditions in understanding and addressing migration patterns. Myers (2002) is widely regarded as one of the pioneering researchers to identify and articulate the potential scale of climate-induced migration. In his work, Myers estimated that environmental degradation due to climate change could displace tens of millions of people globally, a concept that has since evolved into what is now called "climate refugees" or "environmental migrants." His projections, which included people fleeing from areas affected by rising sea levels, desertification, and resource scarcity, drew attention to the potential humanitarian and geopolitical impacts of climate change.

Moreover, Hugo (2008) offered a perspective that expanded the understanding of migration as an adaptation strategy, suggesting that climate-induced migration can be both a reactive and proactive response to environmental changes. The author argued that, for many, migration is a viable way to mitigate the risks associated with climate stressors, enabling communities to adapt by moving to more resource-abundant areas. This view reframes migration from a mere reaction to crisis to a deliberate, adaptive resilience strategy in response to environmental changes.

Furthering the discussion, Warner et al. (2010), examined the complex interplay between climate change, environmental degradation, and migration. They found that while environmental factors are influential, they rarely act as sole migration drivers; rather, they intersect with economic, social, and political conditions, jointly shaping migration outcomes. A key concept introduced is "trapped populations"—groups exposed to severe environmental risks but constrained from migrating due to a lack of resources or viable options. This concept highlights the heightened vulnerability of such populations and underscores the importance of policies that cater to both those who migrate and those who remain involuntarily, addressing the distinct needs and challenges of each group affected by environmental changes.

Research by Black et al., (2011) provides a nuanced understanding of the complex relationship between climate change and migration, emphasizing that environmental factors alone rarely drive migration. Instead, environmental changes often interact with and exacerbate existing vulnerabilities, such as economic, social, and political conditions, which together create circumstances where migration becomes a more likely outcome. Their findings challenge simplistic views of "climate refugees" by arguing that migration, rather than being solely a response to climate stress, is a multi-causal process that can serve as an adaptation strategy. In communities with limited resources or inadequate political support, climate-induced pressures such as droughts, floods, or sea-level rise may force migration as an adaptive response.

Furthermore, Beine and Parsons (2019) conducted a synthesis of recent empirical studies on climate-induced migration, examining how climate shocks influence individuals' and households' migration capabilities. They found that climate-related events, such as droughts and floods, often deplete household resources and

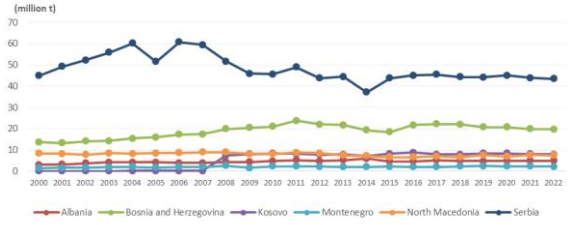
heighten vulnerabilities, which in turn shape migration decisions. The study suggests that climate shocks impact migration in complex ways, both directly, by pushing people to relocate, and indirectly, by straining resources and limiting options for those wishing to migrate. The authors' work emphasizes the role of economic resilience in mediating migration decisions in response to environmental stressors.

In the latest studies, Hoffmann et al. (2022) examined the role of climate change as a "threat multiplier," a concept highlighting how environmental stress exacerbates existing socio-economic vulnerabilities and contributes to migration pressures. Their study emphasizes that climate-induced disasters, such as hurricanes, wildfires, and floods, displace millions of people globally each year, often pushing already vulnerable communities into migration. By integrating findings from various studies, the authors illustrate the complex interplay between climate events and socio-economic factors, underscoring the need for targeted interventions that address both environmental and socio-economic drivers of migration.

STATISTICAL OVERVIEW

Figure 1 shows the annual CO_2 emissions (in million tons) for six Western Balkan countries—Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia, and Serbia—over the period from 2000 to 2022. Serbia has the highest CO_2 emissions among the six, with emissions peaking around 2007–2008 at over 60 million tons, then stabilizing in the 40–50-million-ton range after 2014. Bosnia and Herzegovina: remained relatively stable, with slight fluctuations, and averaged around 20 million tons annually. Counties as Montenegro, North Macedonia, Albania, and Kosovo exhibit relatively low CO_2 emissions, each ranging between 0 to 10 million tons. Kosovo shows a slight increase after 2008, whereas the others remain fairly stable throughout the period. The data suggest that while some countries in the region have maintained steady or declining emission levels, others, like Kosovo, have seen an increase over time. These variations may reflect differences in industrial activity, energy sources, and climate policies across the Western Balkans.

Figure 1. Annual CO2 emissions in WB countries, 2000-2022

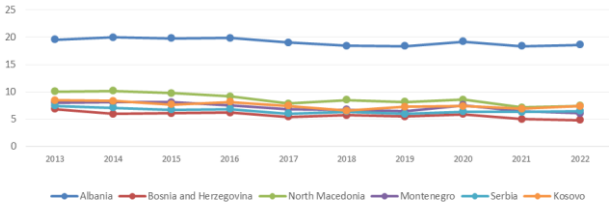


Source: Global Carbon Budget (2023) and author's calculations

Figure 2 illustrates the percentage of GDP contributed by agriculture, forestry, and fishing in Western Balkan countries from 2013 to 2022. Albania stands out with the highest contribution in these sectors, consistently around 20% of GDP, indicating its strong reliance on agriculture compared to its neighbours. In contrast, Bosnia and Herzegovina, North Macedonia, Montenegro, Serbia, and Kosovo show lower contributions, generally between 5% and 10% of GDP, with most countries experiencing either stable or slightly declining trends over the period. This suggests a gradual shift

away from traditional sectors toward industrial or service-based economies. Overall, while Albania maintains a significant agricultural presence, the other Western Balkan countries demonstrate a more diversified economic structure with a reduced dependence on agriculture, forestry, and fishing.

Figure 2. Agriculture, forestry, and fishing, value added (% of GDP) in WB countries, 2013-2022

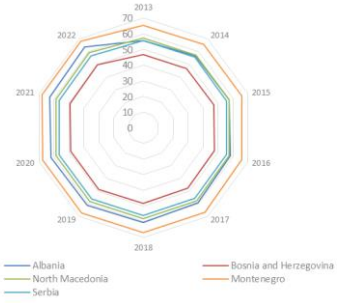


Source: World Bank (2024) and author's calculations

Figure 3 depicts the proportion of the urban population within the total population of Western Balkan countries from 2013 to 2022. The data shows a consistent urbanization trend across all countries, with only minor fluctuations over the years. Serbia and Montenegro exhibit the highest urbanization levels, reflecting a more urbanized population compared to other countries in the region. Conversely, Bosnia and Herzegovina, North Macedonia, and Albania have slightly lower urban population percentages, though these figures remain fairly constant over the period.

In general, the data indicates that urbanization in the Western Balkans has reached a steady state, which could influence infrastructure development, economic planning, and policies addressing both urban and rural areas. Urban centres in countries like Serbia and Montenegro, with already high urbanization rates, may face increased pressure from internal migration, potentially straining infrastructure, housing, and public services. Meanwhile, nations with lower urbanization rates, such as Bosnia and Herzegovina, North Macedonia, and Albania, may still experience growth in urban areas due to rural-to-urban migration driven by climate change, though at a slower pace. This trend could intensify urban population density, create a new group of "climate migrants" within the region, and lead to further socio-economic challenges.

Figure 3. Urban population (% of total population) in WB countries, 2013-2022



Source: World Bank (2024) and author's calculations

METHODOLOGY

The methodology used to analyse the relationship between climate change and migration in WB is based on gravity model. The dataset includes migration stock from the WB to main European destinations and the influencing variables, covering the period from 2009 to 2022. The primary sources of data include international organizations such as the World Bank, Eurostat, OECD, Transparency International, and the National Statistics Institutes of EU countries.

Indicators Considered

The variables incorporated into the model are:

- **GDP per capita** in origin (o) and destination (d) countries (gdpcap_o, gdpcap_d);
- **Population size** in origin and destination countries (pop_o, pop_d);
- **Distance** between countries (dist);
- **Differences in Corruption Perception Index** between destination and origin countries (diff_cpi);
- **Differences in Unemployment Rates** between origin and destination countries (diff_unempl);
- **Differences in Greenhouse Gas Emissions** between destination and origin countries (diff_ghg).

Gravity Model Specification

The gravity model is expressed in the natural logarithm (*ln*) form as follow:

$$\ln(mig\_odt) = ß0 + ß1 \cdot \ln(gdpcap\_ot) + ß2 \cdot \ln(pop\_ot) + ß3 \cdot \ln(gdpcap\_dt) + ß4 \cdot \ln(pop\_dt) + ß5 \cdot \ln(dist\_od) + ß6 \cdot \ln(diff\_cpi\_dot) + ß7 \cdot \ln(diff\_unemp\_odt) + ß8 \cdot \ln(diff\_ghg\_dot) + \varepsilon odt$$

Climate change is projected to drive substantial migration in the coming decades, with various organizations highlighting the scale of this impact. According to the World Bank's Groundswell Report (2021), climate change could force up to 216 million people across six regions to migrate within their countries by 2050.

RESULTS

The regression analysis utilizing the gravity model reveals significant socio-economic and environmental predictors of migration stocks between the Western Balkans and major European destinations from 2009 to 2022. Key findings indicate that higher GDP per capita in origin countries ($B = -0.742$, $p = .006$) negatively impacts migration, while higher GDP per capita in destination countries ($B = 1.034$, $p = .001$) positively influences migration flows. Population size in both origin ($B = 1.184$, $p < .001$) and destination countries ($B = 1.395$, $p < .001$) shows a strong positive correlation with migration stocks. Additionally, greater distances between countries ($B = -2.255$, $p < .001$) serve as a significant barrier, reducing migration flows. The analysis also highlights the importance of governance quality, as greater differences in the Corruption Perception Index ($B = 0.464$, $p < .001$) and unemployment rates ($B = 0.606$, $p < .001$) between origin and destination countries are associated with increased migration. Environmental factors, such as differences in greenhouse gas emissions ($B = -0.186$, $p = .041$), underscore the impact of climate change on migration patterns, where

smaller differences in emissions (which can happen if emissions in the origin country increase or emissions in the destination country decrease) correlate with higher migration stocks, reflecting the pursuit of better living conditions (see Annex table 1).

The model shows a strong explanatory power with an R Square of .691 and an Adjusted R Square of .685. The predictors chosen explain a significant portion of the variance in migration stocks, making it a robust model (see Annex table 2).

CONCLUSIONS REMARKS

This study sheds light on the complex interplay between climate change and migration in the Western Balkans, emphasizing the significance of socio-economic and environmental factors. The use of a gravity model reveals that higher GDP per capita in destination countries and larger population sizes are strong positive predictors of migration flows, whereas higher GDP per capita in origin countries and greater distances between countries act as deterrents.

The analysis highlights the substantial impact of governance quality, as indicated by differences in the Corruption Perception Index, and differences in unemployment rates, both contributing to increased migration. Additionally, the findings underscore the critical role of environmental factors, such as greenhouse gas emissions, in influencing migration patterns. The negative correlation between greenhouse gas emissions and migration underscores the necessity of addressing environmental disparities to mitigate forced migration.

The robust explanatory power of the model, with an R Square of 0.691 and an Adjusted R Square of 0.685, suggests that the selected predictors effectively capture the key drivers of migration. These insights are crucial for policymakers aiming to develop strategies that address the root causes of migration and support affected communities. By integrating socio-economic and environmental variables, this study contributes to a more comprehensive understanding of the dynamics shaping migration in response to climate change in the Western Balkans.

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ANNEX

Table 1. Estimation results (SPSS software)

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	-22.324	4.839		-4.613	.000
	gdpcap_o	-.742	.268	-.099	-2.770	.006
	gdpcap_d	1.034	.318	.161	3.252	.001
	pop_o	1.184	.094	.432	12.583	.000
	pop_d	1.395	.132	.733	10.571	.000
	dist	-2.255	.186	-.437	-12.129	.000
	diff_cpi	.464	.095	.190	4.883	.000
	diff_unempl	.606	.110	.198	5.523	.000
	diff_ghg	-.186	.091	-.148	-2.054	.041

a. Dependent Variable: mig

Table 2. Model Summary (SPSS software)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.831[a]	.691	.685	1.1396

a. Predictors: (Constant), diff_ghg, gdpcap_o, dist, pop_o, diff_unempl, diff_cpi, gdpcap_d, pop_d

b. Dependent Variable: mig

Table 3. ANOVA (SPSS software)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1192.058	8	149.007	114.726	.000
	Residual	533.812	411	1.299		
	Total	1725.871	419			

a. Dependent Variable: mig

b. Predictors: (Constant), diff_ghg, gdpcap_o, dist, pop_o, diff_unempl, diff_cpi, gdpcap_d, pop_d