IBEROAMERICANA
NORDIC JOURNAL OF LATIN AMERICAN AND CARIBBEAN STUDIES

Adaptive Migration: Climate Change, Climate Migration, and Climate Adaptation in Peru's Highlands Communities

COLLECTION:
FACING THE CHALLENGES OF CLIMATE CHANGE – LATIN AMERICAN PERSPECTIVES

RESEARCH ARTICLE

KARSTEN PAERREGAARD

STOCKHOLM UNIVERSITY PRESS

ABSTRACT

In the current debate about climate-induced migration some scholars argue that rather than understanding migration as a failure to cope with climate change, we should view it as a means of adapting to it. To scrutinize this argument and assess the applicability of the notion of "adaptive migration" the paper examines the role migration plays in the climate adaptation of Peru's highland communities. Drawing on research in two communities located in the country's southwestern highlands, it shows how climate change impacts agriculture and water management threatening the villagers' lives and livelihoods. It also investigates the communities' climate adaptation options and discusses how the villagers deal with them. Moreover, the paper explores how migration intersects with these options especially regarding crop shifts and reorganization of irrigation routines. Lastly, it discusses the range of activities migrants engage in in their home communities highlighting those that contribute to climate adaptation. The paper argues that given that all migrations entail a process of adaptation, the term "adaptive migration" is redundant. Even so, the paper's data suggest that returning migrants sometimes act as promotors and implementors of climate adaptation. To foreground these migrants, the paper encourages scholars to apply the term "migratory adaptation" instead of "adaptive migration."

ABSTRACTA

En el debate sobre la migración inducida por el cambio climático algunos investigadores sostienen que la migración posibilita que gente viviendo en sitios vulnerables al clima pueden quedarse en sus comunidades en vez de huir. Para escrutar este argumento y evaluar la aplicabilidad de la noción de "migración adaptiva" este artículo examina el papel que la migración juega en la adaptación climática de las comunidades de la sierra peruana. Revisando datos de investigación en dos comunidades en el sur del Perú el artículo muestra cómo el cambio climático impacta la agricultura y el manejo del agua poniendo la vida y el sustento de los comuneros en peligro. También investiga las opciones que ellos tienen para adaptarse al cambio climático y discute cómo los comuneros las manejan. Por fin explora el enlace entre la migración y estas opciones enfocando en el cambio de cultivo y la reorganización del riego. El artículo sostiene que todas las migraciones implican un proceso de adaptación. Por lo tanto, el término "migración adaptiva" es redundante. No obstante, los datos muestran que algunos migrantes de retorno contribuyen a la adaptación climática. Para empatizar su papel el artículo sugiere que aplicamos el término "adaptación migratoria" en vez de "migración adaptativa."

CORRESPONDING AUTHOR:
Karsten Paerregaard
Professor Emeritus, School of Global Studies, University of Gothenburg, Sweden
karsten.paerregaard@globalstudies.gu.se

KEYWORDS:
Peru; climate change; adaptation; migration; agriculture; water

PALABRAS CLAVES:
Perú; cambio climático; adaptación; migración; agricultura; agua

TO CITE THIS ARTICLE:
Paerregaard, K. 2024. *Adaptive Migration:* Climate Change, Climate Migration, and Climate Adaptation in Peru's Highlands Communities. *Iberoamericana – Nordic Journal of Latin American and Caribbean Studies*, 53(1): 20–30. DOI: https://doi.org/10.16993/iberoamericana.617

Climate change is rapidly transforming the world and its consequences in terms of environmental change, natural hazards, water shortage, etc. are threatening people's lives and livelihoods forcing many to migrate temporarily or permanently. To address this risk and draw attention to the challenges it poses to both national governments and the international community, reporters, politicians, and policy makers have coined the terms "climate refugees" and "climate migration." The prospects of people fleeing their homes because of climate change bring ammunition to the current controversy about refugeeism and migration and have become a contested political topic that creates strife between nations and divides their populations. Some warn that by generating a new population flow from the Global South to the Global North climate change represents a security threat to the world order. Others claim that as the main victims of the environmental change and natural disasters that climate change causes climate migrants should have the right to asylum in the countries that contribute most to it (Ayeb-Karlsson, Baldwin & Kniveton 2022; Bettini 2013; Boas et al. 2019; Burman 2017).

The issue has also sparked debates within the scholarly community about the nature and extension of migration induced by climate change (Black et al. 2011; Entwisle et al. 2020; McLeman et al. 2021; Piguet 2022). An implicit assumption in many of these studies is that migration is the last option people have when all other possibilities of coping with climate change are exhausted. From this perspective, migration is synonymous with uprooting and an irreversible break with people's lifestyle. Some scholars, however, take issue with this view arguing that migration may serve as a means of adapting to rather than fleeing from climate change (Klaiber 2014; McLeman & Smit 2006). In the words of Bettini: "The focus on forced migration (as for climate refugees) has given way to the idea that migration can also represent an adaptation strategy" (2014: 1). Supporting this viewpoint, Gemenne and Blocker argue: "Migration is not necessarily a strategy of last resort" and add that it "is often a voluntary decision taken as part of longer-term strategies aimed at building capacities to confront unfavourable conditions" (2017: 340). In other words, rather than understanding migration as a last, desperate move in response to climate change we may see it as a planned, preventive action that enables people to adjust their lives and livelihoods to the transformation their environment and lifeworld are undergoing. Scholars have even argued that when climate-induced migration occurs, it is mostly related to sudden-onset environmental change and, even so, often temporary. According to Tacoli: "research on contexts that offer similarities with the predicted impacts of climate change suggests that environmental degradation does not inevitably result in migration. Where it does, it is likely that movement is predominantly short term, as in the case of extreme weather events and natural disasters, and short distance, as in the case of drought and land degradation" (2009: 519). In other words, climate-induced migration is not only temporary but also local.

The question, then, is not whether migration is synonymous with failed adaptation but whether migration is necessary for it to succeed. To document how this happens, a scrutiny of people's migration histories and patterns as well as of the networks they make use of to migrate is required. How long does migration go back in time? Who have spearheaded it, who do they pull, and what are the relations between those who leave and those who stay? What are the destinations of migration and which resources are needed to get there? What assets do migrants attain and how do their families and home community benefit from them? Do people migrate permanently, temporarily, or seasonally, and who return and for how long?

AIM AND ARGUMENT

As the body of literature on climate migration grows, it becomes evident that the phenomenon covers a host of scenarios ranging from people fleeing natural disasters such as droughts, storms, floods, GLOFs (Glacier Lake Outburst Floods), etc. to migration driven by environmental degradation in the form of desertification, water depletion, changing biodiversity, etc. (Hoffmann et. al. 2021; Kaczan & Orgill-Meyer 2020). While it may be possible to attribute migration to sudden-onset climate change, it is far more complicated to document migration that happens in response to slow-onset climate change, which have led many scholars to call for caution when trying to establish a direct link between climate change and population movements (Baldwin & Fonalé 2017; Bardsley & Hugo 2010). Moreover, climate migration can take many forms. In some situations, climate change may trigger international migration, but there is growing evidence that it is predominantly local and regional (Black & Collyer 2014; Cundill et al. 2021; Fussell et. al. 2014) and driven by those who can afford the cost of traveling and who have the networks and resources to establish themselves and find work in new locations (Gray & Wise 2016; Hoffman et al. 2020; Kaczan & Orgill-Meyer 2020; Tacoli 2009).

Research also finds that climate adaptation is a costly and complex enterprise that few people have planned for and many rather would have been without (Black et al. 2011; Paerregaard 2018). Thus, climate adaptation often implies extensive measures such as a change of livelihoods, the management of scarce resources, and the introduction of new technologies demanding expertise and capital which are assets many lack. In a similar vein, scholars report that rather than making people come together to find common solutions, climate change causes strives and divisions within rural communities (Jurt

et al. 2015; Schnegg et al. 2021). While some members attribute the degradation of their environment to global warming, others are unfamiliar with the scientific discourse of climate change which they explain as an act of God or other nonhuman powers, or as the effect of their own activities (Paerregaard 2020). Moreover, people who question global climate change tend to belong the more marginal and less educated population groups with fewer means of adapting to its impact (Brügger et al. 2021). Conversely, those who recognize climate change as real often command more resources to adapt to its impact. One of these resources is migration.

The paper's aim is to examine migration practices in two Peruvian highland communities as these are impacted by global climate change and to use the insights of this exploration to assess the applicability of the concept of "adaptive migration" to study climate-induced migration. The paper argues that the concept of "adaptive migration" is tautologic given that physical mobility always implies an effort to adapt in both the sending and receiving end of the migration chain. When people migrate, their absence affects the remaining families and households that either experience an alleviation in demand for resources (in case migrants are minors or seniors) or a labor shortage (in case migrants are adults). Equally, in the receiving context migrants must adapt to new environments to find a place to live, get a job, and socialize with people with another social and cultural background. In short, adaptation is an inherent aspect of migration which undercuts the conceptual meaning of "adaptive migration." However, I also argue that scholars supporting the idea of migration as a way of adapting to climate change make an important point by bringing to the fore the importance of migrants as adaptative agents. To draw our attention to their contribution to climate adaptation in their home communities I suggest we label their mobility "migratory adaptation."

The paper reviews data from long-term fieldwork in the two communities where the author has conducted structured surveys asking household members about their livelihoods, climate perceptions, and measures to adapt to climate change and unstructured interviews with a selected group of villagers asking them about their migration history, community participation, and vision of the community's future. The paper is structured in three sections. In the first section I discuss the environmental and political context in which climate-induced migration develops in Peru. In the second I explore the climate-migration nexus in two highland communities. The section has three parts: one examining agriculture, the second water management, and the third migration. In the third section I present two case studies that exemplify how the migration-climate nexus works in the two communities. In the conclusion I sum up the paper's empirical findings and discuss their implications for the use and relevance of "adaptive migration."

CLIMATE-INDUCED MIGRATION IN PERU

The Andes offers an interesting case to examine how migration encourages climate adaptation. As one of the most densely inhabited mountain regions in the world, it is extremely sensitive to global warming that causes glacier melt, floodings, and water scarcity and leads to environmental degragation, social conflicts, and depopulation (IOM 2021). Peru alone contains 71 percent of the world's tropical glaciers and, together with rain and ground water, these constitute its principal fresh water supplies. According to Peru's Ministry of Environment (Ministerio de Ambiente 2015), the country has already lost 22% of its glaciers and 12% of its freshwater volume (INAIGEM 2017). As the glaciers recede, Peru faces a major water crisis (Bury et al. 2011; Mark et al. 2017). The vulnerability of the Peruvian Andes is especially worrying because meltwater from its glaciers supplies not only Andean people (Paerregaard 2023) but also the country's mining and agricultural industry and major cities with fresh water (Li 2015; Rangecroft et al. 2013; Vergara et al. 2007).

The country, on the other hand, has a long migration history. For centuries people from Europe, Africa, and Asia traveled and settled in Peru either voluntarily or involuntarily and in the 20th century the country experienced a massive rural-urban migration from the highlands to the coastal cities (Paerregaard 1997). Much of this migration has been driven by a desire by Peru's rural indigenous population to achieve social mobility and gain access to health and education and other social services. As a result, 78 percent of Peru's population of 33 million now live in cities of which the biggest are situated on the coast (INEI 2017). But Peruvians do not only migrate within the country. In the past four decades, more than three million Peruvians have left the country in the search for new life opportunities (Paerregaard 2008, 2015). Against this backdrop the paper's research questions are: how does climate change affect the lives and livelihoods of Peru's highland communities, how do these adapt to its environmental impact, and what role does migration play in their effort to cope with climate change?

To answer these questions the paper investigates migration as one of a variety of adaptation possibilities that Andean communities face when coping with climate change. As Kaczan and Orgill-Meyer conclude from their review of the literature on climate-induced migration: "migration is just one of the many coping strategies that households can employ to mitigate the effects of climate change. Other mitigation strategies may include switching to low-risk crops, purchasing insurance, changing livelihoods to depend less on climate-related factors, and investing in technologies that lessen the negative effects of weather shocks (for example, irrigation). It is important to understand how migration fits into a larger

pool of coping strategies" (Kaczan & Orgill-Meyer 2020: 297). Accordingly, this paper focuses on three coping strategies: water governance, crop shifts, and migration, which all are critical to the ability of Andean communities to adapt to climate change. My suggestion is that the three strategies are complementary insofar as in dry and semi-dry areas like Peru's southwestern highlands crop shifts demand a change in water management just as both the former and the latter have implications for the way people move. On the other hand, migration is often the factor that triggers a transformation in agricultural traditions and irrigation systems. While this supports the claim that migration serves as means of adapting to climatic and environmental change, the paper shows that Andean communities have migrated for decades, and that their mobility has made them adept to adapt to unforeseen circumstances in not only their new places of settlement but also their home communities.

In Peru, migration has been an important way of adapting not only to environmental change but also to social and political change for decades (Altamirano 2010, 2014). The land reform of 1969 accelerated rural-urban migration inciting the country's indigenous population to move to and seek social mobility in the country's cities (Seligmann 1995). Some migrants turned the back to their places of origin, but many engaged in a dual process of adaptation, one adopting a modern lifestyle and assimilating to the urban environment and another redefining their relations with the families they had left behind and reaffirming their affinity to their home communities (Alber 1999; Degregori & Golte 1973; Fuenzalida 1968).

Even though melting glaciers, shrinking water supplies, and changing microclimates have become critical push factors in Peru's rural-urban exodus, this is still driven by such pull factors as better health and educational services and the aspiration to move up the social ladder. As in other rural communities in the Global South, it is therefore difficult to separate climate change from other migration drivers (Baldwin & Fornalé 2017; Black et al. 2011; Gemenne & Blocher 2017). But which are the households that not only have the resources to migrate but also use their migration experience to adapt to the climatic and environmental changes of their communities? And what coping strategies do they draw on to accomplish their aims? In the following I answer these questions by examining the migration history of and climate change impact in two Peruvian highlands communities.

TWO HIGHLAND COMMUNITIES

Tapay and Cabanaconde lie in the region of Arequipa in Peru's southwestern highlands. Located on opposite banks of the Colca River, the northern and southern side respectively, Tapay stretched from 2,250 to 5,400 m and Cabanaconde from 2,200 and 6,000 m. Their livelihoods are agriculture, fruit-growing, and animal husbandry with trade and labor migration as secondary sources of income. Some villagers also make money by lodging and servicing the constant flow of national and international tourists who visit the communities. Rain only falls between December and April and can be irregular which makes water a scarce good and irrigation necessary to cultivate the land and grow fruit. Up to recently the communities' irrigation systems were entirely fed by meltwater from nearby ice- and snow-capped mountains. Tapay still relies on the meltwater, but Cabanaconde now receives water from a state-built channel. Both communities store the water in reservoirs overnight and transport it to the fields via human-made canals during the day. To manage the water, the water users of the communities' irrigation clusters appoint their own irrigation committees and water allocators.

Due to the retreat of the region's glaciers and snow capes and several years of drought and irregular precipitation, the water supplies of Tapay's and Cabanaconde's mountains have decreased in the past two decades. At the same time, the villagers complain that it's getting hotter in daytime and that there're more nights with frost which damage their crops and harm their animals. When asked what is causing the deterioration of the environment, many say "climate change," but only a few explain this as a global phenomenon. Rather than attributing the rising temperatures and the shrinking water supplies to the agency of people in other parts of Peru or the world, the majority point to themselves and their newly acquired modern lifestyle as the cause of the deteriorating environment (Paerregaard 2018). And when asked for solutions to the problem, many villagers suggest measures to mitigate their own contribution to global warming, e.g., by stopping the tree and trash burning, the use of modern chemicals, and the burning of fireworks. In contrast, only a minority proposes measures to adapt to climate change; e.g., by protecting their watersheds, modernizing their sewage infrastructure, improving their drinking water systems and waste and recycling managements; or to strengthen the community's sustainability, e.g., by introducing differentiated water tariffs so that private homes pay less than tourist hotels or changing crops and fruit trees and adjusting the water managements to meet the demand of new production practices (ibid.). Indeed, even though climate adaptation is imperative for the communities' future, its implementation implies difficult and conflictive choices.

Agriculture, fruit growing, and husbandry are activities embedded in communal traditions and cultural rituals and geared toward household consumption. Many villagers therefore oppose changes in the communities' planting and harvesting calendars and irrigation schemes and routines which they fear will undermine their livelihoods and economic security. Moreover, some

of the new crops and fruit trees that the villagers are likely to introduce to adapt to climate change require start capital, which most of them lack, and are directed toward the market, which will further their integration in the regional and national world and accelerate their physical mobility. More bluntly, migration and adaptation are two sides of the same coin. Before unraveling their nexus, a presentation of the communities' agricultural production and water management is pertinent.

AGRICULTURE

Asking the villagers of Cabanaconde about their favorite crop, many say corn. To their regret, however, it is threatened by climate change. For several years the villagers have reported that worms eat the corncobs and bugs destroy the corn husk. Many attribute the appearance of these intruders to rising temperatures. Similarly, they say that there are more birds eating their crops. Others complain that the sun burns more than it used to and that their crops therefore need more water. Even so, Cabanaconde is better off than Tapay and other Colca communities. Until 1983 it entirely relied on the mountains' meltwater but when the Peruvian state finished the construction of a channel that runs from the highlands through the Colca communities situated on the southern bank of the Colca river to the coast, Cabanaconde was granted access to its water (Paerregaard et al. 2020). The channel has doubled the community's water discharge enabling it to extend its irrigated land-base significantly (Gelles 2000). But while accessing new water sources alleviated the pressure on land and made it possible to enhance the production of corn, this is now endangered by the changing microclimate.

In Tapay, corn also constitutes the villagers' principal crop and, as in Cabanaconde, rising temperatures and the worms and bugs that come with them threaten its production. But, unlike Cabanaconde, Tapay has seen its water supply steadily shrinking in the past decades. Situated on the northern bank of the Colca river, the community does not receive water from the state channel, and today the villagers only irrigate and cultivate one third of its land-base. Nonetheless, because of its milder climate fruit growing which requires less water than the cultivation of crops such as corn is widespread in Tapay. The fruit trees provide the villagers with apples, pears, and peaches which they traditionally have used to barter locally for items they are short of. Because the community has failed to renew the trees, however, the production of fruit is declining. Also, the growing use of money in the region has eroded its value as a bartering object.

Some villagers supplement agriculture and fruit growing with the sale of dried cochineal, a louse that lives on a cactus which thrives on the dry slopes above Tapay's settlements. Called *botaderos* these areas were up to recently used to graze the community's animals during the rainy season. Pointing to the prospect of planting avocado trees on the *botaderos*, the villagers now plan to change to cash production directed toward the national (and international) market like the production of cochineal but less vulnerable to volatility of the demand. If irrigated regularly, the villagers explain, the *botaderos* would be suitable for producing avocados on a large scale. Such a shift, nonetheless, requires investments in new trees and, water, two assets Tapay lacks. But there is hope. A goldmine operating within its territory is currently building a channel from a nearby river, which is expected to double the community's water discharge, as happened in Cabanaconde in 1983.

In sum, both communities face painful trade-offs (seeking help from the state and other external agents with the changes it implies or maintaining their autonomy while their water supplies diminish) and limitations (adjusting their agriculture and fruit growing to the changing climate or facing a steady declining production) in the effort to adapt to climate change. Cabanaconde solved its water crisis forty years ago but must now rethink its agricultural production because of the changing microclimate. Tapay, on the other hand, has made plans how to adapt its fruit production to climate change but the community is still waiting for more water to implement them. Yet, as Cabanaconde shows, even if Tapay gains access to new water sources, the introduction of new crops and fruits requires a reorganization of its water management, which today is organized to secure the production of corn – a crop of not only economic but also cultural value to the villagers.

WATER MANAGEMENT

Starting with Tapay, the most common water management method is *corte* which means allocating water uphill from the lowest to the highest located fields. The method is used in Tapay's largest irrigation clusters that are fed by offtakes from rivers or take water from the big reservoirs. The *brinco* method, on the other hand, means that the individual water users call on the allocator to allocate water to all their fields in a single round. It is primarily used in Tapay's smaller irrigation cluster. To determine the irrigation schedule of the *brinco* method, the allocator makes a list of water users within the irrigation cluster that have requested water. The governing principle is that the water user who sows his/her crop first is entitled to receive water first. In the past decades the *brinco* method has gained ground as more villagers are shifting from traditional crops such as corn to vegetables and commercial products such as avocado that need irrigation with different intervals and in different time periods.

Cabanaconde used to irrigate in the same manner as the *corte* method but in reverse direction. Its largest irrigation cluster called La Campiña was divided into two moieties called Hanansaya and Urinsaya that each elected their own water allocators. Starting upstream, the two allocators engaged in a fierce competition moving

downstream to finish the allocation of water in their moiety first, a showdown that was repeated in the four irrigation rounds (Gelles 2000; Paerregaard 1992). Older villagers recount that the competition served as a means of saving water and ensure that everybody including those having fields downstream received an equal share. Nevertheless, they also recall that people fought over the smallest drop of water. Indeed, many say that water allocator, a duty all males had to assume once in their lives, was the most onerous office they ever had occupied in Cabanaconde (Gelles 2000). Similarly, they relate that during the rainy season from January to March when the villagers were free to take water from the canals and irrigate their fields, disputes over water were very common, particularly in years with little or no rain.

In 1997 the water users of La Campiña replaced the communal water management model with a state water governance model (Gelles 2000). A locally elected water committee administers the new system selling tickets to the villagers that authorizes them to claim water from the allocators. Also, while the village authorities previously appointed the allocators, the water committee now hires them. A similar model has been introduced in the irrigation clusters that take water from the state-built channel. Moreover, in contrast to the old dual model that was based on a principle of competition and that followed Cabanaconde's traditional dual classification, in the new system the allocators distribute water sequentially, that is from one plot to the next, using what is known as the *de canto* method starting upstream.

But even though Cabanaconde replaced its own community model with a state model in 1997, its water management continues to follow its traditional irrigation scheme crafted to irrigate the villagers' favorite crop (Paerregaard 2019). Accordingly, the water users are allocated water once a month from the planting of corn in September to the early rain in late December. Only in years of drought when the rain fails between January and April do the water allocators depart from the established irrigation scheme distributing water according to the water users' individual demands in return for a payment in money. Even so, the allocators always employ the *de canto* method, which leaves the water users waiting for their turn as the allocator distributes water from the highest to the lowest located fields, rather than the *brinco* method, as Tapay practices, which allows the water allocator to direct water to the several fields of the same water user and which arguably would meet the needs of different crops more effectively.

Another caveat related to Cabanaconde's (as well as Tapay's) water management is the use of surface watering; that is, irrigation by flooding the field and distributing water over the soil surface by gravity, which leads to the waste of water as this either evaporates in the sun (when irrigating at daytime) or spills over the fields flooding pathways, streets, and roads. A more efficient method is drip irrigation, which implies dripping water onto the soil from a system of plastic pipes fitted with outlets. Surface drip irrigation offers an even better way of saving water. It reduces soil water evaporation losses by applying water directly inside the ground instead of on the surface. Both methods, however, require investment capital and knowledge how to apply them – assets of high demand in Cabanaconde (and Tapay).

A shift in agricultural production and water management, then, is a both critical and contested step in climate adaptation. But how is such shift linked to migration, and how does migration facilitate its implementation? Before answering these questions, I offer a brief introduction to the communities' migration histories.

MIGRATION

From Peru's independence in 1821 and up to the mid 20th century both communities grew steadily but in the second half of the century their population growths peaked, first in Tapay and later in Cabanaconde (Cook 1981; INEI 2017; Paerregaard 1997). As a result, Tapay's population shrunk 72% between 1940 and 2017 and Cabanaconde's 33% between 1981 and 2017 leading to a change in the age profile with a decreasing number of minors under 15 and a growing number of seniors over 65 (INEI 2017). In the same period, out-migration drained the population of both communities which now have large migrant colonies in Peru's major cities and Cabanaconde also in Washington, DC (Paerregaard 2017).

Quite a few migrants pay regular visits to the communities particularly when these celebrate their annual fiestas. The sponsorships of these events, which in Tapay amount to 20,000 US$ and in Cabanaconde often pass 100,000 US$, are voluntary and predominantly financed by wealthy migrants. Driven by a desire to demonstrate their loyalty to the communities these represent a tiny section of the migrant populations. Not only do they command the capital to sponsor the fiesta, but they are also able to mobilize support groups to assist them organizing the event and accompanying them during the five days it lasts (Paerregaard 2015). In the case of Cabanaconde, the sponsors belong to a privileged group of migrants who have been granted stay permit or citizenship in the US which allows them to travel back and forth between Washington and Peru legally. The sponsorships, which even for the most successful migrants cost many years of hard-earned dollars, are viewed as a yardstick in the endeavor to achieve social mobility in the receiving society (Paerregaard 2010). Once their aim has been accomplished, many of the sponsors never return to Cabanaconde again.

But even though the communities' fiestas reveal a divide between the villagers and the migrants, these do not constitute two distinct population groups. Up through the second half of the 20th century, return

migration to both Tapay and Cabanaconde was extensive and today, the bulk of the communities' members are former migrants who after several years in Peru's cities have decided to re-settle and resume their previous lives in the communities. Among Tapay's and Cabanaconde's returning migrants a small group draw on their migration experience and the assets it has yielded to invest in and implement climate adaptation initiatives in the communities.

In the following I present two cases showing how migrants make plans to introduce new crops and invest their savings in new livelihoods. The cases encompass two families that have returned. Both families have been accompanied by a son who also has spent several years outside Tapay and Cabanaconde. The families' remaining children who all are women live in Peru's cities. The cases shed light on three aspects of adaptive migration. The first regards the resources returning migrants draw on to innovate the communities' agricultural production and water management. The second concerns the role external agents play in returning migrants' effort to introduce adaptive initiatives. The third deals with the gender and generational relations that shape adaptive migration.

EXEMPLIFYING THE MIGRATION-ADAPTATION NEXUS

CASE 1

Case 1 is a family in Tapay including M., 67 years, and R., 70 years. Both have spent several years of their youth outside the community studying and working. After they met and got married, the couple returned to Tapay where they had two children, a daughter, and a son. When these had reached school age the couple migrated again, this time to Lima where they lived ten years. Once the children had graduated from school, M. and R. went back to Tapay together with the grown-up son, RN., to take care of their ageing parents. To make a living they cultivate the land they have inherited as well as the land their siblings living in Peru's cities have left with them. The family's economy is based on the cultivation of a variety of crops and fruits which meet their daily needs and occasional incomes from the sale of cochineal and the lodging of tourists.

M. and R. have enough land to provide for themselves but worry that Tapay's water resources may dry up leaving them without water to irrigate the fields and orchards. They say that their money incomes also are unreliable, pointing to the plunging of the sale of cochineal two decades ago and the Corona pandemic which crippled the tourist industry three years ago. The prospects of a declining production and failing cash revenues have forced the family to rethink its livelihoods. Meanwhile, due to need for medical treatment, R. has returned to Lima where she currently is living with the daughter and her family. During her absence M. and RN. are planning to replace the cultivation of corn, fruit, and other traditional crops with the production of avocados. The plan relies on two assets: water to irrigate the new avocado trees and money to buy them, which the family hopes the mining company will help them acquire. When the company started to operate in Tapay, M. opposed it out of feared that it would pollute the community's water supply. However, when he learned that the company is building a channel to supply the community with water, he changed his mind and today he supports it. M. says: "The channel will enable us to irrigate the *botaderos* and if we plant avocado trees on them, we will have a safe money income. There's a big market for avocados in Peru and in other countries." He predicts that more villagers will follow his dreams of profiting from the channel to cultivate and sell avocados and that the opportunity this creates will trigger a wave of returning migrants.

To make an income RN., who is 35, has taken work in the gold mine, which is located at 5,200 m above Tapay's main settlement and which has hired more than 150 villagers and migrants from the community. The employees work in shifts spending two weeks in the mine and resting ten days at home either in Arequipa or, as RN., with his family in Tapay. As a single, RN. is cable of saving most of his earnings, which he plans to invest in avocado trees in Tapay. He says: "When the channel opens, I'll go back to my parents' place and use my savings to plant avocado trees. I may also use some of the money to renovate their tourist compound." Thus, while Mauricio uses the waiting time until the water arrives to prepare the *botaderos* and clean the fields, Ronald saves investment capital. In this way, by working together, the father and son will be able to introduce some of the adaptive measures the community needs to take to cope with climate change.

CASE 2

The second case is a family in Cabanaconde that includes J., 63, and F., 62. When J. was young, he served his military service in Arequipa. He also spent a couple of years working in the city before he returned to Cabanaconde. F. too spent some time in Arequipa studying and working. The couple, who met and got married in Cabanaconde, has two daughters and one son. After finishing school, the children all moved to Arequipa where the daughters today live with their spouses and children. After several years working in Arequipa the son, J.P., on the other hand, returned to Cabanaconde where he established a family. J. and F. make a living cultivating the land they have inherited cultivating corn and other traditional crops. J. also uses the land to raise bulls which he buys young and sell once they have been fed. He has spent the money he makes on bulls to buy more land where he cultivates lucerne (*alfalfa*) which serves as fodder for

his animals. J. remembers the time when Cabanaconde's only water source were the ice caps of the community's mountains and when all its land was used to grow corn and other crops aimed for household consumption. He says: "I started to raise bulls after we began to receive water from the state channel. Before we always lacked water and could barely survive."

But even though Cabanaconde's new water source has enabled him to generate new incomes, J. finds the temperature extremes and the changing microclimate troubling. To adapt to these changes, he says, the villagers must reinvent their agricultural traditions and reform Cabanaconde's water management. Rotating existing crops and introducing new ones that resist climate change and can be sold on the market is essential to this shift, he points out. And to do this, J. adds, the community must improve the water management by adopting modern irrigation technologies and adapting the water allocation to the needs of new crops.

J.P., who is 43, is also planning to change livelihood. To provide for his wife and four children he cultivates the lot the community has assigned to him but to generate new incomes, he needs capital and to make this he decided to emigrate. In 2008, J.P. travelled to northeastern Spain on a contract to work in the country's agriculture. After two years, however, he returned home. J.P. says: "My children could no longer recognize me so I changed plans." But even though J.P. didn't complete the work contract, he managed to save 8,000 US$. He also learned how modern irrigation technologies and methods can improve the management of water.

In Cabanaconde, J.P. bought a used tractor which he rents to other villagers. The business has provided him with a stable income but as the number of tractor owners in Cabanaconde grows and competition gets fiercer, J.P. is reconsidering his options. He says: "The business covers our monthly expenditures. But it's not the answer to our problems." Instead, he plans to sell the tractor and use the money from the sale to invest in news crops such as potatoes, peas, barley, wheat, and beans that are more resistant to temperature extremes and that require less water than corn. He also plans to raise bulls like his father. To do this, however, he needs not only capital but also land and water to plant lucerne to feed animals. Inspired by his father's struggle to reorganize the community's water management J.P. says: "To change agriculture we must reorganize water management and make it more efficient, but Cabanaconde is not ready for that yet."

As in the case of M. and RN., the migration experience has encouraged J. and J.P. to introduce new ideas and methods to reinvent Cabanaconde's traditional livelihoods. Likewise, generational cooperation has proven important for the initiatives they take to prepare the community for climate adaptation. But even though the state-built channel has paved the way for this change, J. and J.P. must struggle to implement it.

CONCLUSION

The two case studies suggest that returning migrants can make an important contribution to climate adaptation by introducing new crops, improving the management and the use of natural resources such as water, and reinventing traditional livelihoods. They also show that while returning migrants may serve as flagships in promoting such initiatives, it requires not only knowledge and capital but also enterprise and persuasion to put them into effect. Furthermore, to acquire the assets required to achieve their goals, returning migrants rely on the contribution that external agents make to the communities' adaptative capacities and on the jobs that these offer to save capital. In the absence of such opportunities the cases show that returning migrants may even have to re-migrate for a limited period to attain the assets they lack. Lastly, the two cases bring to the fore the critical role gender and generational relations play in returning migrants' endeavor to prepare their communities for climate adaptation. Importantly, they show that while the families which promote the changes needed to adapt include males as well as females, the former tend to take the lead in implementing them oftentimes across generational relations.

The case studies demonstrate that in Peru's climate vulnerable communities, migration is far from new, as the notion of "adaptive migration" implies. On the contrary, their members are often returning migrants with extensive migration histories. Equally, they suggest that migrants have played an active role as economic, social, and cultural brokers in the communities long before these began to respond to climate change. Moreover, they reveal that migrants' engagement in their home communities comprises a range of activities including initiatives to adapt to climate change by for example introducing new crops and reforming water management. Lastly, the case studies show that migration involves a continuous effort to adapt and re-adapt, not only by migrants in their new places of settlement but also by the relatives they leave behind and those migrants who eventually return. In short, adaptation is inextricably related to migration which makes the term "adaptive migration" redundant.

Overall, the paper points to a link between migration and adaptation indicating that the prospects of making money and gaining new knowledge are crucial for the decision people living in climate vulnerable places make to migrate and use the assets they acquire outside their communities to return and adapt to climatic and environmental change. Hence, rather than viewing migration as failed adaptation, we should see it as a remedy to cope with climate change as proposed by the scholars who question the popular image of climate refugees. While supporting this argument,

however, the case studies also show that the migration-adaptation nexus is more complex than the literature suggests. Thus, in some places returning migrants who introduce new knowedge and implement changes in the agricultural practices and irrigation routines of their home communities meet resistance by other villagers and depend on external support.

Still, scholars pointing to migration as a way of adapting to climate change make an important contribution to the study of climate-induced migration by underscoring migrants' role in climate adaptation and correcting their image as refugees who threaten global security. Climate adaptation entails hard choices and creates divides within communities. Highlighting migrants as innovators in the struggle to strengthen the sustainability of vulnerable communities and bridge builders to urge their members to change lifestyle and create new livelihoods is pivotal to our understanding of how the world adapts to climate change. Scholars should acknowledge the unique role of these migrants by labelling their movements and agency "migratory adaptation" rather than "adaptive migration."

FUNDING INFORMATION

The research has been supported by the Danish Research Council (FKK 09-069200) and the Swedish Research Council (VR 2021-02163).

COMPETING INTERESTS

The author has no competing interests to declare.

AUTHOR AFFILIATIONS

Karsten Paerregaard orcid.org/0000-0002-0973-2238
Professor Emeritus, School of Global Studies, University of Gothenburg, Sweden

REFERENCES

Altamirano Rua, T. 2010. *In times of crisis. Migration, remittances, and development*. Lima: Pontificia Universidad Católica del Perú.

Altamirano Rua, T. 2014. *Refugiados ambientales. Cambio climático y migración forzada*. Lima: Pontificia Universidad Católica del Perú. DOI: https://doi.org/10.18800/9786124146541

Alber, E. 1999. *Migración o movilidad en Huayopampa? Nuevos temas y tendencias en la discusión sobre la comunidad campesina en los Andes*. Lima: Instituto de Estudios Peruanos.

Ayeb-Karlsson, S, Baldwin, AW and **Kniveton, D.** 2022. Who is the climate-trapped figure? *WIRE's Climate Change*, 13(e803): 1–24. DOI: https://doi.org/10.1002/wcc.803

Baldwin, A and **Fornalé, E.** 2017. Adaptive migration: pluralising the debate on climate change and migration. *The Geographical Journal*, 183(4): 322–328. DOI: https://doi.org/10.1111/geoj.12242

Bardsley, D and **Hugo, GJ.** 2010. Migration and climate change: examining thresholds of change to guide effective adaptation decisions-making. *Population and Environment*, 32: 238–262. DOI: https://doi.org/10.1007/s11111-010-0126-9

Bettini, G. 2013. Climate barbarians at the gate? a critique of apocalyptic narratives on "climate refugees." *Geoforum*, 45: 63–72. DOI: https://doi.org/10.1016/j.geoforum.2012.09.009

Bettini, G. 2014. Climate migration as an adaption strategy: De-securitizing climate-induced migration or making the unruly governable? *Critical Studies on Secutiry*, 2(2): 180–195. DOI: https://doi.org/10.1080/21624887.2014.909225

Black, R, Adger, WN, Arnell, W, Dercon, S, Geddes, A and **Thomas, D.** 2011. The effect of environmental change on human migration. *Global Environmental Change*, 21: 3–11. DOI: https://doi.org/10.1016/j.gloenvcha.2011.10.001

Black, R and **Collyer, M.** 2014. Populations 'trapped' at times of crisis. *Forced Migration Review*, 45: 52–56. https://www.fmreview.org/crisis/black-collyer.

Boas, I, Farbotko, C, Adams, H, Sterly, H, Bush, S, van der Geest, K, Wiegel, H, Ashraf, H, Baldwin, A, Bettini, G, Blondin, S, de Bruijn, M, Durand-Delacre, D, Fröhlich, C, Gioli, G, Guaita, L, Hut, E, Jarawura, FX, Lamers, M, Lietaer, S, Nash, SL, Piguet, E, Rothe, D, Sakdapolrak, P, Nash, SL, Rothe, D, Sakdapolrak, P, Smith, L, Furlong, BT, Turhan, E, Warner, J, Zickgraf, C, Black, R and **Hulme, M.** 2019. Climate migration myths. *Nature Climate Change*, 9: 901–903. DOI: https://doi.org/10.1038/s41558-019-0633-3

Brügger, A, Tobias, R and **Monge-Rodríguez, F.** 2021. Public perceptions of climate change in the Peruvian Andes. *Sustainability*, 13(3): 26–77. DOI: https://doi.org/10.3390/su13052677

Burman, A. 2017. The political ontology of climate change: Moral meteorology, climate justice, and the coloniality of reality in the Bolivian Andes. *Journal of Political Ecology*, 24(1): 921–938. DOI: https://doi.org/10.2458/v24i1.20974

Bury, J, Mark, B, McKenzie, J, French, A, Baraer, M, In Huh, K, Zapata, MA and **Gómez, LRJ.** 2011. Glacier recession and human vulnerability in the Yanamarey watershed of the Cordillera Blanca, Peru. *Climatic Change*, 105(1–2): 179–206. DOI: https://doi.org/10.1007/s10584-010-9870-1

Cook, DN. 1981. *Demographic collapse. Indian Peru, 1520–1620*. Cambridge: Cambridge University Press. DOI: https://doi.org/10.1017/CBO9780511572715

Cundill, G, Singh, C, Adger, WN, Safra de Campos, R, Vincent, K, Tebboth, M and **Maharjan, A.** 2021. Toward

a climate mobilities research agenda: Intersectionality, immobility, and policy responses. *Global Environmental Change*, 69: 102315. DOI: https://doi.org/10.1016/j.gloenvcha.2021.102315

Degregori, C and **Golte, J.** 1973. *Dependencia y desintegración estructural en la comunidad de Pacaraos*. Lima: Instituto de Estudios Peruanos.

Entwisle, B, Verdery, A and **Williams, N.** 2020. Climate change and migration: New insights from a dynamic model of out-migration and return migration. *American Journal of Sociology*, 125(6): 1469–512. DOI: https://doi.org/10.1086/709463

Fuenzalida, F. 1968. *Estructuras tradicionales y economía de mercado*. Lima: Instituto de Estudios Peruanos.

Fussell, E, Verdery, LM and **Williams, N.** 2014. Measuring the environmental dimensions of human migration: The demographer's toolkit. *Global Environmental Change*, 28(2014): 182–191. DOI: https://doi.org/10.1016/j.gloenvcha.2014.07.001

Gelles, P. 2000. *Water and power in highland Peru. The cultural politics of irrigation and development*. New Brunswick: Rutgers University Press.

Gemenne, F and **Blocher, J.** 2017. How can migration serve adaptation to climate change? Challenges to fleshing out a policy ideal. *The Geographical Journal*, 183(4): 336–347. DOI: https://doi.org/10.1111/geoj.12205

Gray, C and **Wise, E.** 2016. Country-specific effects of climate variability on human migration. *Climatic Change*, 135: 555–568. DOI: https://doi.org/10.1007/s10584-015-1592-y

Hoffmann, R, Dimitrova, A, Muttarak, R, Crespo Cuaresma, J and **Peisker, J.** 2020. A meta-analysis of country-level studies on environmental change and migration. *Nat. Clim. Change*, 10: 904–912. DOI: https://doi.org/10.1038/s41558-020-0898-6

Hoffmann, R, Sedová, B and **Vinke, K.** 2021. Improving the evidence base: A methodological review of the quantitative climate migration literature. *Global Environmental Change*, 71: 102367. DOI: https://doi.org/10.1016/j.gloenvcha.2021.102367

INAIGEM (Instituto Nacional de Investigación en Glaciares y Ecosistemas de Montaña). 2017. *Informe de la situación de los glaciares y ecosistemas de montaña en el Perú*. Lima: INIAGEM, Dirección de Información y Gestión del Conocimiento.

IOM. 2021. *Assessing the evidence: Climate change and migration in Peru*. Geneva: International Organization for Migration.

INEI (Instituto de Estadística y Informática – Peru). 2017. *Censos nacionales 1993–2017*. Lima: Plataforma digital única del Estado Peruano.

Jurt, C, Burga, MD, Vicuna, L, Hüggel, C and **Orlove, B.** 2015. Local perceptions in climate change debates: Insights from case studies in the Alps and the Andes. *Climatic Change*, 133(3): 511–523. DOI: https://doi.org/10.1007/s10584-015-1529-5

Kaczan, DJ and **Orgill-Meyer, J.** 2020. The impact of climate change on migration: A synthesis of recent empirical insights. *Climatic Change*, 158(3): 281–300. DOI: https://doi.org/10.1007/s10584-019-02560-0

Klaiber, AH. 2014. Migration and household adaptation. A review of empirical research. *Energy Economics*, 46: 539–547. DOI: https://doi.org/10.1016/j.eneco.2014.04.001

Li, F. 2015. *Unearthing conflict. Corporate mining, activism, and expertise in Peru*. Durham: Duke University Press. DOI: https://doi.org/10.1515/9780822375869

Mark, BG, French, A, Baraer, M, Carey, M, Bury, J, Young, K, Polk, M, Wigmore, O, Lagos, P, Crumley, R, McKenzie, J and **Lautz, L.** 2017. Glacier loss and hydro-social risks in the Peruvian Andes. *Global and Planetary Change*, 159: 61–76. DOI: https://doi.org/10.1016/j.gloplacha.2017.10.003

McLeman, R and **Smit, B.** 2006. Migration as an adaptation to climate change. *Climatic Change*, 76(1): 31–53. DOI: https://doi.org/10.1007/s10584-005-9000-7

McLeman, R, Wrathall, D, Gilmore, E, Thornton, P, Adams, H and **Gemenne, F.** 2021. Conceptual framing to link a climate risk assessments and climate-migration scholarship. *Climatic Change*, 165: 24. DOI: https://doi.org/10.1007/s10584-021-03056-6

Ministerio de Ambiente. 2015. *Portal de cambio climático*. (http://cambioclimatico.minam.gob.pe/manejo-de-la-tierra-y-el-agua/manejo-del-agua/impactos-del-cc-sobre-el-agua).

Paerregaard, K. 1992. Complementarity and duality: Ecological, social, and ritual oppositions between agriculturalists and herders in an Andean village. *Ethnology*, 31(1): 15–26. DOI: https://doi.org/10.2307/3773439

Paerregaard, K. 1997. *Linking separate worlds: Urban migrants and rural lives in Peru*. Oxford: Berg Publishers.

Paerregaard, K. 2008. *Peruvians dispersed: A global ethnography of migration*. Lanham: Lexington Books.

Paerregaard, K. 2010. The show must go on. The role of fiestas in Andean transnational migration. *Latin American Perspectives*, 37(5): 50–66. DOI: https://doi.org/10.1177/0094582X10379105

Paerregaard, K. 2015. *Return to sender. The moral economy of remittances in Peruvian migration*. Berkeley: University of California Press. DOI: https://doi.org/10.1525/california/9780520284739.001.0001

Paerregaard, K. 2017. *Ayni* unbound. Cooperation, inequality, and migration in the Peruvian Andes. *Journal of Latin American and Caribbean Anthropology*, 22(3): 459–474. DOI: https://doi.org/10.1111/jlca.12285

Paerregaard, K. 2018. The Climate-development nexus: Using climate voices to prepare adaptation initiatives in the Peruvian Andes. *Climate and Development*, 10(4): 360–368. DOI: https://doi.org/10.1080/17565529.2017.1291400

Paerregaard, K. 2019. Liquid accountability. Water as a common, a public, and a private good in the Peruvian Andes. *Water Alternatives*, 12(3): 488–502.

Paerregaard, K. 2020. Communicating the inevitably. Climate awareness, climate discord, and climate research in Andean communities. *Environmental Communication*, 14(1): 112–125. DOI: https://doi.org/10.1080/17524032.2019.1626754

Paerregaard, K. 2023. *Andean meltdown: A climate ethnography of water, power, and culture in Peru*. Berkeley: University of California Press. DOI: https://doi.org/10.1525/9780520393936

Paerregaard, K, Ullberg, S and **Brandshaug, M.** 2020. Smooth flow? Hydrosocial communities, water governance, and infrastructural discord in the Peru's southern highlands. *Water International*, 45(3): 169–188. DOI: https://doi.org/10.1080/02508060.2020.1755538

Piguet, E. 2022. Linking climate change, environmental degradation, and migration: an update after 10 years. *WIRE's Climate Change*. DOI: https://doi.org/10.1002/wcc.746

Rangecroft, S, Harrison, S, Anderson, K, Magrath, J, Castel, AP and **Pacheco, P.** 2013. Climate change and water resources in arid mountains: An example from the Bolivian Andes. *Ambio*, 42(7): 852–863. DOI: https://doi.org/10.1007/s13280-013-0430-6

Schnegg, M, O'Brian, CI and **Sievert, IJ.** 2021. It's our fault: A global comparison of different ways of explaining climate change. *Human Ecology*, 49: 327–339. DOI: https://doi.org/10.1007/s10745-021-00229-w

Seligmann, L. 1995. *Between reform & revolution. Political struggles in the Peruvian Andes, 1969–1991*. Stanford: Stanford University Press. DOI: https://doi.org/10.1515/9781503615663

Tacoli, C. 2009. Crisis or adaptation? Migration and climate change in a context of high mobility. *Environment & Urbanization*, 21(2): 513–525. DOI: https://doi.org/10.1177/0956247809342182

Vergara, W, Deeb, A, Valencia, AM, Bradley, RS, Francou, B, Zarzar, A, Grunwaldt, AI and **Haeussling, SM.** 2007. Economic impacts of rapid glacier melt in the Andes. *EOS, Transactions, American Geophysical Union*, 88(25): 261–268. DOI: https://doi.org/10.1029/2007EO250001

TO CITE THIS ARTICLE:
Paerregaard, K. 2024. *Adaptive Migration:* Climate Change, Climate Migration, and Climate Adaptation in Peru's Highlands Communities. *Iberoamericana – Nordic Journal of Latin American and Caribbean Studies*, 53(1): 20–30. DOI: https://doi.org/10.16993/iberoamericana.617

Submitted: 29 August 2023 **Accepted:** 16 January 2024 **Published:** 18 March 2024