

Internship Report

Mountain biodiversity, ecosystem services, and human migration

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Human Migration

In recent years, human migration has taken unprecedented proportions. In 2017, 258 million people resided in a country other than their country of birth, 150.3 million people were counted as migrant workers - sending remittances back to their places of origin and directly or indirectly contributing to the local development, and 8.8 million people in 135 countries were newly displaced by sudden-onset disasters within their own countries (IOM, 2018).

Understanding why and when people migrate is key to addressing the social, economic, and ecological consequences of their mobility and to developing appropriate migration and sustainable development policies. As such, migration is part of heated debates and negotiations around policy agendas, both at global and local levels.

In view of ongoing declines in biodiversity and environmental degradation (IPBES, 2019) it appears particularly important to gain a better understanding of how migration impacts the Earth's ecosystems and their species. This is particularly true for mountain regions, which represent complex and fragile social-ecological systems (Klein et al., 2019) that are home to almost 1 billion people (Köerner et al., 2017), provide half of the world's freshwater resources (Immerseel et al., 2019, Viviroli et al., 2020), and are covered by 23% of the world's forests (MRI, 2020). Human migration is complex. It can take different forms that can be location-specific, dynamics unfold at different spatio-temporal scales, and reasons for migrations are often multiple and intertwined (box 1).

Definition of migration

Migration is the "movement of a person or a group of persons, either across an international border, or within a state. It is a population movement, encompassing any kind of movement of people, whatever its length, composition and causes; it includes migration of refugees, displaced persons, economic migrants, and persons moving for other purposes, including family reunification" (Bachmann et al. 2019).

BOX 1. KEY MIGRATION CONCEPTS

WHY

SOCIAL NEEDS

Seeking education, self-development, life improvements.

ECONOMIC NEEDS

Searching for work and other income diversification options.

ENVIRONMENTAL REASONS

Changes in the natural environment affecting human decision-making on migration (typically caused by climate and/or land-use change.)

HOW

BY DECISION (Individual, household, community)

The decision on migration is made by an individual, or member/members of household, or by the community. Both the reason for migrating and the duration of the relocation might vary.

BY FORCE (forced migration and displacement)

A migratory movement in which an element of coercion exists, including threats to life and livelihood, whether arising from natural or man-made causes.

HOW LONG

PERMANENT

Leaving the place of residence with no plan and/or intention to return.

TEMPORARILY

Leaving the place of usual residence with plan and/or intention to return.

WHERE

RURAL-URBAN

Leaving the usual place of residence in a rural area to move to urban area.

RURAL-TO-RURAL

Leaving the usual place of residence in a rural area to move to rural area.

COUNTERURBANIZATION

Movement away from cities, including suburbanization, exurbanization, or movement to rural areas.

AMENITY MIGRATION

Migration of largely affluent urban, or suburban populations to pursue a particular lifestyle or experience an improvement in life quality.

DOMESTIC

Migration within the country borders.

INTERNATIONAL

Migration across the national borders.

How is Human Migration linked to Change in Biodiversity and Ecosystem Services

The effects of human migration on biodiversity and ecosystems are multidimensional. Based on this analysis of the migration-related contents available in the regional and thematic reports* of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) and the IPBES conceptual framework (Diaz et al., 2015), human migration can affect biodiversity and ecosystem services both directly and indirectly and it can simultaneously be an indirect driver of change, a response strategy to change, and a tool to address or mitigate the change. Sustainable development approaches therefore call for understanding and considering the complex and interconnected nature of drivers, responses, and tools (see highlighted cases on map 1).

* IPBES regional assessment reports on Biodiversity and Ecosystem Services for (1) Africa, (2) Americas, (3) Asia-Pacific, (4) Europe and Central Asia, and the (5) Assessment Report on Land Degradation and Restoration were analyzed for the migration-related content. The content was further categorized as driver, response and tool.

Map 1. Examples of migration as a driver, a response, and a tool



(1) Migration as a Driver of Change

Migration is driving change in a variety of ways, which differ depending on the type of migration. Some of the major impacts of migration as a driver of change in biodiversity and ecosystem services can be articulated around two key questions: what happens where people leave, and where they arrive.

Rapid immigration (to any location) is increasing demand on ecosystem services or so-called Nature's Contribution to People (NCP, Diaz et al., 2019). This may result in overexploitation (e.g. forest for fuelwood), degradation of nature (e.g. pollution), and declines in NCPs that will further increase ecosystem vulnerability and threaten livelihoods. Immigration also contributes to change in the social structure in the place of destination, and a decline in traditional values, identities, and indigenous and local knowledge. Examples illustrate that immigration has a direct impact on land-use and land-cover change through enhanced deforestation, land degradation, land conversion, and land sparing. In addition, the influx of immigrants can create conflicts between old and new settlers, which could be accelerated by limited access to resources, increased land degradation, and overexploitation of natural resources. This can have a direct and indirect impact on biodiversity and ecosystem services in migrants' receiving regions.

Rural-urban migration is one of the prevailing types of migration. Its impact on biodiversity and ecosystem services is also nonlinear. Immigration contributes to the growth of urban populations and has a subsequent impact on urban, suburban, and rural areas. Sprawling urban areas are linked to land-use and land-cover change. The growing urban demand for food and water is also linked to overexploitation of natural resources in and outside of urban areas.

Outmigration accelerates social change and causes declines in traditional practices that affect biodiversity and ecosystem services. Outmigration is also one of the significant drivers of land abandonment, which further accelerates land-use and land-cover change in abandoned places with (often negative) consequences on biodiversity and the provision of ecosystem services. Yet, outmigration driven by an aspiration to achieve economic or educational improvements, can increase human wellbeing both at the individual and household levels. The typical practice of sending material and social remittances back to the places migrants left can help mitigate the impact of reduced ecosystem services and help regenerate biodiversity in the long term.

Forced migration and inconsiderate displacement, driven by conflicts, large-scale rapid developments, or environmental change, may decrease overall human wellbeing, increase their vulnerability, and accelerate poverty. This subsequently leads to pressure on biodiversity and ecosystem services.

(2) Migration as a Response Strategy to Change

Migration can be a strategy to adapt to changes in biodiversity and ecosystem services caused by external drivers.

Land-use and land-cover change: rapid land-use and land-cover change can lead to overexploitation and limited access to land resources, and result in biodiversity losses. The resulting resource scarcity can lead to outmigration and promote land abandonment, which can further accelerate environmental degradation locally and in the place of arrival.

Correlations also exist between agro-industrial expansion, agriculture development and landscape homogenization, which in some cases reduce livelihood options for local populations and drive outmigration. In addition, a decrease in agricultural productivity can trigger migration for people who have no alternative to agricultural income or are dependent on subsistence farming. This can also further accelerate land abandonment and outmigration.

Overexploitation: deforestation and its consequences, including land degradation, increased exposure to natural disasters, and limited access to forest resources, can affect the living condition of forest-resource dependent communities and accelerate outmigration from deforested areas.

Climate change: climate-induced migration is an emerging challenge, especially affecting coastal settlements and least developed nations. Climate change has resulted in and will continue to result in desertification, coastal erosion, and flooding – all of which have been documented as increasing outmigration from affected areas. In some cases, migration in response to climate change is expected to be temporary and cyclical as sudden environmental shocks (e.g. flooding), or slow-moving chronic stresses (e.g. drought) displace people temporarily to different areas for safety and employment. However, long-term land impacts may lead to permanent population displacement.

Environmental drivers rarely act alone, meaning that people do not typically migrate because of only one of the mentioned environmental triggers. People respond differently to the changes in the environment and migration is only one response strategy. Environmental change and its effects on people vary depending on the socioeconomic systems in place. Vulnerable people with no material resources and networks are more likely to adapt to the impacts of environmental change than to migrate (Jokisch et al., 2019). Therefore, this conceptualization of environment-migration relations should be further considered when discussing environmental change as the sole driver of migration.

(3) Migration as a Tool to Adapt / Mitigate the Impacts of Change

The way migration could be used as a tool in the adaptation or mitigation of change is through organized resettlement policy measures. However, inconsiderate planning could increase human vulnerability, and affect biodiversity and ecosystem services.

Large-scale infrastructure development, such as roads, dams, and agroindustrial expansion could be linked to population resettlement policies. Oftentimes, conservation measures and establishment of protected areas might also require population displacement. These measures could be followed by conflicts of interests between development actors and locals residing in the development areas.

Displacement measures might be a negotiated result of well planned and communicated policies, but it can also result in conflicts between the participating actors. Some considerations to effectively use migration as a tool to address and mitigate change include informed decision-making on development and resettlement, where local and indigenous knowledge and interests, as much as area-specific planning are some of the recommended measures.

Why Human Migration Matters for Mountain Biodiversity and Ecosystem Services

Mountains are the world's water towers (Immerzeel et al., 2019, Viviroli et al., 2020) and strongholds of biodiversity (Koerner 2004; Rahbek et al., 2019) as well as cultural and linguistic diversity (Wymann von Dachs et al., 2016). Yet over the last decades, they have been experiencing profound transformations as a consequence of environmental changes such as rapid elevation-dependent increases in temperatures or land-use change, and of growing demographic and socio-economic pressures. These transformations range from the disappearance of glaciers to the redistribution and loss of habitats and species along elevational gradients and on mountain summits, to increased food insecurity that has gradually forced people to migrate away from their homes (FAO 2015). These transformations have profound consequences for the fate of much of the planet's biota and to the hundreds of millions of people who depend on the vital ecosystem services supported by mountains and their ecosystems for their survival (Martin-Lopez et al., 2019). For instance, approximately one fifth of the world's total population benefits from the ecosystem services of the Hindu Kush Himalaya and about 105 million lives rely on ecosystem services from the Andes (see Payne et al., 2020). Hence, a pressing need exists for acknowledging mountains as environmental commons (Messerli et al., 2019) that necessitate safeguard through institutional responses and action to protect mountain ecosystems and appropriate policies at scale (Makino et al., 2019).

Rapid changes in mountain environments are both a consequence of and a reason for human migration. Migration has long been used as a life-improvement strategy for people living in mountains where resources are often scarce and land productivity declining. As such, outmigration from mountain regions is an adaptive response to environmental, social, economic, or political pressures (Bachmann et al., 2019).



Shepherds' shelter in village Bakhmaro, Republic of Georgia (left) and Whitefish Ski Resort, MO, USA (right). Photos courtesy of the author.

Outmigration: main trends indicate that people are moving away from rural mountain regions, either to urban centres in the mountains, to lowland areas or occasionally abroad – temporarily or permanently (cf. Box 1, Bachmann et al., 2019). Due to mostly short-distance outmigration of the economically active population – mostly working-age men – to larger economic hubs domestically (de Haas, 2006), mountainous areas are experiencing “generational gaps” where most of the remaining population consists of young or elderly people (Childs et al., 2014; Kohler et al., 2017; Speck, 2017).

As climate change increases and disproportionately affects mountains, their ecosystems, and the services these ecosystems support, outmigration is likely to increase, leaving mountain areas unattended and unmanaged, and resulting in increasing land abandonment. Based on examples from the European Alps, land abandonment causes the degradation, loss, and fragmentation of many ecosystems, with adverse effects on biodiversity and in particular on alpine bird populations (Payne et al. 2020). Land abandonment is also often associated with forest regrowth and the loss of typical open habitat species of conservation but also economic value.

Declines in traditional practices associated with outmigration also represent a major threat to the maintenance of traditional agrobiodiversity and agroforestry systems that are typically prevalent in the Himalaya, the Andes, and East African mountains for instance, and critical for people’s livelihoods and to a sustainable ecological balance. Outmigration toward urban centers also cause indirect pressures on mountain ecosystems as the demand for ecosystem services from mountain regions, including water, food, or timber for construction, increases (Jaquet et al., 2015; KC et al., 2017). Outmigration from the mountains is often driven by a lack of opportunities and sustainable development-oriented approaches should therefore not force people to remain in the places without creating alternatives to the outdated lifestyle methods and traditions that further accelerate poverty and affect local environments (Grau & Aide, 2007).

Inmigration: in recent years, growing opportunities in mountain regions for affluent people and international investors as well as growing aspiration for improved life quality away from large urban centers has resulted in an increased tendency to relocate in mountain areas. Effects of the affluence-led counterurbanization process on mountain ecosystems and biodiversity are multiple. First, new settlements, the necessary infrastructure (e.g. housing, roads, and dams for power supply), and growing demand for food represent a major threat for mountain ecosystems and their biodiversity, including freshwater ecosystems. Overexploitation of natural resources for construction materials and space, and land conversion to support growing demand for agricultural products contribute to major declines in forest coverage in many mountain regions worldwide and to environmental degradation in mountains. Second, newcomers often settle in rural mountain areas with the intention of developing and exploiting new economic opportunities, such as tourism and extractive industries, which both have major impacts on nature and on the sustained provision of key ecosystem services. Effects on ecosystems are exacerbated by the displacement of environmental impacts to the less developed regions to further protect amenity places for new highlanders at the expense of more vulnerable populations (Abrams et al., 2012; Farrell, 2020; Park & Pellow, 2013). Together, the challenges brought about by human migration out of and to mountain areas could weaken the fabric of fragile mountain settlements and ecosystems, bring or exacerbate uneven social dynamics, and result in cascading and long-lasting environmental impacts.

Outlook

Understanding migration as a driver, a response, and a tool

The complex nature of migration and its role as a driver of as well as a response to change can, directly and indirectly, lead to a change in biodiversity and ecosystem services both where migrants come from and where they go. Addressing the impacts of migration on nature and people and applying migration as a policy tool to address and mitigate the change both require a detailed understanding of the complexity of the migration process. While existing knowledge assessed by IPBES points to some of the prevailing dynamics of migration as a driver, response and tool worldwide and their impacts on ecosystems and biodiversity, area-specific research is necessary for planning migration policies, especially in mountain communities, where available literature is limited. Fundamental questions could include (1) in what way is migration driving environmental change in mountains, (2) how do people use migration in response to environmental change and (3) what are the ways to use migration as a tool to ensure sustainable development in mountains.

Multifaceted nature of the environment-migration nexus

While past tendencies in research used to simplify the migration process, we now know that the complex nature of migration does not come down to simple deterministic narratives of one push factor triggering migration (Groth et al., 2020). This is confirmed by the analysis of migration-related content in IPBES reports, where the outlined dynamics suggest that migration as a response to environmental change is triggered by multiple interrelated drivers that further accelerate the change process both in the places that migrants leave and where they move to. A holistic approach to environment-migration related research and evaluation of policy options could be useful, in particular if it considers direct and indirect drivers of migration, where environmental change is only one out of five (economic, political, social, demographic and environmental drivers)(Black et al., 2011).

Level of socioeconomic development matters

Looking at the development of mountainous areas on a spectrum of wealth and poverty indicates that mountain populations face different challenges based on the level of local development. Less developed economies with centralized governance and concentration of development in larger urban centers experience marginalization of mountainous areas, outmigration, depopulation of rural settlements, a rural decline, and land degradation. However, on the opposite side of the spectrum are wealthier regions planning for the resilience of their mountainous settlements that face social inequalities and environmental challenges caused by affluence-led amenity migration and counterurbanization process. Considering these examples, it might be useful to properly assess the level of local development in the target areas and to propose development interventions that address specific challenges of population migration at scale.

Rethinking rural-urban migration

Rural-urban migration is one of the most widespread global demographic trend. The urbanization process is not only a long-distance migration to large cities but often includes the transient or long-term concentration of populations in small local towns (Grau & Aide, 2007). The prevalence of rural-urban migration was also clearly observable in the reviewed IPBES reports, which also highlighted the existence of different migration triggers. According to Grau and Aide (2007) rural-urban

migration policies often try to present this type of migration as a negative development and try to reverse it. However, migration is closely linked with sustainable development, as it contributes significantly to economic and social development and has potential to promote recovery of the biodiversity and ecosystem services in migrants’ places of origin. If planned accordingly, safe, orderly, and regular migration might have the potential to contribute to achieving the sustainable development goals (SDGs). However, the potential of well-planned migration policies is often overlooked in international, national, and local level development (Bachmann et al., 2019).

Immobility - an overlooked element in migration policy

Often overlooked, population immobility, also known as “poverty trap” is an important element for planning sustainable migration policies. Lack of capital and opportunities creates a double burden for impoverished people, who can not respond to environmental change by migrating to different places (Black et al., 2011). Therefore, it might be important to first consider development strategies that will help mitigate the impacts of environmental change at the place of residence, rather than see migration and displacement as an exclusive mitigation strategy.

Method

The key findings outlined in the above internship report were derived from a review of five reports by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) and are following three stages of data collection and analysis. A qualitative analysis of the contents was performed based on the IPBES Conceptual Framework (Diaz et al., 2015), which effectively unpacks biodiversity, ecosystem services, human well-being, indirect and direct drivers, and their interrelations while accounting for different scientific disciplines, diverse stakeholders, as well as different knowledge systems .

Stage 1: The regional IPBES assessment reports on Biodiversity and Ecosystem Services for (1) Africa, (2) Americas, (3) Asia-Pacific, (4) Europe and Central Asia, and the (5) Assessment report on Land Degradation and Restoration were reviewed for the content on human migration using pre-identified search terms (table 1). The search terms were applied to filter-out the human migration-related content and relevant quotes were pulled-out (table 2) for further coding (see stage 2). Overall, 173 quotes were tagged at the next stage of analysis.

Table 1. Applied search terms

| Dimension | Search Term |
|-----------|---|
| Migration | Amenity; Depopulation; Displacement; Migra; Refugee; Relocation; Remittances; Resettlement; Rural to; Urban to. |

Table 2. Human migration-related quotes by reports

| Report | Total Quotes |
|---|---------------------|
| The IPBES regional assessment report on biodiversity and ecosystem services for the Africa | 29 |
| The IPBES regional assessment report on biodiversity and ecosystem services for the Americas | 20 |
| The IPBES regional assessment report on biodiversity and ecosystem services for the Asia and the Pacific | 54 |
| The IPBES regional assessment report on biodiversity and ecosystem services for the Europe and Central Asia | 11 |
| The IPBES assessment report on land degradation and restoration | 59 |
| <i>Total quotes</i> | <i>173</i> |

Stage 2: The content was tagged along the dimensions of the IPBES framework and additional dimensions concerning population migration. This enabled us to identify causal links between environmental change and human migration and classify information based on whether migration was described as a (indirect) driver of change (impacting biodiversity and ecosystem services, 146 tags), as a strategy to respond to changes in the environment (135 tags), or as a tool for development and/or to address and mitigate impacts of change in biodiversity and ecosystem (17 tags). The findings in this report were based only on the qualitative analysis of these three dynamics.

Stage 3: A screening of additional peer-reviewed and grey literature on the intersection between migration, environmental change, and mountains was performed. The aim was to further inform our understanding and interpretation of the IPBES contents in the mountain context.

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