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# Exploring Connections—Environmental Change, Food Security and Violence as Drivers of Migration—A Critical Review of Research

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**Abstract:** Migration, whether triggered by single events, such as violent conflict, or by long term pressures related to environmental change or food insecurity is altering sustainable development in societies. Although there is a large amount of literature, there is a gap for consolidating frameworks of migration-related to the interaction and correlation between drivers. We review scientific papers and research reports about three categories of drivers: Environmental Change (EC), Food Security (FS), and Violent Conflict (VC). First, we organize the literature to understand the explanations of the three drivers on migration individually, as well as the interactions among each other. Secondly, we analyse the literature produced regarding Colombia, Myanmar, and Tanzania; countries with different combinations of the driving factors for migration. Although we find that many correlations are explained in the literature, migration is mostly driven by structural vulnerabilities and unsustainable development paths in places that have a low resilience capacity to cope with risk. For example, food insecurity, as a product of environmental changes (droughts and floods), is seen as a mediating factor detonating violent conflict and migration in vulnerable populations. The paper contributes to the literature about multi-driven migration, presenting an overview of the way in which different driver combinations trigger migration. This is important for determining the best governance mechanisms and policy responses that tackle forced migration and improve the resilience of vulnerable communities as well as sustainable development.

**Keywords:** environmental change; food security; violent conflict; forced migration; resilience; vulnerability; Colombia; Myanmar; Tanzania

## 1. Introduction

Migration, “the movement of persons away from their place of usual residence, either across an international border or within a State”, [1] has shaped societies throughout history, even today. According to the United Nations International Migration Report 2019, the number of international migrants is rapidly growing, reaching 272 million in 2019 from about 153 million in 1990. Persecution, conflict, and general violence have forcibly displaced 70.8 million people, including 25.9 million refugees and more than 41.3 million internally displaced persons (IDP) [2]. Poorly managed migration is one of the faces of an unsustainable society. There is growing evidence

that migration and its consequent population pressure on land is a severe problem in many countries, especially in those where the demand for resources exceeds the food production capacity, thus impacting environmental sustainability [3].

People migrate for many different reasons: macro and meso drivers influence the process of migration [4]. The majority of people migrating internationally do so for work, family, or study-related reasons. However, many people leave their homes and countries for a combination of acute and forced reasons, including violent conflict, persecution, and environmental change. Their goal can be to improve their livelihoods or to escape structural problems, such as poverty and food insecurity [5]. People forced to migrate due to acute situations are often the most vulnerable, needing special assistance [6]. Thus, as migration has a variety of underlying causes, identifying and understanding their interactions is crucial to better design systemic policies that address sustainability as a whole.

Distinguishing between violent conflict, food insecurity, or environmental change as the immediate cause of displacement is complex, highlighting the need to identify ways to report on migration in the context of multiple drivers. For example, migration across the Mediterranean border of the EU comprises individuals or families seeking protection (refugees) as well as individuals or families looking for a better life, these latter are also called 'economic migrants' [7]. According to the IOM glossary an economic migrant could be related to:

Labour migration, which is defined as a movement of persons from one State to another, or within their own country of residence, for the purpose of employment. Most States addresses labor migration in their migration laws. ( . . . ) however, an economic migrant could also be considered as someone forced to migrate due to the coercion present to their livelihoods whether arising from natural or man-made causes (e.g. movements of refugees and internally displaced persons as well as people displaced by natural or environmental disasters, famine, or development projects).

[1]

Nevertheless, people crossing the Mediterranean Sea, for example, often have a mix of drivers or causes underlying their migration decision. As an illustration, people who leave their home countries primarily for economic reasons can then face violent conflict, lack of basic services, such as sufficient energy access and other basic infrastructures in the countries they move to [8]. In a similar sense, refugees who originally moved because of war and arrived in host countries like Greece, Jordan, Kenya, Lebanon, Turkey or Uganda said that they had to move on yet again because they were unable to make a living, due to the poor employment prospects or inadequate infrastructure (water, energy, and food nexus systems [9].

Research projects tend to be mostly one-dimensional, and inter-organizational. Given the urgency of the matter, scholars from different disciplines seek to draw scenarios and estimates, but few have managed to anticipate and conceptualize an interdisciplinary and multidimensional outlook on migration [10]. Nevertheless, the interactions of Environmental Change (EC), Food Security (FS), and Violent Conflict (VC) as drivers of migration can lead populations to embrace models of sustainable development and be either self-organizing in a resilient way or vulnerable to failure (natural or man-made) in the face of uncertainties and associated impacts. Therefore, the need to understand the complex nature of migration, its irregular manifestations, and their interactions for sustainability was the primary motivation of this research, consistent with on-going migration research trends. Further, understanding the interconnection between different drivers of migration is a big challenge and remains insufficiently researched [11].

This paper aims to understand, on a conceptual level, the interrelations between environmental change, violent conflict, and food (in) security, as drivers of migration. The paper seeks to do so by reviewing the literature that explains the interaction between these three drivers at a conceptual level, as well as the literature produced for the Colombian, Myanmar, and Tanzanian cases.

Drawing on the existing collaboration and expertise of the research consortium of the project “M3 Multidimensional Framework and Response Matrix for Migration,” the approach was to work with three pilot countries located in Africa, Latin America and Asia, specifically Colombia, Myanmar and Tanzania, where previous work was undertaken and an empirical base was developed by commissioned master studies. The three countries were selected because all three cases have a long migration history and within each of the case study areas one category—EC, FS, VC—was the dominant driving force for migration along with the other two playing a correlational role. First, despite the ongoing peace process, violent conflict threatens the lives of rural populations and the killings of social leaders remain as the main direct reason for internal displacement in Colombia. Second, EC is observed to be the most influential force driving the mostly inter-country and inter-continental migration in Tanzania. FS is observed to affect how the impact of EC in Tanzania is experienced at regional, local, and household levels, which, in turn, leads to “decisions to migrate.” Third, the study on migrants’ profiles, drivers of migration, and migration trends are particularly challenging in the case of Southeast Asia, a region characterized by accelerated and uneven economic development, socially diverse populations, as well as a complex scenario of national and ethnic conflicts. The consequences of EC are observed to have major impacts on the livelihoods of people living in poor and vulnerable rural societies in Myanmar. The report by the Asian Development Bank (ADB) [12] points out that the high level of exposure to risks from environmental disasters causes large numbers of people to be displaced every year by extreme weather events.

The research assumes, firstly, that EC, FS, and VC are the most dominant categories of drivers of migration in each of the case study areas. These each consist of an array of drivers of migration with varying significance and weight. Secondly, these drivers of migration have complex interactions and correlate with each other influencing paths for sustainable development with varying degrees of impacts on the subsequent migration patterns.

Section 2 of this paper is a conceptual review focusing on the development and challenges of multidisciplinary migration studies. Section 3 explores the rationale and dilemmas presented in the literature to understand the complexity of the interaction between these particular three drivers at a global scale. Section 4 reviews the literature addressing three countries: Colombia, Myanmar, and Tanzania. The final section, Section 5, presents a discussion about why it is important to address the mechanisms of interaction between drivers of migration to address migration in a sustainable manner.

## 2. Approaches to Migration Research

Migration research is characterized by multiple traditions, specific literature, a variety of concepts, many methodological approaches, and diverging policy agendas. With multiple nexuses, migration research is increasingly interdisciplinary [13–16]. From its earliest days, at the end of the 19th century, migration scholarship has suffered from the lack of a coherent body of scientific knowledge, instead, relying upon a variety of discipline-specific and trans-disciplinary connections [17].

One of the most widely used theories for explaining the causes of migration is neoclassical [13,18]. Its central argument is that migration is mainly stimulated by rational economic considerations of benefits and relative costs, both financial and psychological [19]. This branch later evolved into the so-called push-pull models, which are regularly used as analytical frameworks for migration research. Its rationale is that factors (economic, political, cultural, or environmental) push people out of one place and pull them toward another where these factors are more beneficial [11]. For example, in some of the classical literature, it is suggested that migrants are pushed by low incomes in their home countries or regions and pulled by better prospects in more affluent areas [20,21]. Further, relatively recent literature shows that migration flows are highly responsive to income per capita at destination [22]. Garcia [23], for example, uses push and pull models to study internal migration flows in 10 countries in sub-Saharan Africa recovering census microdata. The results show that this model could explain 87 per cent of internal migration.

Some argue that these models offer an advantage because they integrate all major “factors” or “drivers” playing into the migratory process [24]. Others claim it is purely a descriptive model in which factors assumed to play a role in migration are enumerated in a relatively arbitrary manner, without specifying their role and, most importantly, the interactions [11]. In fact, predictive models do lack certain explanatory power, for example, when dependent variables are taken from a different scale (global climatic models) and the purpose is to explain short distance local migration [25,26]. Further, it is claimed that the neoclassical approach is rather simplistic, not only failing to capture the interactions between drivers or market imperfections, but also failing to capture the importance of policies [27].

In contrast to the aforementioned classical migration theory, there is a growing interest in understanding the decision processes and intentions of individuals who migrate, as well as, existing structures, known as new economics of labour migration [28]. This puts forward the idea of understanding the underlying drivers as interacting factors that shape the broader context within which aspirations and desires to migrate are formed as well as why people make their migration decisions [29].

Theoretical approaches also include the human development and human security frameworks. Both look at context-specific and interacting drivers, identifying how these affect the migration decisions of the most vulnerable. Drivers taken into account by human development include education levels, health, and distribution of resources. Human security pays attention to non-conventional sources of insecurity, including environmental degradation, food insecurity, and institutionalized forms of gender violence [30–32]. In a similar line, recent literature includes new information technologies to address migration drivers and to respond to challenges for providing livelihoods to the refugee population [33].

One of the main challenges in migration research is to precisely explain the interactions between drivers at the mezzo level and context-specific cases, as well, as combining predictive models (quantitative research) with context-specific produced knowledge (e.g. ethnography and political science) [34]. Despite its long history, migration research still lacks an understanding of the mechanisms and scope conditions under which different migration drivers interact. A deeper understanding of the mechanisms of interaction would likely help to understand the migration phenomena as a process [35,36] where many drivers interact. This implies that the leading strand of migration research shifts toward understanding how, where, and when drivers interact to shape migration. These may function in different locations, at places of origin, transit, and destination. At each location, they may operate at different levels [34].

### 3. Materials and Methods

The data collection process started with a general conceptual review. First, a scientific team composed of ten junior and senior researchers shared previous academic experiences and conducted five meetings for transdisciplinary discussion. The team agreed on the following keywords and their combinations for mapping the literature: forced migration, irregular migration, displacement, climate change, food (in) security, hunger, livelihood, violent conflict, environmental change, drought, flood, vulnerability, and rainfall variability. The keywords were refined through an iterative process according to specificities of the research project, such as the interaction of driving factors and its impact on vulnerable communities and slow-onset migration as a pattern (but not exclusively). Attention was paid also to on-going research conducted by master’s students in the selected countries and the discussion about the contextual patterns of migration for the presented three case studies.

Second, using the keywords, we conducted a search in engines such as Scopus and Google Scholar. Within these databases, migration journals and cross-disciplinary journals that publish at the cross intersection of these drivers were used. The scientific team mapped the material available from these search engines in order to find and access articles in academic journals, repositories, archives and special issues. The journals found included: Migration, Mobility and Displacement, Sustainability, Social Sciences, Migration Studies, International Migration, Population and Development, Climate and Development, Ethnic and Migration Studies, Refugee Studies and Population, Space and Place,

among others. Furthermore, for a more thorough literature review, grey literature, policy briefs, and reports written by researchers from international agencies (e.g. The Un Refugee Agency (UNHCR), The Food and Agriculture Organization of the United Nations (FAO), International Organization for Migration (IOM), World Food Programme (WFP)) are considered.

The publications were filtered according to their explanatory power provided to correlate drivers for triggering migration in vulnerable communities. The time framework used to filter the search is for publications between 2014 and 2020 (except for the general literature about migration research). Overall, 139 publications were considered relevant for this study, including journal articles, reports, briefing papers, and books.

The publications were analysed using the MAXQDA software for filtering, coding, and clustering the keywords and to determine the explanations for each individual driver and the correlations among drivers. The analysis process consisted of identifying articles that explained: first, each concept as the most prevalent driver used to explain the reason for out-migration in vulnerable communities. Second, the integration and clustering of correlations between two and/or three migration drivers as a reason to migrate forcibly. The results of the conceptual review are presented in a category system explaining the former (See Table 1). A list of the selected articles and of the articles clustered by drivers of migration as well as its combinations is provided as supplementary materials.

The second methodological step was a context-specific search inspired by the idea that context-based studies in migration that examine how structures, cultures, processes, or institutions affect outcomes through the combination of drivers is an adequate strategy [37]. The search was based on the same drivers and combinations for the cases of Colombia, Myanmar, and Tanzania, in order to investigate the dominant research trends for understanding how each of the three drivers of migration works and the respective research gaps in each country.

Colombia represents an interesting case study to illustrate the role of violent conflict in migration before and after a peace agreement [38], as well as the impacts of conflict on environmental degradation and its correlations with food insecurity [39]. Furthermore, it shows the importance of building food security and environmental resilience in rural areas, engaging both the victims of the conflict and ex-combatants to foster reconciliation and peacebuilding in a post-agreement context.

Myanmar is a case where conflict-driven migration is happening, as well, as coastal migration, due to environmental change. Thus, it facilitates the understanding of the new challenges put forth by climate change and security in the Asian context [40]. Furthermore, this country provides a case study to understand the role of inter-ethnic conflicts on migration and its impact on international justice and democratic processes [41].

Tanzania provides an excellent case study illustrating the interconnection of the environment, food security, and migration. First, as it is highly vulnerable to droughts and floods [42], some studies find that climate change is affecting its agriculture and livelihoods opportunities [43]. Equally important, Tanzania is experiencing high levels of internal movements toward either commercial and industrial areas (e.g., Dar es Salaam and Zanzibar) or regions with economic opportunities related to the growth of non-agricultural activities, such as mining or tourism (e.g., Arusha and Kagera regions) [44].

**Table 1.** Number of publications reviewed according to drivers.

Category	No. of Publications
General Migration Research (theories, trends, international reports, data)	36
<b>Driver Isolated</b>	
Environment	28
Conflict	25
Food security	8
<b>Drivers Combined</b>	
Environment & Conflict	20
Environment & Food security	10
Conflict & Food security	7
Environment, conflict & food security	5
Total	139

## 4. Results

Results show that while there is a significant body of research individually exploring migration driven by conflict, environmental change and food insecurity, and some research on multiple driven migration, there is very little research connecting the interaction of these exact three drivers (EC, VC, FS). In the studies reviewed, we find very few interconnections are made to explain the interaction among drivers, mostly because each case has a main driver that explains its migration patterns, which does not mean that the other drivers do not influence, to a certain degree, the decision to migrate.

The remainder of section four explores trends in the literature for each driver and the combinations thereof.

### 4.1. General Concepts

#### 4.1.1. Conflict-Driven Migration

Around the world, an increasing number of people are forced to flee their homes due to international or internal armed conflict, as well as widespread violence—whether community, ethnic, political, or criminal. According to studies conducted by the Centre for Internal Displacement Monitoring of the Norwegian Refugee Council (IDMC) (2015), this trend started increasing with Iraqi sectarian violence in the late 2000s. Other peaks occurred with the Darfur crisis in 2004, the Arab Spring in 2011, and the ensuing crisis in the Middle East [45]. The main factor driving the increasing number of refugees between 2010 and 2015 was the war in Syria. Excluding Syria, the increasing number of refugees from the end of 2011 through mid-2015 would have been only 500,000 refugees [46]. Further, the conflict and food insecurity in the Middle East is represented in countries like Yemen, which is coping with a war that has resulted in thousands of IDPs and refugees, all complicated by the fact that, as of February 2018, it is also hosting 271,347 refugees, the majority of whom were Somalis (256,256) [2]. More recently, Myanmar is one of the bilateral migration corridors with 134,000 migrants per year due to conflict [47].

In 2017, more than 11.8 million people were internally displaced—living away from home but within the borders of their own country—due to armed conflict and widespread violence [48]. IDMC researchers find that, since the end of the Cold War, there has been a steady increase in the number of IDPs, which reflects the changing nature of the conflict. Syria, Colombia, and Sudan are the countries with the highest numbers of internally displaced people. Disparities in the distribution of capital and the low levels of investment in education and other areas of human development have led to the increasing marginalization of certain geographic areas [49]. These phenomena may explain why previously repressed sectors of society with no political representation have emerged, seeking greater independence, power, and control, resulting in internal conflicts.

#### 4.1.2. Environmental Drivers of Migration

The IOM defines an environmental migrant(s) as:

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

[50]

This definition agrees with those of Raleigh, C. [51], Neumann et al. [52], that environmental drivers of migration include both rapid-onset (e.g. floods and hurricanes) and slow-onset changes (e.g. land degradation, desertification, and changes in climate variability). Migration is conceptualized and comprehended in the context of vulnerability and adaptation to climate change and other global environmental changes [53]. The rationale is that warming and variable precipitation, effects of climate change, affect the lives of rural communities in developing countries [54] because they are highly

dependent on agricultural production [55]. Historical evidence highlights that a potential response to cope with climate variation is out-migration, leaving the origin community [56,57].

Climate change affects all levels of society, from basic economic activities such as agriculture to sophisticated sectors, like power generation, in industrialized economies. In fact, there is evidence that climate change negatively affects firm productivity [58]. Authors like Wood use the term “ecomigrants” to describe how climate change and the consequent declining access to arable land, low farm productivity, disasters, degraded resources (soil and water), and poverty is a commonality in migrant communities [59]. This rationale is exemplified by the Intergovernmental Panel on Climate Change (IPCC)’s research, which finds that, in regions such as Eastern and Southern Africa, as well as Southern Asia, environmental change and disasters are present and increasing, thus influencing human movement and displacement [40,60]. In Southern Africa, precipitation variability is increasing, along with increasingly frequent droughts. These slow-onset environmental changes have a major impact on food security, given that agriculture is a dominant economic sector in both Eastern and Southern Africa [61]. Further, drought influenced by El Niño climate cycles in 2015 and 2016 caused food insecurity and famine, contributing to human displacement in a number of countries [62]. Additionally, rapid-onset disasters, such as flooding in 2016, displaced around 300,000 people in Ethiopia, 40,000 in Kenya, 70,000 in Somalia, and thousands more in Tanzania and Madagascar [48]. In Southern Asia, many factors, including insufficient infrastructure, high dependency on land resources, and highly dense populations living in vulnerable areas, make people vulnerable to slow-onset disasters that contribute to human displacement [63].

Migration is an increasingly used coping strategy for environmentally-based change in Southern Asia, including sea-level rise, coastal erosion, flooding, and groundwater depletion [40]. China, for example, has implemented agricultural resettlement models for immigrants as part of ecological protection and disaster avoidance [64]. Furthermore, climate change has induced the relocation of people from vulnerable environments, such as the Pacific Islands. However, some argue that this could be considered as a form of displacement because it is sometimes unwanted and it breaks attachment of the populations to their land [64]. Other scholars sustain that environmental migration can occur for reasons other than climate vulnerability, such as being attracted to specific environmental resources [53]. From another perspective, some empirical studies show that adverse environmental conditions might actually discourage internal migration [44,65,66].

Additionally, with respect to migration originating from environmental factors, internal displacement occurs more frequently than international migration. Thus, the movement mostly occurs within the borders of their state of birth, as environmental migrants typically only move short distances after environmental hazards. As these migrants are often missed by data collection [67], the challenges are enormous for them and their receiving communities, especially in coping with socio-political and contextual factors.

In order to respond to this complex reality, environmental migration research scholars are taking other contextual factors into account, such as motivations, level of education, and age, in the fields of development studies, sociology, geography, demography, and refugee law [53]. Obokata et al. [68], claim that, although the separation of environmental and non-environmental factors is important for analytical purposes, isolating environmental drivers from other drivers is difficult, especially in the context of sustainability and risk reduction [69]. Thus, it is also crucial to use dynamic models (conceptual and empirical) where the interaction of different drivers is used to explain the interaction of human behavior with the environment.

#### 4.1.3. Food Security and Migration

The Food and Agriculture Organisation (FAO) defines food security as a combination of food availability, access, and utilization:

Food availability refers to the quantity of food, which should be sufficient and consistently available. Food access refers to the physical, social and economic ability to regularly acquire

enough quantities of nutritious food. Food utilization looks at how the food is stored, preserved, cooked and shared among family's and community's members to ensure its nutritional potential is maximized.

[70]

Furthermore, food security is also presented as a multi-factor function of agricultural production, investments in food production technologies, population pressure, trade policies, food prices, political stability as well as infrastructure for food storage, distribution and access [52].

Migration and food security are both important issues on the development agenda. However, as they are treated separately from an institutional perspective, there is little literature systematically explaining this connection [71]. It is found that migration is used in Africa as a strategy to achieve household food security by sending remittances to buy foodstuffs and other agricultural goods [72]. Further, this type of migration also affects the agricultural sector because it leaves rural households with less labour for agriculture [71,73]. This twofold phenomenon is the major focus of literature explaining the link between food and migration.

A study conducted by the World Food Programme (WFP) in Guatemala, Honduras, and El Salvador corroborates this rationale. It shows that high rates of food insecurity are indeed a migration driver. Migration records from the U.S. border show that, between 2010 and 2016, the number of irregular migrants increased from 50,000 to 408,870. Results show that the households interviewed spend more than two-thirds of their income on food, which reflects a high level of vulnerability to food insecurity. Most of the migrants are young male workers coming from the agricultural sector in a region characterized by high unemployment rates and low paid wages. Finally, the study shows that migration reduces the available workforce and, if not offset by remittances, typically results in increased food insecurity [74]. This study and others [75,76] elaborate on how food security could also be considered to be a mediating factor between other drivers of migration, such as violent conflict and the environment, opening the way to new forms of understanding the complexity of migration.

#### 4.1.4. Conflict, Environmental Change and Migration

Understanding how important population movements are caused by either environmentally driven conflicts or a scenario under which climate change triggers new violent conflicts is a major research topic. The literature identifies three ways to explain the interconnections between environmental changes and violent conflict. First, the impact that climate variability could have on violent conflict onsets triggers forced displacement [77]. Second, environmentally-driven migration could affect new violent conflicts [78]. Third, the impact of migrant populations on the environment, especially environmental degradation around refugee camps, mainly due to the reliance of migrants on biofuel for cooking and heating [8,79]. We focus on the first two connections in order to explore the mechanisms that cause migration.

Regarding the connection between environmental change and violent conflict, over a dozen studies conduct statistical analyses on the relationship between environmental change and the onset of new civil wars. However, there are few signs of a confluence for civic conflict beginning immediately after an environmental change [77]. One problem is the generalizing assumptions that suggest how environmental changes could induce wars because it undermines the capacity of human agency to prevent violent conflict [35]. However, there is some evidence for the impact of both high and low rainfall on conflict rates in vulnerable rural areas [80]. Additionally, it shows that violent conflicts are strongly seasonal, reaching peaks in periods preceding high rainfall when strategic efforts to gain territory and control of migration paths are likely to bring greater benefits [81–83]. In the same fashion, studies show that countries, like Afghanistan, that have been largely affected by both climate change and violent conflict experience cumulative effects. For example, as changes in rainfall patterns affect agriculture and conflict weakens governance for managing water and land, the exacerbated situation contributes to migrations flows [84].

From another perspective, very few studies are able to statistically test the popular argument that environmentally-driven migration triggers new violent conflicts because data on migration at the appropriate analytical level is scarce. For example, regarding internally displaced people [78,85]. Nevertheless, the literature shows that civil conflicts, lack of democracy, and poverty are the most important drivers of mass population displacements, while environmental change has an indirect effect on mass migration [86] or, as the IPCC puts it, 'conflict strongly influences vulnerability to climate change impacts' [87].

This literature stream shows an important connection between environmental variability, particularly rainfall and droughts, and its impact on violent conflict, highlighting the role of agricultural production dependence and food security in making people more or less prone to migrate.

#### 4.1.5. Environmental Change, Food Security and Migration

The most visible effects of environmental change as a migration driver are seen in the context of dryland conditions. Hunger and vulnerability are likely to increase on drylands as a result of environmental changes, including land degradation, increasing rainfall variability, chronic water shortages, and an increased frequency of droughts [52]. In particular, climate change producing higher temperatures may cause increased water scarcity and reduced yields. Rising temperatures will also affect food production systems, such as livestock production and fisheries that are important sources of income and nutrients in the least developed countries. Climate variability will also affect food prices and stability, thus causing an increase in poverty and food security in terms of availability in access [31]. In fact, projections indicate the existence of more than 143 million internal migrants by 2050 across sub-Saharan Africa, South Asia, and Latin America, due to the effects of climate change [88].

The dominant narrative among international agencies is that rural populations are especially vulnerable to climate change and have a limited capacity to manage environmental risk. Often, they are highly dependent on natural resources and agriculture for livelihoods, thus their exposure to natural hazards inherently increases their vulnerability level [52]. Therefore, migration is seen as an adaptation strategy that helps rural households diversify sources of income away from agriculture [75].

An empirical study by Warner and Afifi [89] concludes that households with more diverse assets and access to diverse livelihood choices, risk management options through social networks, community or government support programs, and education can use migration in ways that enhance resilience. In addition, a study conducted of Kenya's pastoralist communities shows that migration is a complementary strategy for self-protection from climate change because it enhances the adoption of agricultural innovations when at least one household member sends remittances that help with the cost of innovations [90].

Other perspectives question the assumption that migration is an adaptation strategy: Radel et al. [91], studying Nicaragua, find that while environmental changes, such as a hotter and drier climate, may induce people to migrate, it is actually structural issues, such as land tenure regime (characterized by the difficulty of smallholders or landless peasants to access farming land), that induces labor migration in order to achieve food security. As a result, they argue that migration neither facilitates adaptation nor reflects adaptation failure, rather, it reflects economic and power structures that are dysfunctional, which are then aggravated by environmental change. Similarly, Warner and Afifi argue that those households with the least access to adaptation mechanisms, such as livelihood diversification opportunities, no land, and little education, could use internal migration during the hunger season as a survival strategy, which can also lead the household to be trapped at the margins of existence [89]. Coupled with the latter, evidence from Bangladesh shows that the nexus between environmental change and food security (livelihoods) and the decision to migrate does not just depend on the lack of means to subsistence but also on the socio-ecological context. For example, people living in fragile salt-shrimp-dependent ecosystems in Bangladesh intended to migrate, but the majority of people living in rain-fed agriculture-dependent settings preferred to not migrate because they have more resilience and sustainable mechanisms [32].

Under these circumstances, it is appropriate to understand how the mechanisms explained by the drivers interact with socio-economic and political factors.

#### 4.1.6. Conflict, Food Security and Migration

As stated before, conflict is one of the main drivers of forced migration. International agencies, such as the FAO, have produced several reports on the links between violent conflict, food security, and migration. These reports claim that conflicts are usually aggravated by drought and other climate shocks, which further complicates the impacts on rural food security and livelihoods. Furthermore, forced mass migration may also stress ecosystems, thus causing conflicts and more food insecurity [76].

The conflict-related research community is shifting attention from climatic conditions and events, to phenomena known to be sensitive to climate change as possible indirect drivers of violent conflict and instability [87]. One proposed indirect pathway goes through food. Whilst income shocks have a modest effect on conflict risk, food price shocks, in contrast, can serve as a powerful trigger of social unrest in societies where fundamental grievances are prevalent. As an illustration, a study conducted using disaggregated data on 113 African markets from January 1997 to April 2010 finds positive feedback between food prices and violence, with higher food prices increasing conflict rates within markets and conflict increasing food prices [80]. In contrast, a study in East Africa finds that decreased yields are not related to violence. Alternatively, another study shows that conflict exists mainly in areas with high vegetation [92].

Therefore, it is important to note that while the most obvious cause pushing people out of their homes in search of better living conditions is hunger and violence, there are other underlying mechanisms and implications. Individuals or families forced to migrate may relocate within their own country, often from rural to urban areas, or internationally to neighboring countries. Indeed, the process of migration across borders poses many risks for these populations, often creating debt for the households and exposing them to insecurity [93]. Furthermore, the dynamics of civil conflicts and war strategies could intentionally worsen food security, creating even more unrest for vulnerable populations [39]. For this reason, it is crucial to recover more plausible data and wider explanatory (context-related) mechanisms in order to address the connections between food insecurity and conflict.

In the following section, a literature review exploring the current understanding of the interconnections of environmental change, food security, and violent conflict as drivers of migration in Colombia, Myanmar, and Tanzania, is presented.

### 4.2. Case Studies

#### 4.2.1. Conflict and Internal Displacement—the Case of Colombia

Colombia provides a markedly important case study to understand how armed conflict drives migration and, consequently, the interconnection it brings for food security and environmental degradation. Colombia accounts for most of the total displacements, with 6,509,000 IDPs as of the end of 2018 [48]. Additionally, it is in second place, after Syria, in terms of the number of displaced persons. Regarding conflict-driven migration, some authors assert that threats to personal integrity directly cause people to leave their homes [94]. Others find that forced migration is frequently caused by state repression, dissident threats (such as guerrilla attacks), counter-insurgency attacks, or a combination thereof during civil wars [95].

Historically, displacement in Colombia is mainly linked to growing cattle ranching, monoculture (e.g. palm oil) and extractive industries (e.g. carbon, oil) as well as violence related to the control of strategic territories among violent actors, such as paramilitaries, guerrillas, and drug dealers, for land access and drug trafficking, as well as select business sectors. The responses to the neo-liberal model imposed by industrialized countries through mechanisms such as the Washington Consensus had led Colombian authorities to implement a development model that mostly rests on resource extraction with low levels of qualified labour needed and a decrease in manufacturing since the 1970s. This led

to rural-urban migration and low recruitment costs for armed actors to take on young populations into war [96]. However, political reasons also play an important role in the logics of displacement. For example, armed groups displaced populations strategically where they have information about civilian loyalties [97]. In 2014, most armed violence was concentrated in the Pacific coast departments of Chocó, Valle del Cauca, Cauca, and Nariño, which also accounted for more than half of the country's new IDPs. Afro-Colombian communities in these departments were particularly affected, representing 30% of the total [49].

Additionally, armed actions caused serious damage to the civilian population, following the demonstration of military power by armed groups. Finally, homicides reflect the magnitude of the violence within the country, considered to reflect actions by the illegally armed groups: the National Centre for Historic Memory—Centro Nacional de Memoria Histórica (CNMH) estimates that 3 out of 10 homicides are the result of the armed conflict [98] (CNMH, 2013: 32).

Currently, despite the peace agreement signed in 2016 between the Colombian State and the Revolutionary Armed Forces of Colombia (FARC), violence against social and environmental activists continues, with 555 leaders murdered between January 1, 2016, and October 2019 [99]. Additionally, fighting continues against the remaining guerrilla group, the Army of National Liberation (Ejército de Liberación Nacional, ELN—Spanish) and other paramilitary groups like the Gaitanistas self-defence forces of Colombia (Autodefensas Gaitanistas de Colombia—Spanish) and Los Caparrapos. Perpetrated by the remaining paramilitary groups involved in narco-trafficking, human rights violations persist against social leaders, ethnic communities, and government officials in territories that lack state presence [100]. This represents a challenge for vulnerable populations, including ethnic communities and young people, who are the most disadvantaged, with 48% of internally displaced persons aged between six and 26, and with many still living in areas affected by ongoing conflict [101]. The situation is additionally aggravated by large numbers of migrants arriving from neighbouring Venezuela.

Several authors [38,102] reinforce the idea that, in a post-war scenario, this difficulty becomes even more evident, with definitions of economic and other forms of migration increasingly overlapping. As argued by Haaß, Kurtenbach, and Strasheim (2016), the places where peace is negotiated are not always ready to receive and protect returning refugees and IDPs [38] because they often do not have the required political reforms already in place. Further, they typically have higher levels of poverty and lower economic dynamics in comparison to the national average [94]. For Colombia, this means that rural areas (87 per cent of displaced people are rural in origin) that are already suffering from structural underdevelopment, are also receiving extra pressure on their vulnerable socio-economic infrastructures as new populations arrive [101].

Regarding the interconnection between food security, conflict, and migration in Colombia, a report by FAO (2017) presents the mass forced displacement from rural areas, triggered by the armed conflict, as the main mechanism explaining the negative effect on food security. The Colombian conflict-affected food security through its destructive and disruptive effects on production, distribution, and marketing of food, mostly at the local and regional levels. Damage to production was mainly caused by the occupation and control of remote rural territories rather than physical destruction [39]. Two main factors explain this: first, the difficulty of bringing in food from other regions, a dynamic also recognized as confinement caused by the armed actors [98] (CNMH, 2013), and, secondly, decreased local production due to the abandonment of land and crops.

Equally important is the fact that food insecurity affects IDPs the most. The WFP (2008) reports that 88 per cent of households (in 6 regions) view themselves as facing food insecurity [103]. Furthermore, the average food calories consumption of IDPs is 1752 kcal per day, which is less than the minimum requirement of 2100 kcal per person per day. Additionally, IDPs have higher incidences of chronic and acute malnutrition than the host population [104].

The interconnections between environmental change, conflict, and migration in the case of Colombia could be explained by the dynamics of the armed conflict itself. Colombia has plenty of natural resources, including extensive freshwater and a variety of minerals, and is, in terms of species

per land unit, the second most biodiverse country in the world [105]. The environmental wealth of the country is associated with the origins of the conflict: land disputes and control of resources in regions with high biodiversity and fragile ecosystems. In fact, the presence of the guerrillas (after their expansion in the 1980s) was mainly in areas where natural resources, such as coal, oil, and gold, as well as commercial agriculture and illicit crops, were found [106,107]. For this reason, the armed conflict caused great environmental damage. Deforestation is one of the biggest problems directly caused by these conditions: 42 per cent of Colombia's forest areas are in municipalities where the armed conflict is being waged [108].

This is aggravated by the weakness of the governance structures for managing natural resources, especially for controlling resource extraction. Under these circumstances, this includes security threats, land degradation caused by illicit crops, the use of glyphosate for the so-called 'war on drugs', illegal mineral extraction, and illegal logging. Many highly vulnerable (environmentally and socially) rural communities have been pushed out of their territories, moving to urban areas and slums [101]. Additionally, according to the National Department of Planning (NDP), some of these displaced communities also caused some of this deforestation. The challenge of sustainable resource management to avoid environmental degradation in displacement settings in Colombia is a commonality present in most of the refugee settings in Sub-Saharan Africa. For example, communities that rely on natural resources for energy consumption (biomass such as wood and charcoal) and on agriculture for livelihoods tend to be more vulnerable, lacking the capacity to deal with a big influx of migrants [8].

It is important to note that, despite its enormous challenges, Colombia has already made progress, legally speaking, to secure justice and reparations for the displaced populations and victims of the conflict. Clearly, Colombia is trying to use the wealth of its natural resources to sustain a fragile peace [109,110]. Additionally, the Colombian government is committed to reducing its emissions by 20% by 2030. International agencies are putting forth a concerted effort not just to build the peace, but also to support sustainable practices. This includes sustainable forest management, conservation areas, as well as capacity building for farmers and displaced populations. Some studies suggest that peacebuilding activities enable conditions and predispose conflict-affected farmers toward forest conservation if these are compatible with their respective livelihood priorities, including cattle ranching [111]. By the same token, many examples are written in the peace accord, such as the implementation of environmental peacebuilding practices in order to address land tenure conflicts, resettlement of migrant communities, sustainable agriculture, and access to water [108]. Thus, the Colombian case illustrates how the dynamics of the conflict affect conditions related to sustainability, such as housing, food price increases, access to land for agricultural activities, labor access, and livelihood diversification (See Table A1 in Appendix A). Therefore, food insecurity and environmental shocks are also factors interconnected to the reality of security threats that cause migration in Colombia.

#### 4.2.2. Climate Risk and Inter-ethnic Conflicts in Myanmar

As the most populous continent in the world, Asia is experiencing increased mobility for a variety of reasons, from industrialization and exploitation of natural resources to environmental change. The loss of space and arable land has caused people in rural areas to lose their livelihoods, forcing them to move to urban areas in order to survive. In particular, the growth of cities in the region and the worsening effects of climate change, such as urban flooding, are becoming more frequent and severe [112]. These environmental factors contribute to a history of violent conflicts, causing major migratory flows in Myanmar.

Before 2013, out-migration in Myanmar was driven by people seeking education and employment opportunities. Most women over the age of 25 migrated out of the household to seek work (55.9%), while men over the age of 15 left the household primarily to seek work (77.1%) [113]. A study by the World Bank (2016) finds that landless households are more likely to have family members migrating than the others [114].

Myanmar is ranked as a country with extreme risk vulnerability. For example, it ranks second in the Global Climate Ratio Index for 2017, which analyses how much states have suffered climate-related losses since 1997. Myanmar also ranks 12 out of 191 countries on the Risk Management Index of 2017, which assesses the risk of a humanitarian crisis based on hazard and exposure analysis, underlying vulnerability, and a lack of coping capacity. In terms of readiness to improve resilience and adapt to Climate Change, Myanmar is 163rd out of 181 countries on the University of Notre Dame Global Adaptation Index. With respect to climate risk, floods and natural hazards increasingly are frequent and increasingly cause of displacement in Myanmar. In 2008, Cyclone Nargis hit Myanmar. It devastated the Ayeyarwady Delta region. According to official figures, 84,500 people were killed and 53,800 went missing. A total of 37 townships were significantly affected and the UN estimates that approximately 2.4 million people were affected [115]. In July and August 2015, heavy rains fuelled by a tropical cyclone caused massive flooding and landslides in 12 states and regions of Myanmar [114]. The 2015 floods and landslides killed 172 people, displaced about 1.7 million over the long-term, and generally affected 9.5 million people. The most affected are poor, rural families who depend on fishing and rice production in coastal areas and deltas [116]. Most recently, many households migrate in response to shocks, for example, the residual effects of Cyclone Nargis. These households are primary landless, with a lack of assets to manage risks and diversify incomes [114].

In addition to flooding, mountainous areas experience landslides and the country is susceptible to earthquakes, forest fires, and drought. Generally, the displacement caused by these events is short-term, with families returning to rebuild their homes [117]. There is also concern about how stateless migrants living in Myanmar are affected by environmental change [118].

Regarding conflict-related migration, an important aspect is that all forms of migration in Myanmar require understanding its conflictive colonial heritage from 1824 (British Burma) through to its modern-day politics [119,120]. Since independence, Myanmar has been controlled by successive military regimes. Modern regional history is characterized by simultaneous struggles for power and democracy. Armed conflicts have shaped politics and state-building [121]. After decades of civil war and ethnic conflict, large numbers of people in Myanmar have been displaced to neighbouring countries. These factors also triggered discrimination against ethnic minorities. Over 1.1 million civilians are currently displaced in Myanmar, most from homes and farms in ethnic nationality areas where most of the fighting has taken place [122]. One example is the Chin community members forced to flee to Thailand and Malaysia. Another ethnic minority heavily affected by discrimination is the Rohingya, who, as described by Secretary-General Antonio Guterres are “one of, if not the, most discriminated people in the world” [123]. Rohingya Muslims represent the largest percentage of Muslims in Myanmar and, from 2012 onwards, have been persecuted. In August 2017, around 700,000 people were forced to migrate after military intervention by the government of Myanmar in Rakhine state [124]. The majority of this population left for Bangladesh and are currently located in Kutupalong, large settlements that make up the largest refugee settlement in the world according to UNHCR. According to Khen Suan Khai, this could be considered as “structural violence” [125]. At the same time, Myanmar’s policies for migrant integration are found to harm its poorest populations [126].

Looking at the uncertainties and risks faced by the migrants, Jessica Ball notes that young migrants aged 12–17 are forced to leave Myanmar due to its broken economy. Most of this population currently lives on the northwest border of Thailand, ultimately disconnected from their families, their culture, and from the formal economy. Consequently, these young forced migrants can be vulnerable and resilient, both victims and agents, bearing not just their native cultures, but also globalized identities shaped by displacement [127]. South and Jolliffe (2015), specialists in security, development, and humanitarian affairs in Myanmar, recall that civilian populations have been the main victims of more than half a century of armed conflict. They argue that assistance to help IDPs and refugees would be more effective if it was framed by an understanding of the protection approaches undertaken by the communities themselves [41].

To conclude, in the case of Myanmar, there is a mix of drivers contributing to forced migration. Namely, the literature exposes vulnerability to climate risk, income insecurity, armed conflict, and structural violence in the form of cultural and ethnic discrimination, as well as a lack of land access as factors influencing migration (See Table A2 in Appendix A). Finally, the solutions proposed for this case suggest the need to reinforce and further develop the mechanisms of the local populations to adapt to the vulnerabilities created by the interrelation between climate risks and violent conflict. First, it is important to increase resilience capacity (e.g. improving climate change adaptation, human security, and land access). It is especially important to empower local knowledge about flood management and to enhance resilience to flooding by considering how locals coped with previous disasters to build better policy responses [112]. With regards to cultural violence and to stop the Rohingya genocide, the government of Myanmar should implement the order of the International Court of Justice to protect the Rohingya people in Myanmar from any kind of violence or attacks from any armed forces [128]. Finally, it is important to develop land access and use policy for displaced populations and rural farmers in order to secure livelihoods and enhance their resilience capacities on site [122].

#### 4.2.3. Environmental Change, Food Insecurity, and Migration in Tanzania

Tanzania is a country with both internally displaced populations, caused by extreme events, and migrants coming into their country [48]. It is also highly vulnerable to floods and droughts [43]. The literature analyzing Tanzania mostly explores, through examples, the interactions between environmental change, food security, and migration (See Table A3 in Appendix A). Some studies point out how rainfall variability affects human mobility, thus also affecting food insecurity for humans and their herds [129]. Others claim that extreme events actually prevent some populations from migrating internally [44].

For example, one study at the household level finds that more than 80% of households were affected by rainfall variability. The profile shows that migration is typically seasonal, lasting less than 6 months. Additionally, it reveals that migration is mostly an attempt to immediately improve their livelihoods, with a smaller group migrating as an investment in their future [129]. Equally important, Paavola (2008) notes migration is one out of a number of livelihood strategies, including intensification and diversification to address earlier climate variability in Morogoro, Tanzania [130]. Using interviews conducted by the Uluguru Mountains Biodiversity Conservation Project (2004), the author shows that farmers move temporarily from remote upland villages to locations where farming conditions are favorable or to locations that have good access to markets [76]. Another strategy is for parents to send their children to work in cities in order to gain remittances, thus reducing the number of people they have to feed using uncertain agricultural income [130].

In contrast, research conducted by Ocello et al. (2015) suggests that environmental changes, such as droughts, floods, and crop diseases, act as a deterrent to inter-district migration in Tanzania [44]. This study illustrates the hypothesis that, in times of environmental scarcity, environmental shocks contribute only marginally to internal and international migration [66,131]. However, in the Tanzanian case, when investigating the effects of education levels, migration is a likely response to environmental shocks among individuals with no education, thus turning it into a livelihood strategy among the most disadvantaged [44].

## 5. Discussion

### 5.1. *The Interconnection between Environmental Changes, Food Insecurity and Violent Conflict as Drivers of Migration*

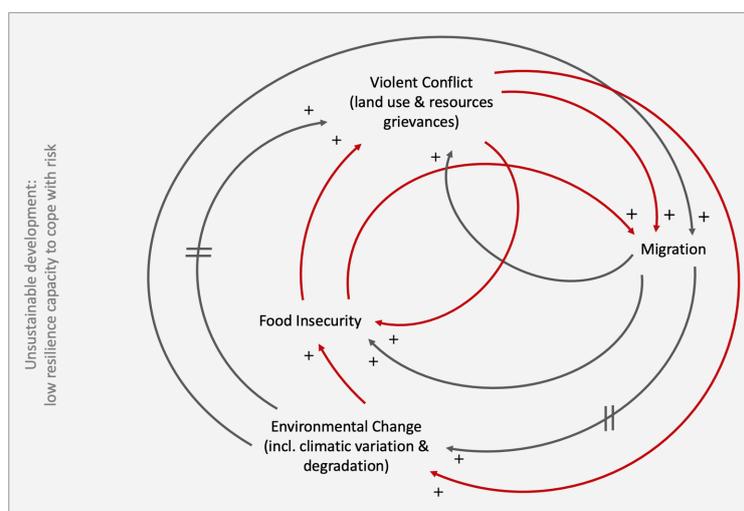
As previously stated, although different theories have developed frameworks to explain multi-driven migration, the literature on the interactions and correlations specifically between environmental change, violent conflict, and food (in) security, is particularly scarce.

A few exceptions are found in the studies of Raleigh et al. (2015) [51,80], which address the interconnection of these three drivers, as well as in, to a lesser extent, the study of Buhaug et al. (2015) [132]. Additionally, a study conducted by WFP [31] analyses the interrelation between the variables of violence and food security in a particularly environmentally vulnerable location, the northern triangle of Central America. These studies show how these three variables are intrinsically correlated, producing a set of mechanisms that explain the process of migration in a complex manner.

However, several studies investigate the relation of these drivers individually or in dual combinations (e.g. environment and migration; environment, food security and migration; conflict, food security and migration; etc.). Thus, the interconnections found in the literature between these three factors suggest a certain logic, summarized as follows and shown in Figure 1 (See supplementary materials).

Figure 1 presents different correlations in the form of reinforcing causal loops. Causal loop diagrams are used in system dynamics to explain behavior of a variable in a simple and intuitive way, as well as identify ‘causal effects’ in the direction to changes [133,134]. In this case, we use the causal loop diagram to explain the correlations between the three variables (VC, FS, EC) and the reinforcing causal loops extracted from the literature. The loop diagram’s frame represents a context of unsustainable development and low resilience capacity to cope with risks (e.g. VC, FS, EC). The lines drawn in red are the loops that explain in a better way the correlation between the observed variables. The symbol (//) represents a delay in the correlation. The most notable reinforcing loop starts in places where there is environmental degradation (e.g. floods and droughts) that increases food insecurity of populations. Food insecurity may detonate directly people’s decision to migrate, and/or food insecurity (e.g. price shocks) increases social unrest and violent conflict, thus reinforcing people’s decisions to migrate [76]. Finally, migration may increase environmental degradation (with a delay in the time when migrant communities use resources in an unsustainable manner), and/or increase food insecurity, and/or create more conflict for resources between migrants and hosting populations closing a negative reinforcing loop that shows unsustainability.

This loop diagram corroborates the commonality in the literature where food security becomes a mediating factor between environmental changes and violent conflict. Specifically, food availability and access play this role since climatic variations (rainfall and temperature) are assumed to create scarcity through limited production and/or reduced yields [135], with a decrease in rainfall exerting an indirect effect on conflict through its impact on food prices. Furthermore, higher food prices increase the likelihood of conflict within markets and violent conflict increases food prices [80].



**Figure 1.** Causal loops showing the correlations of environmental change, violent conflict, and food insecurity as drivers of migration. Own source.

However, other loops in the figure explain more direct correlations. For example, armed conflict induces directly migration and populations may increase conflict in places of destination. Even more, conflict produces food insecurity as it impedes food access and production [74,76] increasing the probability of outmigration. For example, in the Colombian case, violence is clearly the dominant driver, with the other two drivers (FS and EC) acting as aggravators.

Finally, although migration is sometimes seen as an adaptation strategy for environmental changes, Tanzania [89] and Nicaragua [91] provide contrasting evidence, cases where only the most vulnerable and extremely poor migrate in order to diversify their livelihoods. In these cases, migration can be an unsuccessful strategy due to the fact that structural causes of low resilience to climate risk and food security prevail in remote rural areas.

## 5.2. Findings Regarding the Connection between Drivers in Case Studies

After mapping the literature on the three case studies (see Table 2), it is clear that each of the three drivers plays a role in the migration process of each individual case. However, the interconnections take different forms. The relevance is stronger for violence (Colombia and Myanmar), while environmental factors and food (in) security are directly linked with migration in Tanzania. However, in all three, the interconnection between drivers is present. In order to address the different drivers correctly, attention should be paid to the context and dynamics of the interplay between the drivers from a variety of perspectives, such as the sustainable development paths and the socio-economic structure.

In Colombia, despite the peace process, armed conflict remains the main reason for internal displacements. The most common pattern of migration is internal, rural to urban, which is mostly forced and slow-paced [101]. For example, migration occurs as a result of a family decision. The family is either threatened by armed actors or has serious difficulties surviving after violent attacks that created a prolonged situation of food insecurity. Thus, they decide to move to nearby cities where they have relatives or a metropolis where they end up living on the outskirts of urban settlements in precarious conditions. This is being aggravated by the effects of climate change and environmental degradation on agricultural production. The latter is caused either by guerrilla attacks on oil fields or by deforestation provoked by legal and illegal mining, which contaminates water sources. As a result, rural populations struggle to survive in agricultural production.

Finally, migration in Colombia also interplays with structural conditions that are the result of unsustainable development paths of an economy based on resource extraction with low levels of employment, a stark inequality, lack of viable livelihoods, as well as lack of social infrastructures, such as hospitals and schools, or roads to get products to markets.

In Myanmar, the reviewed studies show that, throughout history, the most important drivers of migration are either interethnic conflict or the quest for education and job opportunities. In part, this condition originates from conflict and Myanmar's complex political history, colonial past, and militarist regimes. Studies of migrant profiles show that cultural reasons and inter-ethnic conflicts contribute greatly to the migration decision [136].

In addition, high risk and low resilience capacity to climate change is also identified as a condition for migration. In fact, Myanmar is ranked as a high-risk country in multiple climate risk rankings, labelled as a country with weak institutions that struggles to adapt to environmental change. The interconnection found is expressed by the fact that minority groups are even more vulnerable to climate risks and conflict [41]. Therefore, as the environmental change affects the livelihoods of landless households, marginalized ethnic minorities, who live in poor and vulnerable rural societies in Myanmar have no option except to migrate.

Overall, environmental change is hypothesized to be the most influential force driving both inter-country and international migration in Tanzania. This driver interacts with food security as an important way in which the impact of climate change in Tanzania is experienced at regional, local, and household levels, which, in turn, leads to "decisions to migrate." The patterns of migration identified in Tanzania can be described as rapid-onset (for disasters), slow-onset (rural to urban migration of

younger population), and sometimes seasonal, as agricultural production strategies developed by rural workers. Specific to the Tanzanian case is the number of studies that show seasonal migration is the most common pattern of migration to deal with climate variability [43,89,129]. However, there are commonalities with the other cases: unsustainable development paths, institutional weaknesses and the lack of a social protection system in rural areas are factors increasing the vulnerability of rural populations, which causes households to initiate rural to urban migration as a survival strategy, particularly among the least educated.

**Table 2.** Summary of findings in the three case studies.

	Colombia	Myanmar	Tanzania
Predominant migration drivers	Violence Post-agreement process Food Insecurity Environmental changes (temporal)	State induced violent conflict. Environmental Change Food Security. Labour migration [137,138]	Climate Change Food (In)Security Violence
Types of spatial and/or temporal migration	Within country (Rural—Urban) International (Acute migration due to violent threats) Slow-onset migration	Within country Same continent—Asia, Bangladesh, Myanmar or Thailand. Rapid-onset (disasters and violence) Slow-onset migration	Within country Temporal-Seasonal Slow-onset migration
Economic structure and sustainable development [139]	Heavily depends on energy and mining exports, making it vulnerable to fluctuations in commodity prices. High vulnerability to climate change, inadequate infrastructure, narco-trafficking, and an uncertain security situation.	Abundant natural resources and young labor force have the potential to attract foreign investments. Living standards have not improved for the majority of the people residing in rural areas. Myanmar remains one of the poorest countries in Asia.	The economy depends on agriculture, which accounts for slightly less than one-quarter of GDP and employs about 65% of the workforce, although gold production in recent years has increased to about 35% of exports.

## 6. Conclusions

Given the urgency of the migration issues, scholars from different disciplines seek to draw scenarios and estimates regarding migration trends. Furthermore, migration is generally perceived as problematic, with most policies trying to influence the volume, direction, and types of movement rather than accommodating flows and supporting migrants [140]. In order to design comprehensive solutions, it is important to understand the mechanisms and dynamics of interaction between multiple drivers as well as to extend the research on structural socio-economic issues, which can help to support certain policy responses.

After reviewing the literature on the interrelations between EC, VC, and FS as drivers of migration, it is important to note that some factors have greater weight than others as a driving cause of migration, with the respective weight being context-dependent. However, a commonality present in the general literature and the three cases (Colombia, Myanmar and Tanzania) is that the interrelations between the three drivers are present when vulnerable communities make the decision to migrate. In fact, interrelations between climate change risk and conflict expressed in food insecurity may aggravate previous vulnerable situations in rural areas, thus forcing the most vulnerable young people to migrate in search for opportunities, sometimes doing so in irregular ways that put their lives at risk. Specifically, rural populations that are dependent on agricultural production with scarce access to land, who are experiencing environmental shocks or violent conflict, are the most vulnerable. Further, food insecurity caused by environmental degradation may fuel conflicts. Therefore, the lack of access to food and secure livelihoods is seen as a factor that has a big weight on vulnerable people's decision to migrate.

It is important to understand that the interactions of natural and socio-economic forces can lead populations to be either self-organizing in a sustainable way or vulnerable to failure in the face of adverse natural or man-made impacts. Most compelling evidence demonstrates that it is important to create resilience in vulnerable populations concerning each of the three drivers (violent conflict, environmental change, and food security). Food security appears to be the most relevant factor, as it plays the role of detonator for aggravating crises generated by conflict and environmental change [74] (See Figure 1). Furthermore, the loop diagram indicates the factors where possible interventions from the international community and governmental responses should be directed to transform in a radical way unsustainable development paths (e.g. economies highly dependent on raw materials exports)

into more diversified economies that grant populations secure livelihoods (e.g. food security) and create resilience mechanisms to cope with violent threats, environmental shocks, and food insecurity to prevent vulnerable populations from migrating in irregular conditions [6,38,44,51,75].

In a context that creates sustainable development conditions, strategies at the international level, such as contingency planning to improve the coordination of different sectors (e.g. informing impact on environmental risk and conflict affectations on food systems), should be implemented in vulnerable areas. Finally, it is important to recall that, in order to grant resilience in rural populations, issues like the economic structure of the country, land access and rural reforms [122] are crucial factors that are beyond the scope of this paper and should be further researched.

The results of this research stress the importance of developing studies on combined drivers from a multi-disciplinary perspective at a meso level in order to provide strategic information for policymakers, researchers, and educators to better understand the specific combinations relevant for a particular location to support migrants in building sustainable paths. After migration occurs, different strategies should be pursued to prevent further migration due to a lack of protection for those refugees escaping conflict or those ‘economic migrants’ who are unable to access services that encourage durable solutions and integration. It is crucial to recognize the importance of prioritizing the economic, developmental, and demographic impacts of displacement [141]. Finding solutions also require the cooperation of multiple stakeholders and sectors ranging from local governmental and non-governmental organizations to international organizations that, together with research centers and universities, approach the problem willing to cooperate and implement the Agenda 2030 for Sustainable Development, the Global Compact for Migration and the New York Declaration for Refugees and Migrants [142,143].

**Supplementary Materials:** The following are available online at <http://www.mdpi.com/2071-1050/12/14/5702/s1>, Figure 1. Causal loops showing the correlations of environmental change, violent conflict, and food insecurity as drivers of migration. Excel sheet with a list of the selected articles and of the articles clustered by drivers of migration as well as its combinations.

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## Appendix A

**Table A1.** General overview of migration literature in Colombia (own source).

Authors	Research Methods	Major Findings, Main Drivers
Valenzuela & Caicedo (2018)	Literature review	Experiences of environmental peacebuilding in Colombia as outlined in the peace agreement.
Echandía (1999)	Historical review	The different stages of armed conflict are related to environmental resources exploitation
USAID (2020)	Country Report description	Colombia is a country with plenty of natural wealth and resources, but lacks governance mechanisms and institutions to manage these resources.
FAO (2017)	Household survey	The Colombian conflict negatively affected food security (e.g. lack of access, rural confinement), thus explaining much of the rural to urban internal migration.
WFP (2008)	Household survey with IDP populations	IDP populations in Colombia have greater malnutrition and food insecurity than the receiving communities

Table A1. Cont.

Authors	Research Methods	Major Findings, Main Drivers
IDCM (2018)	Quantitative analysis—Report	Colombia accounts for most of the total displacements, with 6,509,000 IDPs as of the end of 2018.
Centro Nacional de Memoria Histórica (2015)	Historical analysis	A historical description of decades of armed conflict and the lack of a state presence as an explanation for the massive displacement of Colombians as a crime against humanity.

Table A2. General overview of migration literature in Myanmar (own source).

Authors	Research Methods	Major Findings, Main Drivers
Ball et al (2016)	Contextual overview and charts a program of research.	Experiences of forced migrant youth aged 12 to 17 from Myanmar who have grown up as temporary residents along the northwest border of Thailand. They feel that they have no prospects on their own country and face discrimination
Bylander (2017)	Literature review	The article explores the idea that the poorest of the poor are generally less likely to migrate internationally than those with greater resources. In the case of Myanmar, its policies for selecting migrants are not pro-poor
Callahan (2004)	Qualitative and Literature review	Describes the role of the military in the building of the nation state in Myanmar, and the authoritarian culture influencing organized violence and the consequences of it for migration.
Grundy-Warr (2013)	Literature review	The migration in Myanmar/Burma could be understood as struggles for power and democracy as well as ethnic political conflicts over forms of nation building.
Hall (2012)	Literature review	Access to social protection by migrant workers coming from Myanmar and moving within the ASEAN region remains limited.
Heinrich Böll Stiftung (2015)	Political analysis and commentary	A mix of climate risks, highly vulnerable rural populations, environmental degradation, and conflict has driven Asian migration.
South and Jolliffe (2015)	Qualitative analysis of aggregated data	A typology of conflict-induced forced migrants in and from southeast Myanmar, followed by an analysis of five main factors that influence their decisions. It helps explain some of the key differences between different types.
Rosenthal (2019)	United Nations report. Observatory participation, literature review	“Since 2012, and especially since August of 2017, the world has witnessed a wrenching spectacle of human rights violations on a massive scale. The statelessness and extreme deprivation of some 1.4 million Rohingya people, not to mention the grave abuses wrought on them and other Muslim minorities in Myanmar.”
Parmar et al (2019)	Household survey analysis	Main out-migration drivers in Myanmar before 2013 were education and employment.
Poussard, Wendy Hayter, Joanna (2011)	A qualitative review of data	Resilience to climate disasters in Myanmar, particularly floods, have driven temporary displacement in Myanmar
World Bank (2016)	Mixed (Quantitative–Qualitative)	Landless households are more likely to have family members migrating. There is a lack of year-round income generating opportunities locally. High dependence of small- and medium-landholding households on the labor provided by family members.

Table A3. General overview of migration literature in Tanzania (own source).

Authors	Research Methods	Major Findings, Main Drivers
Afifi et al. (2014)	Expert interviews, a household survey and Participatory Research Approach (PRA) sessions with communities. Tools employed were Focus Group Discussions, seasonality calendars, timeline and trend analysis, risk ranking, Venn diagrams and mobility maps.	Rainfall variability affects human mobility through food insecurity for humans and livestock.
Ocello et al., (2015)	A multi-topic household questionnaire, a community questionnaire, and a questionnaire focused on agriculture.	Droughts, floods, and crop diseases are associated with an overall decrease in the likelihood of inter-district mobility (“environmental scarcity” hypothesis).
Black et al. (2011)	Review one emerging theoretical and empirical case-based literature (neoclassical economics, the new economics of labour migration, segmented labour market theory, world systems theory, social capital theory, and the theory of cumulative causation).	Five families of drivers affect migration decisions: economic, political, social, demographic, and environmental drivers.
Paavola (2004)	Analysis based primarily on a review of published and grey literature of government statistics, summaries of interviews made in other projects, as well as a limited number of expert interviews conducted during a preliminary fieldwork trip to Tanzania.	Farmers responded to droughts by using seasonal migration as a coping strategy. Other activities included expanding cultivation, reducing fallows, and engaging in wage employment or in charcoal, timber, and brick production.
Liwenga (2012)	Cross-sectional research design.	Drought leads to poor income and forces people to migrate to other places in search of food and better weather conditions. Mostly seasonal migration.

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