



Human Settlements Working Paper Series

Rural-Urban Interactions and Livelihood Strategies - 28

Not only climate change: mobility, vulnerability and socio-economic transformations in environmentally fragile areas of Bolivia, Senegal and Tanzania

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February 2011

Acknowledgements

This paper and the research on which it draws were prepared with financial support from the German Federal Ministry for Economic Cooperation and Development (BMZ). Additional funding was provided by the Swedish International Development Cooperation (Sida) and the Ministry of Foreign Affairs of Denmark (Danida). Technical support from the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) is also gratefully acknowledged. The opinions expressed in this paper are the sole responsibility of the author and do not necessarily reflect those of the funding agencies.

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ISBN: 978-1-84369-808-1

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Not only climate change: mobility, vulnerability and socio-economic transformations in environmentally fragile areas in Bolivia, Senegal and Tanzania

EXECUTIVE SUMMARY

Despite predictions of hundreds of millions of migrants forced to leave their homes and countries as a consequence of climate change, the current understanding of the links between mobility and environmental degradation linked to climate change is still inadequate. The relatively high levels of uncertainty on the locally-specific impacts of climate change, combined with limited data on migration, especially internal and temporary movements, make it difficult if not impossible to predict with any precision future mobility patterns, let alone their size and direction. Moreover, given the generally negative views of migration and migrants held by policy-makers, there is a concern that alarmist predictions will backfire and result in policies that marginalise the poorest and most vulnerable groups.

This paper argues that migration is better defined as an adaptive response to socio-economic, cultural, political and environmental transformations, in most instances closely linked to the need to diversify income sources and reduce dependence on natural resources. Drawing on case studies in Bolivia, Senegal and Tanzania, it describes how environmental change at the local level interacts with other factors to shape migration patterns, and how such patterns in turn affect the livelihoods and resilience of individuals, households and communities in areas experiencing the impacts of climate change in the form of desertification, soil degradation, disrupted rainfall patterns and changes in temperature.

Although these are typically described as slow-onset or gradual changes, in the worse-affected case study locations people identify 'precipitating events' (unusually harsh droughts, epidemics of livestock diseases, the unintended consequences of actions to reduce environmental pressures in neighbouring areas) having a long-term impact on natural resources and, perhaps more importantly, on local economies and livelihoods. Crucially, it is largely the socio-economic context that makes such events so catastrophic, by restricting people's ability to rely on well-tested strategies of local diversification of activities within the agricultural and the non-farm sector. As a result, while mobility has long been a traditional coping strategy for people living in fragile environments, it has become much more widespread and diverse. Indeed, it is now so important that in all the case study locations the most vulnerable households are unanimously identified as those who do not receive remittances from migrant relatives.

Non-environmental factors largely determine the duration, destination and composition of migrant flows. Seasonal mobility takes place during the agricultural slack season and is predominant in the poorest areas relying on rainfed agriculture. It is also in many cases essential for survival and food security. Seasonal movement is largely determined by the lack of local non-farm opportunities but also by the persistence of family farming as an essential element of livelihoods. It is also stimulated by the growing demand for wage labourers on family farms in areas with different agricultural cycles, and where shortages of labour caused by out-migration are compensated by cash from remittances.

Temporary migration is more likely to be directed towards urban centres, and increasingly towards smaller towns. Women are more likely to engage in this type of

movement to work in non-farm sectors (domestic service, small-scale trade) provided that the nature of their responsibilities in farming households allows them to move. Young people also move to towns, with boys as young as 14 going to work in construction and services such as watchmen. This is partly because of the important role of social networks in this type of movement, which ensures access to jobs and accommodation and at the same time social protection and control.

The case studies give no reason to think that environmental degradation linked to climate change will result in large flows of international migrants. However, investments by international migrants have an impact on internal movement. The main reason is that such investments tend to be made in areas with potential for economic growth and, in many cases, in non-agricultural activities. The concentration of investment in construction and businesses in urban centres, especially in small and intermediate ones where land is cheaper, is a powerful magnet for internal, often temporary, migrants. Hence, while there are locally-specific differences in migration patterns, it is important to take into account the close interrelations between them. Even in the most economically dynamic settlements, in-migration typically goes hand in hand with out-migration.

What do these findings mean for policy-makers and international development cooperation? First, they highlight the need to consider the broader context and range of factors beyond environmental ones that shape and are shaped by mobility. Understanding the ways in which migration supports livelihoods through the diversification of income sources (including farming) is critical for policies and initiatives that aim to increase the resilience of the groups that are more vulnerable to the impacts of climate change. Second, the diversity and locally-specific nature of mobility patterns and of the factors underpinning them point to the crucial importance of local governance systems, institutions and civil society in any such policies and initiatives. This does not mean, however, that regional, national and international levels should be overlooked.

The practical implications for policy and development cooperation fall under three main categories: protect livelihoods in migrants' home areas, with specific attention to ensuring access to land; support migrants at destination, making sure that they have adequate representation and that their rights are respected; and avoid vicious cycles, whereby migration is the consequence of actions intended to promote adaptation and mitigation rather than climate change per se.

Overall, however, it is not possible to address the potential of migration to increase social polarisation and deepen local environmental degradation without local governance systems that are inclusive, accountable and have the necessary technical capacity and financial resources. This is also key in addressing the unavoidable challenge of linking adaptation and mitigation initiatives and policies.

environmental transformations, with a focus on migration patterns – their duration, composition and destinations. It then examines the impact of increased mobility on the resilience of communities, households and individuals. Section 4 draws out the implications for policy-makers and development cooperation.

2 - Migration and climate change: adaptation or failure to adapt?

To a large extent, current debates on the links between migration and climate change reflect different views and perceptions of the role of migration in socio-economic development, rather than being informed by empirical evidence. This section reviews the reasons why there is such limited evidence on environment-related mobility, and the key arguments underpinning what at times appears to be a polarised discussion.

2.1 - Limited evidence and methodological problems

While environmental change has long been identified as one of the many drivers of migration, until recently it has been conspicuously marginal in migration research. In part, this is because interest has focused primarily on the socio-economic factors of migration. In the context of international flows, attention has focused on their impact on the development of low-income nations (Global Commission on International Migration 2005; UNDP 2009). In the context of internal migration, rural-urban flows and their role in urbanization, economic growth and poverty reduction have taken centre-stage (UNFPA 2007; World Bank 2009). On the other hand, predicting with any precision how climate change will impact on population distribution and movement is difficult because of the still relatively high levels of uncertainty on the locally-specific impacts of climate change and the speed at which they may occur, as well as the lack of comprehensive data on migration, especially movements (and particularly temporary ones) within national boundaries or cross-border flows in and between low-income nations that are likely to be most affected by climate change (Kniveton et al. 2008).

Recent mapping exercises combine areas that are expected to be affected by the impacts of climate change and their estimated population distribution (McGranahan et al. 2007; Warner et al. 2009). These are important contributions to the understanding of the numbers of people at risk, which are staggering. More than 600 million people (10 percent of the world's population) are estimated to live in coastal zones with an elevation of up to 10 metres (about 2 percent of the world's land area). Of these, 360 million live in urban areas (13 percent of the world's urban population) and about 247 million live in low-income nations (McGranahan et al. 2007). Obviously the number of people at risk from sea level rise and storm surges over the next few decades is smaller than this, but there are no reliable figures for the proportions of people living within 2-3 metres of current sea level. But the important point here is that with the notable exception of small island states, which risk losing most if not all of their national territory, exposure to disaster risk is not necessarily the same as vulnerability to such disasters. The latter is largely determined by poverty – not only income poverty but also, most importantly, marginalisation from policy debates and capacity to influence decisions and secure support to reduce the harm caused by physical hazards. Hence, non-environmental factors are key in assessing vulnerability to the impacts of climate change.

In a similar vein, the mapping of climate change impacts in seven regions (glacier melt in Asia; drought and disasters in Mexico and Central America; desertification and land degradation in the Sahel; flooding in the Ganges and the Mekong deltas; and sea level rise in the Maldives and Tuvalu) notes that, possibly with the exception of the impact of sea level rise on small island states, it is not possible to draw causal

links between climate change and migration (Warner et al. 2009, page 1). Several non-environmental factors – social, economic, political and cultural as well as geographical – interact with environmental change in determining who moves, where to and for how long as well as, crucially, who does not move.

It has also been pointed out that, by downplaying political and socio-economic factors in favour of an emphasis on environmental ones, alarmist predictions of climate change-induced migration can result in inappropriate policies, for example forced resettlement programmes, that will do little to protect the rights of those vulnerable to environmental change (GECHS 2008; Piguet 2008). Given the prevalent view of migration as a 'problem' that needs to be controlled, this would be hardly surprising.

2.2 - Policy-makers' perceptions of migration

Migration is perceived as a growing problem by the majority of governments of low- and middle-income nations. The proportion of those with policies to reduce migration to urban centres, especially the larger cities, rose from 51 percent in 1996 to 73 percent in 2005 (United Nations 2006). A review of Poverty Reduction Strategy Papers across Africa shows how deeply held negative perceptions of migration are: aside from putting pressure on urban areas, migration is perceived as promoting the spread of crime and HIV/AIDS, stimulating land degradation and reinforcing both rural and urban poverty (Black et al. 2006). This is despite the fact that there is little evidence to support such views.

Urbanization is without doubt one of the most important transformations in population distribution: since 2008, half of the world's population is estimated to live in urban centres, and 90 percent of the world's population growth in coming decades is expected to be in urban areas, mainly in low- and middle-income nations (United Nations 2008). There is a strong statistical association between urbanization on the one hand and, on the other hand, economic growth, increases in the proportion of GDP generated by industry and services, and the proportion of the labour force working in these sectors. At the same time, however, the scale of urban poverty in low-income countries is growing rapidly, while in many middle-income ones it now exceeds rural poverty (Tacoli et al. 2008). But is this fuelled by rural-urban migration? Evidence suggests that it is not the case. According to the available UN estimates, in the majority of the world's countries the combined contribution of rural-urban migration and the reclassification of settlements from rural to urban is less than that of natural urban population growth (the net excess of births over deaths in urban areas) (United Nations 2008). Many of the nations where rural-urban migration is the largest contributor to urban growth are also those with rapid economic growth, such as China and Indonesia.

Another common assumption is that migrants are the majority of the urban poor. Again, evidence shows this not to be the case (Montgomery et al. 2004). Migrants are also not the only residents of low-income informal settlements: in many cases a large part of these populations are former residents of city centres who lost their homes to financial centres, and commercial and residential areas for high-income groups that increasingly appropriate the more desirable urban areas (Tacoli et al. 2008).

A final point that needs to be made is that in many cases, rural-urban migration is not the prevailing type of movement. In general terms, the direction of migration flows reflects a country's level of urbanization (the proportion of its population residing in areas classed as urban) and the nature of its economic base. In agriculture-based nations with low levels of urbanization, such as in many low-income African nations,

rural-rural migration is the main direction of movement. In contrast, regions with high levels of urbanization, for example Latin America and the Caribbean, are more likely to have mainly urban-urban movement. Nations with high levels of economic growth and expanding industry and services sectors are likely to have high rates of rural-urban movement; even there, however, it is not unusual for rural-rural migration to remain important. This is the case, for example, in Vietnam and India (Skeldon 2003). The main reason is that rural-rural migrants are usually the poorest groups, who often do not have the skills, financial capital and social networks to migrate to the cities. Another, increasingly important, reason is the growing demand for wage agricultural labour in areas with high levels of out-migration, to compensate for seasonal labour shortages (Hoang et al. 2008; see also section 3.4 in this paper).

2.3 - Migration and mobility as livelihood strategies: the role of income diversification

In contrast with these negative views, there is a wealth of evidence supporting the view that migration and mobility are key elements of poor (and less poor) people's livelihood strategies in both rural and urban areas (Bah et al. 2003; Baker 1995; Ellis 1998; Rigg 2003). Much of it does not explicitly incorporate the environmental factor, but nevertheless provides crucial background information to better understand the links between migration and climate change.

As long ago as 2004, a survey by China's Ministry of Agriculture suggested that in rural households' budgets the proportion of non-farm income and internal transfers from migrants to the cities was about to overtake earnings from agriculture, while in India it was estimated that remittances represent about one-third of the annual incomes of poor and landless rural households (Deshingkar 2006). In Bangladesh, at the beginning of the decade about half of rural households' incomes came from non-farm activities and remittances, rising from 35 percent a decade earlier (Afsar 2003). In most countries, rural livelihoods appear to be less and less based solely on farming and rely instead on a diversified portfolio of activities; in turn, these may include some mobility, while others may be conducted within rural settlements or in nearby smaller urban centres.

But this is not necessarily a movement out of farming and, indeed, farming can benefit from such diversification: research in Africa's drylands (Tiffen 2003) and in Vietnam (Hoang et al. 2005; Hoang et al. 2008) shows that farming innovation and intensification is often financed by non-farm incomes, including remittances. A diversified income base also allows farmers to take more risks since they can rely on a safety net, an obviously important factor in the face of environmental degradation. It is important to bear this in mind in the context of climate change, since policies that build on existing strategies to support adaptation to climate change are amongst the most likely to succeed.

One important form of migration that tends to be underestimated is seasonal (or circular) movement, in part because it typically eludes national censuses and statistics. The numbers of people involved are substantial: in India, an estimated 20 million move temporarily within any given year (Deshingkar 2006). Much seasonal migration is between different ecological areas where crop calendars do not overlap: for example, in Vietnam's Mekong delta farmers from rice-growing areas move temporarily to fruit-growing areas to work as wage labourers in family farms at specific times of the year (Hoang et al. 2008). At the same time, in areas with fast-growing urban centres it is increasingly common for rural residents to combine farming with periods of construction work in town. This was noted in the Red River delta, with farmers regularly moving to Hanoi (Hoang et al. 2005). In India's Bihar

state, between 1983 and 2000, temporary movement to urban centres grew from 3 percent to about one-quarter of the total (Deshingkar 2006).

Such evidence supports the view that migration and the diversification of income sources that underpins it are key elements of livelihood strategies. In the context of climate change, the expected reduction in access and availability of natural resources will act as an additional incentive to such diversification and mobility. The critical issue is how policies and institutions can best accommodate and support these shifts in livelihood patterns, and ensure that the poorest and most vulnerable groups have access to these options, which in most cases they do not.

2.4 - Key points

- A key difficulty in predicting how climate change will affect population distribution and movement is the still relatively high level of uncertainty on the locally-specific impacts of climate change, and the lack of comprehensive data on migration, especially internal and temporary movements. What we do know, however, is that non-environmental factors play a key role in determining who, amongst those exposed to climate change-related risks, is vulnerable to them.
- A second crucial difficulty in assessing the links between climate change and migration, and in exploring their implications for policy, is the prevailing negative view of migration amongst policy-makers. This is reflected in the increase in the proportion of governments that implement policies to control and curb migration, especially towards large cities, from 51 percent in 1996 to 73 percent in 2005. However, there is very little evidence that migration is the prime contributor to the growth of urban populations and urban poverty. Moreover, these views overlook the fact that the diversity of migration destinations and durations closely reflects national, regional and global economic structures and dynamics.
- Migration is best understood as the diversification of income sources entailing some form of mobility. As such, it is an essential element of livelihood strategies, which is likely to become increasingly important as climate change affects access to, and availability of, natural resources.

3 - How environmental change affects migration patterns: evidence from Bolivia, Senegal and Tanzania

This section describes the findings from case studies conducted in three countries, Bolivia, Senegal and Tanzania, all of which are experiencing the impacts of slow-onset climate change. Within each country, specific locations were selected in areas representing a range of environmental changes, as described below. The methodology used was qualitative and as much as possible based on group discussions, as well as interviews with key informants. This enabled the three country teams to engage other actors (peasant federations in Bolivia, farmers' associations in Senegal and youth organisations in Tanzania) in the research and discussions, and in so-doing stimulate local debates. Moreover, while migration is typically perceived mainly as a 'private' choice, opening up discussions on perceptions and experiences made it easier to explore the more collective determinants and impacts of mobility, and its relations to environmental change as well as other factors.

In Bolivia, research focused on two locations. The first is the relatively remote Norte Potosí province, one of the poorest areas of the country and of the continent, with 71 percent of its land affected by desertification and 98 percent of its population classed

as poor. Out-migration from the province is high, with an average of 15 percent and peaks of 50 percent in some communities. The other location is the municipality of San Julián in Santa Cruz province, in the eastern lowlands of Bolivia. San Julián is the product of the resettlement programme initiated by the Bolivian government in the late 1960s.

Figure 1: Case study locations in Bolivia: Norte Potosí and San Julián



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In Senegal, four locations were selected. The rural commune of Gandiole, on the coast south of the city of Saint Louis, is a traditional fishing and agricultural village, known for its vegetables production, especially onions, close to the national park of the Langue de Barbarie, a natural oasis that is home to several bird species and is also a tourist attraction. This settlement is experiencing dramatic changes in its environment, and out-migration is becoming increasingly important. In contrast, the municipality of Ross-Bethio, upstream on the Senegal River delta, is a growing centre with a dynamic and diversified local economy centred on the development of irrigated agriculture attracting migrants from other parts of Senegal and from

neighbouring countries. The third location is Ngueye-Ngueye in the Diourbel region, at the heart of the groundnut basin, where rainfed agriculture and pastoralism are the main activities. The fourth location is the town of Ourossogui in the northeast of the country, along the banks of the Senegal River and one of the areas most affected by drought. Nevertheless, Ourossogui is a growing centre with a dynamic and diversified economy driven largely by the remittances of international migrants who started moving to West and Central Africa as far back as the mid-1950s.

Figure 2: Case study locations in Senegal: Gandiole, Ngueye-Ngueye, Ross Bethio and Ourossogui



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In Tanzania, the research explored the experiences and perceptions of young Maasai men, a rapidly-growing migrant group. Interviews and group discussions were held in the country's commercial capital, Dar es Salaam; also in the fast-growing town of Arusha, at the foot of Mount Kilimanjaro and bordering with the traditional Maasai pastoral homeland; and in the Maasai settlement of Monduli and in rural areas around Arusha.

Figure 3: Case study locations in Tanzania: Arusha, Monduli and Dar es Salaam



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3.1 - Migration and mobility in fragile environments: some background

It should not be surprising that migration and mobility have long been a key element of the livelihoods of people living in fragile environments where risk is ever-present. **In the Bolivian Andes**, subsistence farming was traditionally undertaken by members of the same family in different ecological zones at various altitudes, to produce different crops. This effectively acted as an insurance policy against crop failure, and exchanges within the extended family group ensured access to a varied diet. In addition, farmers would diversify their incomes by going to work in the mines during the agricultural slack season. However, even agricultural activities often involve mobility: between October and March, women move for 3-6 months to bring their livestock, mainly llamas, to pasture, while it is not unusual for farm plots to be located more than three hours walk away from the settlement. During periods of intensive agricultural work, farmers live in huts on the farm.

In the Andean region, not only Bolivia but also neighbouring countries such as Ecuador have experienced large-scale migration between rural areas, to urban centres and to international destinations (Gray 2009). In Bolivia, internal migration has been an important part of regional development policies since 1955, and the opening up of new settlements in the sub-tropical lowlands under the National Council for Colonization was a key strategy for both population redistribution and agricultural growth. Between 1950 and 1976, the population of the highlands declined

by 10 percent while that of the lowlands increased by 3.85 percent annually. If anything, this trend has become more pronounced and, in the 2001 Census, the province of Potosí had a net out-migration (long-term movement) of more than 46,000 people, while the main area of destination, the province of Santa Cruz in the eastern lowlands, had net in-migration of more than 90,000 people. Since the 1980s and 1990s, international migration to Argentina, Brazil, the United States and, more recently, Spain has gathered pace and according to recent estimates there are more than 2.5 million Bolivians, or 25 percent of the total population, living abroad (Nijenhuis 2010). In 2007, international remittances inflows were estimated to equal 6.6 percent of GDP (UNDP 2009). People have also moved to urban centres, and while 30 years ago 64 percent of Bolivia's population lived in rural areas, 62 percent now live in centres classed as urban.

In sub-Saharan Africa, temporary migration has also long been part of livelihoods. Under colonial domination, subsistence farmers often had no options but to work on plantations to raise cash to pay taxes; indeed, the primary purpose of taxation was in many cases to provide wage agricultural labour for export crops. A major impetus to rural-urban migration in the region was given by the development of national administrative systems after independence. In some countries such as Burkina Faso and Ghana, internal and cross-border migration to the coastal areas pre-dated colonisation, and rural-rural migration, often in the form of circular movement, still predominates (Henry et al. 2004; van der Geest 2009). In Senegal, migration patterns vary between locations. Senegalese people have a long tradition of mobility, and the country has also historically been an important destination for migrants from other parts of the region. Until the 1990s, movement was mainly internal or to African countries; since then, however, international migration, especially to Europe, has become idealised as the only path to success, despite the hardship many migrants have to endure. Both internal and international financial transfers have become a key component of household budgets, and international remittances are a substantial element of the Senegalese economy, contributing an estimated 8.5 percent of GDP in 2007 (UNDP, 2009).

Pastoralists in East Africa are a traditionally mobile group who have long developed strategies to cope with unpredictable environments, including the mobility of families or some of its members for pastoral production, seasonal transhumance and movement to markets. However, decreasing rains and more frequent droughts have been putting pressure on pastoral resources, pushing pastoralists away from their traditional migratory routes. Years of political and economic marginalisation, inappropriate development policies constraining mobility, a much lower access to basic services compared to national averages and limited opportunities for income diversification are all factors that contribute to the increase in the numbers of young men moving to urban centres (Hesse and Cotula 2006; Oxfam International 2008). International migration is not as pervasive in Tanzania as it is in Bolivia and Senegal, and in 2007 international remittances were estimated to represent only 0.1 percent of GDP.

3.2 - Perceived environmental changes in the case study locations

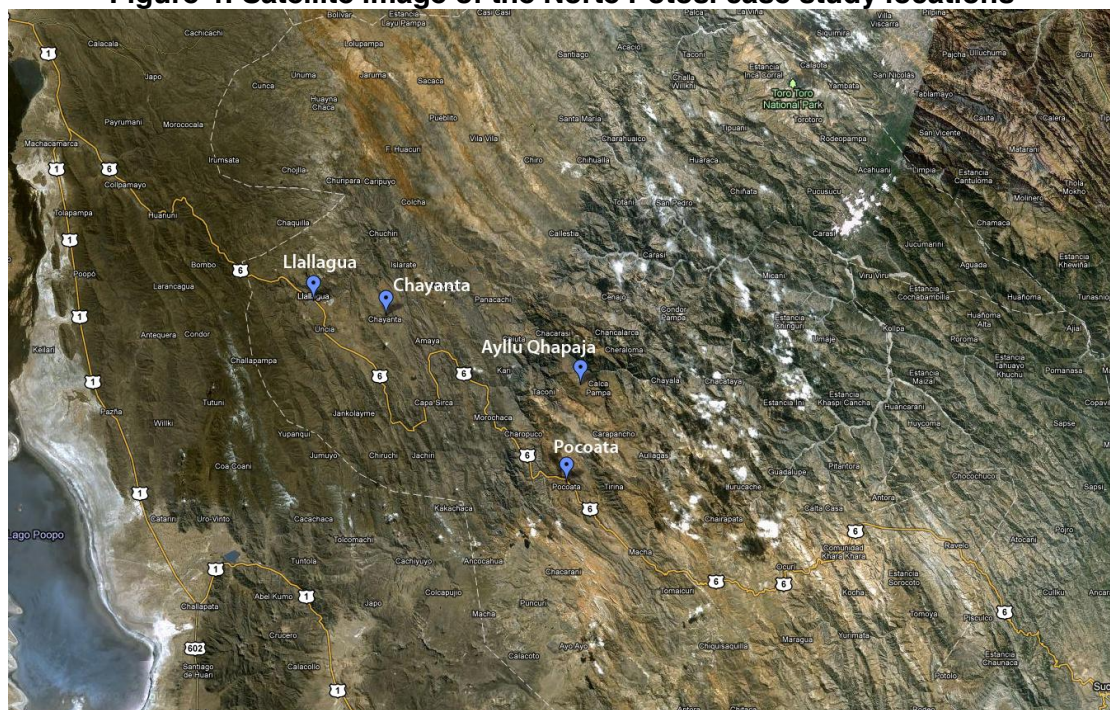
Migration and mobility are affected by both extreme weather events and slow-onset land degradation and desertification. This paper focuses mainly on the impacts of slow-onset climate change, although it is important to note that in many cases there are strong links with extreme weather events. These can be described as precipitating events in two senses: first, their impact on natural resources is not limited to the duration of the event but lasts for a much longer period of time. Second, and perhaps more importantly, their negative impact on local economies is such that

it requires radical and long-lasting shifts in the ways livelihoods are constructed. Typically, this would involve a reduction of the role of natural resources as a primary source of income and subsistence.

An additional impact of climate change, albeit one that is often neglected, is the displacement of population as a result of infrastructure that aims to limit the use of fossil-generated power and/or preserve water for agricultural and other uses, for example dams, or interventions intended to alleviate the impacts of environmental change in other locations. This section describes the impacts of environmental change as reported by respondents in the case study locations rather than by objective measurements. This is because subjective perceptions and expectations are important in influencing livelihood strategies, including decisions to move.

In Bolivia's Norte Potosí people trace the beginning of a downward spiral of environmental change and consequent migration to the catastrophic drought of 1982-83. Agricultural production declined by 30 percent, and a large proportion of livestock was lost. Since the early 1980s, more than 100 hectares in the case study area have been lost to land degradation, exacerbated by changes in rainfall patterns, which are on average around 500 mm per year but have become irregular, with less frequent but heavier downpours. With milder weather, crops that traditionally could only be grown in the valleys now are planted higher up the mountains, although with much lower yields and significant year-on-year variations. The area between the valleys and the high mountains is thus now overexploited, contributing to further soil erosion. Enclosures to protect crops and access to increasingly scarce water in turn limit the spaces available for pasture, and livestock is also affected by diseases such as Chagas, which is now present at altitudes over 3,500 metres.

Figure 4: Satellite image of the Norte Potosí case study locations

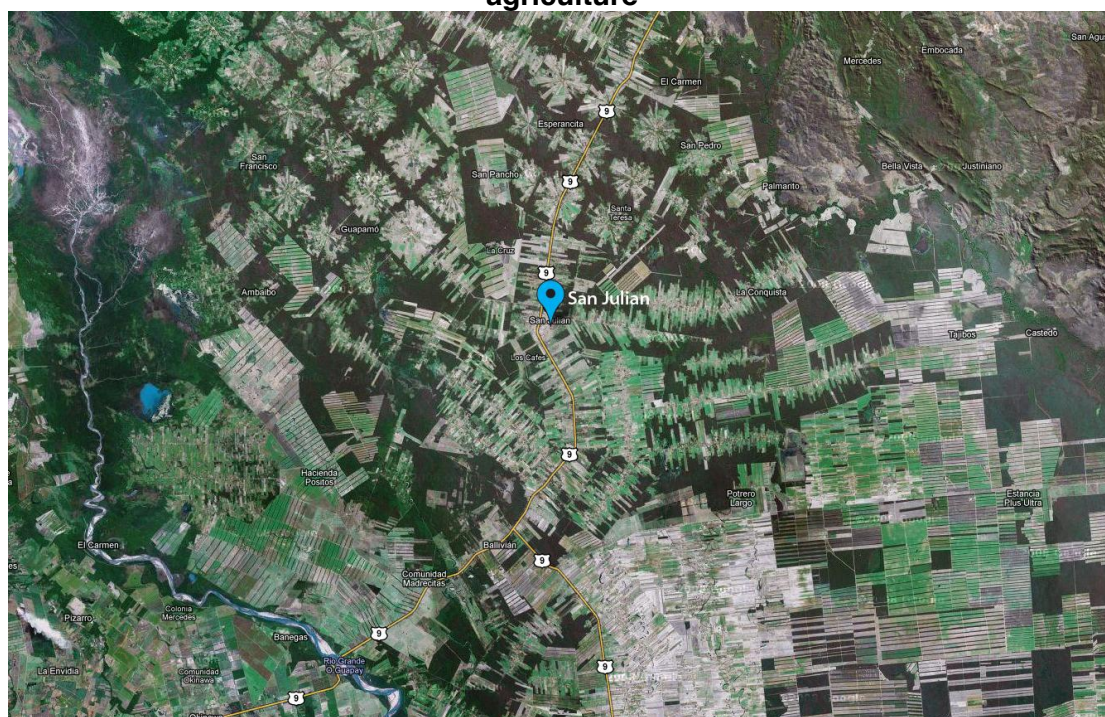


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In contrast, the other location **in Bolivia, San Julián**, is a sub-tropical ecological zone at less than 250 metres above sea level, compared to the 2,800-4,000+ of Norte Potosí, with average rainfalls of 1,000-2,000 mm per year. Originally a densely forested area, it was selected as a resettlement location by the government in the

late 1960s. Settlers were allocated 50 hectares of land that was cleared gradually. In time, some settlers returned to their home places in the highlands, including Norte Potosí, frustrated by the lack of support in adapting to a new climate and different agricultural practices. The area continued to attract migrants, however, who in some cases bought land from those returning home and in other cases took over abandoned plots. Since the 1990s, a land market has developed and purchase is the only form of access. While this has resulted in a decline in the numbers of in-migrants, clearance of forest land has continued. A key reason for this is the gradual displacement of subsistence agriculture and the growing importance of mechanised commercial farming, especially soy production, and the consolidation of plots. The main environmental changes perceived in the past 20-30 years are floods, strong winds, erratic rainfall patterns and increased resistance of old and new varieties of parasites.

Figure 5: Satellite image of San Julián showing the expansion of commercial agriculture



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In Tanzania, Maasai men describe the prolonged dry season of 1997 that was followed by El Niño-related floods in 1998 as a turning point in their traditional way of life. While these events affected crops and worsened soil erosion, the related outbreaks of livestock diseases such as Rift Valley fever decimated cattle and were far more devastating for pastoralists. This was followed by three years of scarce rainfall between 2000 and 2002, which again severely affected livestock. Drought returned in 2009-10, making it difficult to find water and good pasture. The cattle death rate was so high that in the words of the Maasai, it was possible to wake up in the morning and find that 5-10 animals had died overnight. Because of the repeated outbreaks of fatal diseases, livestock has become increasingly weak and its resistance is further lowered by the need to move farther away to find pasture. At the same time, deforestation for charcoal-making and traditional medicine, both of which have become additional income sources for many, has resulted in strong winds and further soil erosion affecting both farm and pasture land.

Figure 6: Satellite image of Maasai homeland in northern Tanzania showing the impacts of drought and soil erosion



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In Senegal, the severe droughts of the 1970s and early 1980s are also remembered as events that introduced significant changes in local livelihoods. Rainfall is estimated to have declined by 30-40 percent in the last decades and deforestation and desertification are significant in all the case study locations. More recently, the construction of infrastructure, including interventions to decrease the pressure of the impacts of climate change, has also affected rural livelihoods. The construction of the Diama dam in 1986 intended to block seawater intrusion in the irrigated areas in the Senegal River basin has resulted in the salinisation of soils in the downstream coastal zone (UN/WWAP (United Nations/World Water Assessment Programme) 2003). But the most destructive initiative for coastal environments in the proximity of the Senegal River delta has been the opening of a breach in 2003 south of the city of Saint Louis to limit damage to the urban areas caused by frequent flooding. The breach was intended to release river waters rapidly. From an initial width of four metres, however, it expanded rapidly to more than 800 metres and by 2006 had reached a width of about 1,500 metres (Durand et al. 2010), eroding farmland and increasing soil salinisation. The case study location of Gandiole has been heavily affected by both interventions. Until recently, 80 percent of its population relied for their livelihoods on fishing and farming, especially fruit and vegetables, benefiting from proximity to the city of Saint Louis. However, the salinisation of land and strong currents at sea have compromised both activities.

Figure 7: The evolution of the man-made breach in the Langue de Barbarie, Senegal

A) just after the opening of the breach, 3rd Oct 2003: 4 m width



B) 2 days after the opening, 5th Oct 2003: 80 m width



C) 3 weeks later, 23rd Oct 2003: 330 m width



D) 8 months later, end May 2004: 800 m width



Source : photos Ibrahima Diop, service hydrographique de la ville de Saint-Louis

3.3 - Responses to environmental change and non-environmental transformations

In all the case study locations, livelihoods have changed, in some cases radically, in response to both environmental change and the impacts of wider socio-economic, cultural and political transformations. While in some locations new economic opportunities have emerged and enabled people to adapt more successfully to the impacts of environmental change, in most cases non-environmental transformations have indeed made it more difficult to resort to well-tested livelihood strategies. There is little doubt that the disastrous droughts of the early 1980s, which in both Bolivia and Senegal marked the start of a cycle of intensified environmental degradation, were so devastating because they took place at a time of major economic and social upheaval.

In Bolivia, the structural adjustment programme implemented from 1986, following years of political and economic turmoil, included the closure of the mines, resulting in a massive loss of jobs for miners and workers in associated industries. In mining areas such as Norte Potosí, this deeply affected the local economic base and curtailed opportunities for seasonal employment in the mines, a traditional strategy of income diversification for the peasantry. International prices for mining products, especially tin, which had fallen vertiginously in the 1980s, only started to recover in 2004. By then, the state-owned mines had been passed to miners cooperatives who

could only afford extremely limited investment, resulting in self-exploitation and dangerous working conditions. Indeed, it is now not unusual for miners to engage in seasonal farming to make ends meet. Nevertheless, better international prices for mining products have somehow revitalised the local economy, and after a decade of decline local towns have started growing again offering some, albeit limited, opportunities for non-farm employment to the population of the surrounding rural areas.

Within the agricultural sector, changing environmental conditions have allowed farming in high altitude areas where it was previously impossible. Warmer temperatures and better water retention in the mountains now mean that potatoes can be grown as high as above 4,000 metres. Soil erosion in the lower valleys, however, has severely affected farming, and while some crops can now be produced at higher altitudes above 3,000 metres, this has resulted in over-exploitation and further soil degradation. Moreover, despite efforts to improve the road and transport system, transport costs, especially for agricultural produce, are still high and deter farmers in remote settlements from selling more than a minimal part of their harvests. In such a context, migration has been and remains an important element of livelihood strategies.

A substantial proportion of migrants have moved to the urban centres – Cochabamba, La Paz and Santa Cruz – often ending up in the urban informal sector, while others went to settlements such as San Julián in the Santa Cruz province, a movement that was initially encouraged by state-sponsored resettlement programmes. The increasing mechanisation of agriculture in the lowlands, the high cost of land and the increasing diversification of the economic base of the settlement have reduced the role of farming as the key sector of employment (although not its proportion of local revenue) while expanding employment opportunities in non-farm activities. Amongst migrants who have arrived since 2000, farming is less common – at least as family farming – while trade, construction and all kinds of services are the main activities. Despite the economic success of San Julián and its role as migrant destination, it is also a source of migrants to a variety of destinations, as described in the next section.

The Maasai of northern Tanzania trace the beginning of profound changes in their livelihoods to the severe outbreak of rinderpest in the early 1980s, a time of deep economic crisis in the country. Another important non-environmental factor overlapping with prolonged droughts has been the increasing land value and conflicts of interest between different land users in Maasai areas since the mid-1990s. Under the Land Act of 1999, traditional pasture land was in many cases classed as unoccupied or unused and thus fell under the exclusive control of central government, which was then able to allocate it to private or foreign investors for large-scale commercial farming. The constantly diminishing grazing areas and the concomitant drought had devastating effects on the pastoralist way of life. As a result, since 1998 the Maasai themselves have started farming. This was initially done in open areas, but with the implementation of the Village Land Act in 2001 disagreements with sedentary farmers and village councils who control local land allocation, including allocating rights to external (non-foreigner) investors against compensation, have become frequent, often forcing Maasai farmers to move to other locations. Such a profound change in land use also causes conflicts amongst the Maasai themselves.

Another reason for the decline of pastoralism is the extremely low price of cattle. In the last two years, this has dropped from around US\$ 250 to just US\$ 30 per head, partly because of a glut in the market caused by pastoralists anxious to sell their

animals before disease and malnutrition kill them. Migration of young men to the cities has become increasingly important, especially since 2000, with a peak in 2009-10. Thus, environmental change, cattle disease and shrinking access to pasture land are key factors in determining transformations in Maasai livelihoods and diversification into agriculture and migration; however, these are still primarily ways to increase herd size and acquire insurance policies against the loss of animals, as pastoralism remains the primary goal of the vast majority of Maasai.

In Senegal, non-farm employment opportunities in most of the study settlements are very limited. The exceptions are the towns of Ourossogui and Ross-Bethio. In the other sites, rainfed agriculture and fishing remain the most important activities, and despite the expansion of microcredit to support small-scale enterprises, including trade, some processing and manufacturing and, in Gandiole, some tourism-related activities, these are not really sufficient to support local livelihoods. In the poorest settlements, such as Ngueye-Ngueye, migration has traditionally been a way to make ends meet during the dry season, and has become more and more a way of life for most households. In Ngueye-Ngueye, residents trace the increase in migration to the fall in international prices for groundnuts in the 1990s. That said, migration is an important element of livelihoods in the successful towns as well, which both attract and send migrants. Indeed, the town of Ourossogui arguably owes its growth from small rural settlement to dynamic small urban centre to migrant investment. The next section describes the specific patterns of migration in the case study locations, how they have changed over time, and the key factors that explain these changes.

3.4 - Migration and mobility patterns: duration, direction and composition

Information on whether migrants engage in temporary or seasonal movement or in long-term migration, where they go and who goes is essential for policy formulation and implementation. It is also crucial to better understand the role of mobility and migration in adaptive livelihood strategies since duration, direction and composition of migrant flows are closely interrelated with economic activities in home areas as well as the diverse opportunities for income generation in destination areas.

3.4.1 - Seasonal migration between rural areas and transformations in family and commercial farming

Seasonal mobility, both between rural areas and from rural areas to urban centres, is defined here as movement that takes place during the agricultural slack season, when farming requires little if any labour. This of course is typical of rainfed agriculture, and is a major form of migration from Senegal's groundnut basin and the Bolivian Andes. Two factors are important to seasonal migration: the first is the lack of non-farm income-generating opportunities within the home settlements; the second is that farming is still seen as an important element of livelihoods, despite the fact that migration is necessary to supplement incomes and, in some cases, literally to make ends meet. This is well illustrated by the case of the Bolivian Andes, where farmers who have access to mountain land (above 3,500 metres) where environmental change has, for the time being, resulted in increased opportunities for farming, are likely to move temporarily. In contrast, farmers whose lands are located in the valleys (between 1,650 and 3,000 metres) have been more affected by land degradation and erosion and are more likely to move away permanently.

The high level of seasonal mobility of farmers from rainfed agricultural areas helps explain the somewhat surprising reliance on waged agricultural labour amongst farmers living in areas with better access to water, even where family farming is the primary mode of production. This is the case of Gandiole in Senegal, where seasonal

labourers from areas further inland come to work during the slack season at home, usually under a sharecropping agreement. The reason for hiring waged labour in Gandiole is the combination of out-migration, often of younger men, and the availability of non-farm income-generating activities both within the settlement and in the nearby city of Saint Louis. Thus, if on the one hand there is a scarcity of agricultural labour, on the other hand farmers can supplement family labour with cash from non-farm activities and remittances. Maasai pastoralists who have turned to farming also often hire wage labourers, but this is explained primarily by their lack of familiarity with – and dislike of – non-mechanised farming.

Less surprisingly, seasonal migrants are an important proportion of the labour force in areas of large-scale irrigated commercial production, such as the town of Ross-Bethio in the Senegal River delta. Labour relations normally entail daily or monthly wages. Moreover, the town offers temporary employment opportunities in processing activities such as rice husking.

That said, seasonal migrants do not always seek employment in agricultural activities. This is especially the case for women, whose numbers moving from the village during the dry season have greatly increased in recent times in poor settlements such as Nguaye-Nguaye. Women tend to go to local towns but also to the larger cities, where they work as housemaids, washerwomen and street traders. Seasonal migration has become so entrenched amongst women that in polygamous households they often take it in turns to move, with one wife staying to look after the family one season and another one the next season. In contrast, women in the Bolivian Andes are less likely to move as they are responsible for the household's livestock, and may move instead to pastures at higher altitudes or stay in the settlement; Maasai women in Tanzania also rarely migrate as this would not fit with their heavy workloads within the household, which include not only domestic reproduction but also repairing the house, managing milk production and marketing, and looking after sick animals.

3.4.2 - Temporary rural-urban migration as a form of income diversification and capital accumulation strategy

Temporary migration from rural areas is equally motivated by low and insecure incomes from farming, but it is less directly linked to seasonal agricultural calendars and is perhaps better defined as a division of labour within households, with one or more members moving while others continue to work in the home area. As a result, its duration varies and it is more likely to be directed towards urban centres, either local towns or the large cities – although areas with irrigated agriculture are also typical destinations. Towns where remittances from international migrants have fuelled construction booms and the diversification of the local economy, such as Ourossogui in Senegal and Cochabamba in Bolivia, are important destinations for young men working in construction and young women working as housemaids. A different case is that of Maasai men in Tanzania, whose employment opportunities are restricted to working as watchmen or hairdressers and, in Arusha, as intermediaries in the tanzanite gems trade. In all instances, social contacts appear to play a much more significant role than in seasonal migration to rural areas, and networks of family or friends from the same home area are key to gaining entry to the urban labour markets. This helps explain the migration of increasingly younger people, especially boys as young as 14, noted in both Tanzania and Bolivia.

It is not only the residents of the poorest settlements who engage in temporary migration. Indeed, more dynamic settlements typically see flows of both in-migrants and out-migrants. San Julián in the Bolivian lowlands was built by migrants from the

mountain provinces, including Norte Potosí, and continues to attract newcomers. In-migration is usually intended to be permanent, but out-migration from the settlement is primarily temporary. For young people, both men and women, the nearby (150 km) city of Santa Cruz is the main destination, where they find employment as construction workers and housemaids. Working in the city has an important element of social status, which in turn reflects the tendency amongst younger generations to move away from farming into services and industry. Cross-border migration to Argentina by entire families for periods ranging from three months to one year is also not unusual, while international migration to Spain is still infrequent because of its high cost. It is also important to note that those who own land rarely move outside Bolivia.

3.4.3 - The links between international migration and internal mobility

No form of migration in Senegal is more pervasive than international migration to Europe. This is not merely a matter of numbers but one of collective dreams and perceptions of what constitutes personal and family success. In recent years, the costs of passage for undocumented migrants have fallen abruptly as fishing boats (pirogues) are used; although relatively cheap in monetary terms, this is also extremely dangerous and many prospective migrants are lost at sea, attracting much media attention in both Senegal and Europe and triggering governments' attempts to curb it, albeit with limited success.

Clearly, international migration, like all forms of mobility, is influenced by a complex mix of factors, of which environmental change is likely to be a part. At the same time, however, it is just one amongst many forms of mobility and destinations and it is certainly not a movement involving the poorest groups and, indeed, those living in localities most affected by environmental change. If there is one factor that is likely to increase international migration it is the existence of social networks that facilitate movement by providing financial resources and key information, reinforcing the prediction that the impacts of climate change are unlikely to result in large flows of international migrants (see also Massey et al. 2007).

There is, nevertheless, an important link between international migration and internal migration in that international migrants' remittances and investments, especially in urban centres, are a crucial engine of economic growth more particularly in smaller towns where land prices are cheaper. This, in turn, creates employment opportunities for internal migrants, especially in construction and domestic work, although at the same time it often increases social polarisation and competition over land and other scarce resources.

3.5 - The impact of migration and mobility on livelihoods

In all its forms, migration has a critical impact on livelihoods in home areas. In the words of an older man in Gandiole, 'I don't regret my children leaving. Had we known, we would have sent them long ago.' In all locations in the three countries, the most vulnerable households were unanimously identified as those not receiving remittances from migrant relatives.

In the most vulnerable areas, remittances are an essential element of food security. In many instances, migrants moving to local towns send home food rather than cash: in Ngueye-Ngueye, the bus that goes to town, on its way back to the settlement brings bags of rice sent by migrants to their relatives. In Norte Potosí, migrants to the local mining towns send processed foods such as sugar and rice, and in exchange receive traditional products from their relatives. A similar preference for sending food

rather than cash has been reported in northern Ghana (van der Geest 2009). The main reason for this is that processed goods are usually cheaper in towns than in rural settlements, where sometimes they are not available at all, especially in remote and badly connected villages. Perhaps most important is the fact that in these cases migration is a response to extreme vulnerability, and is essential to satisfying the most basic needs. Migrants from very poor areas are more likely to work in unskilled jobs and as wage agricultural labourers, and their earnings are some of the lowest: in the Senegal River delta, labourers earn about 40 euros per month.

Overall, the primary use of remittances is household consumption, followed by housing improvements. Investment is generally limited because of the low earnings of most migrants. Where there is investment, however, it seems to follow specific patterns. The first is that investment in agriculture is very limited in areas where natural resources are severely depleted and markets are distant – for example Norte Potosí and Ngueye-Ngueye in Senegal. Some money may be used to hire wage labourers, but this is more akin to replacing an asset (labour) rather than acquiring a new one. A similar pattern has been noted in Vietnam's Mekong delta (Hoang et al. 2008) and in northern Tanzania (Diyamett et al. 2001) and is linked to increasing income diversification and a gradual decline of income from farming as a proportion of households' budgets.

In contrast, in areas where commercial agriculture is the basis of the local economy, investment in agriculture is an important use of remittances and, in some cases, one of the main reasons for migrating. In San Julián, remittances provide the bulk of the capital needed for mechanisation and the purchase of pesticides. As mentioned earlier, these changes in agricultural practices are at least in part caused by environmental change. Amongst the Maasai of northern Tanzania, the purchase of cattle is one of the main uses of remittances and a response to the heavy losses of the past years. However, remittances also help to sustain the relatively recent diversification into agriculture through the payment of wage labourers and the acquisition of machinery. In other words, remittances are important in supporting adaptation to local environmental change **within** the farming sector.

Because of its diverse economic base, a substantial proportion of young migrants from San Julián plan to return once they have gained financial independence and the means to acquire land, build a house in the settlement's centre or start a business. Similarly, migrants' investment in the town of Ourossogui in Senegal is important, especially in comparison to investment in rural settlements. In the Bolivian Andes, migrants also prefer to invest in urban centres rather than in rural areas. As a generalisation, migrants make rational decisions to invest in locations where economic activities are likely to succeed, rather than in areas where lack of economic dynamism prevails and is itself a reason for migrating.

3.6 - Key points

- Migration and mobility have long been a key livelihood strategy in fragile environments, often encouraged by government policies both explicitly or as the unintended consequence of other policies.
- All the case study locations are in areas affected by long-term environmental change (desertification, soil degradation, deforestation) rather than extreme weather events. However, in the majority of locations residents identify a precipitating event – a particularly severe drought, an epidemic of livestock disease, the unintended impact of infrastructure – as the tipping point that results in drastic changes in local livelihoods. In all cases, socio-economic

factors are what make these precipitating environmental events so catastrophic.

- Seasonal migration is important in the poorest rural areas and often essential to make ends meet. It is largely determined by the lack of local non-farm opportunities but also by the persistence of (rainfed) farming as a key element of livelihoods. It is also stimulated by demand for seasonal wage agricultural labourers on family farms in different ecological areas, where out-migration creates labour shortages but remittances are used to pay hired workers.
- Temporary migration is often more likely to be directed towards urban centres. International migration is linked primarily to access to social networks, so it is unlikely that the impacts of climate change will result in large flows of international migrants. However, the investments of international migrants in urban centres, especially smaller ones, create employment that attracts internal migrants.
- Although women are more likely to move to urban centres and engage in non-farm activities (domestic service, trade...), whether they move or not is largely determined by the nature of their responsibilities in farming households. Urban centres also attract increasingly young boys who can rely on social networks.
- In all locations in the three countries, the most vulnerable households are those that do not receive remittances. In poorer areas, remittances are often as food rather than cash and contribute to households' food security. Overall, remittances support consumption. Investment in agriculture is low in areas with depleted natural resource bases and limited access to markets, but higher in areas dominated by commercial agriculture. In many cases, however, migrants prefer to invest in urban centres.

Figure 8: Seasonal/temporary mobility in response to precipitating environmental events in remote rural areas – Norte Potosí (Bolivia), Ngueye-Ngueye (Senegal) and Maasai youth (Tanzania)

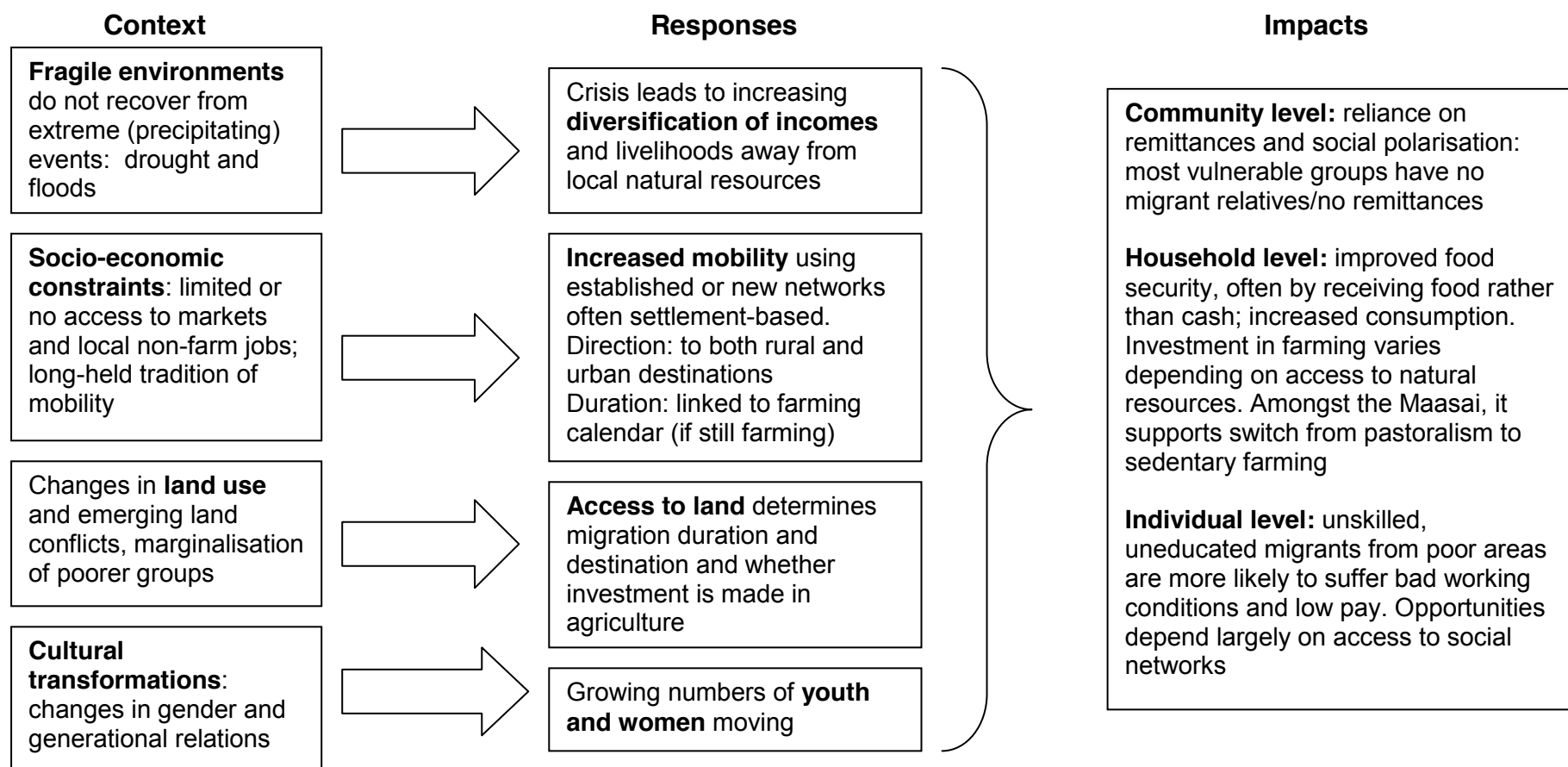


Figure 9: Migration as a response to the unintended consequences of initiatives to reduce the impacts of environmental change elsewhere – Gandiole (Senegal)

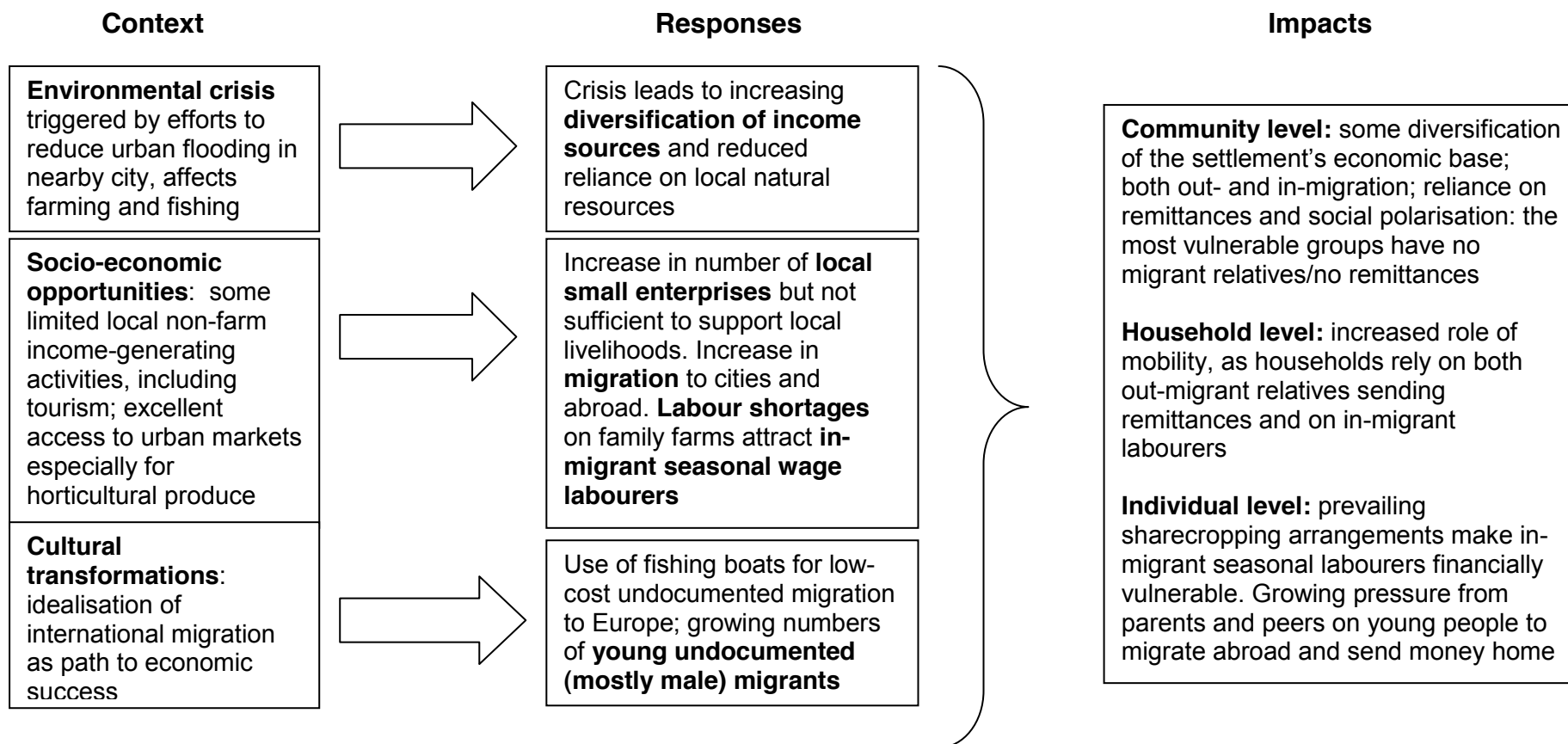


Figure 10: In- and out-migration in areas of commercial agriculture with gradual environmental change – Ross-Bethio (Senegal) and San Julián (Bolivia)

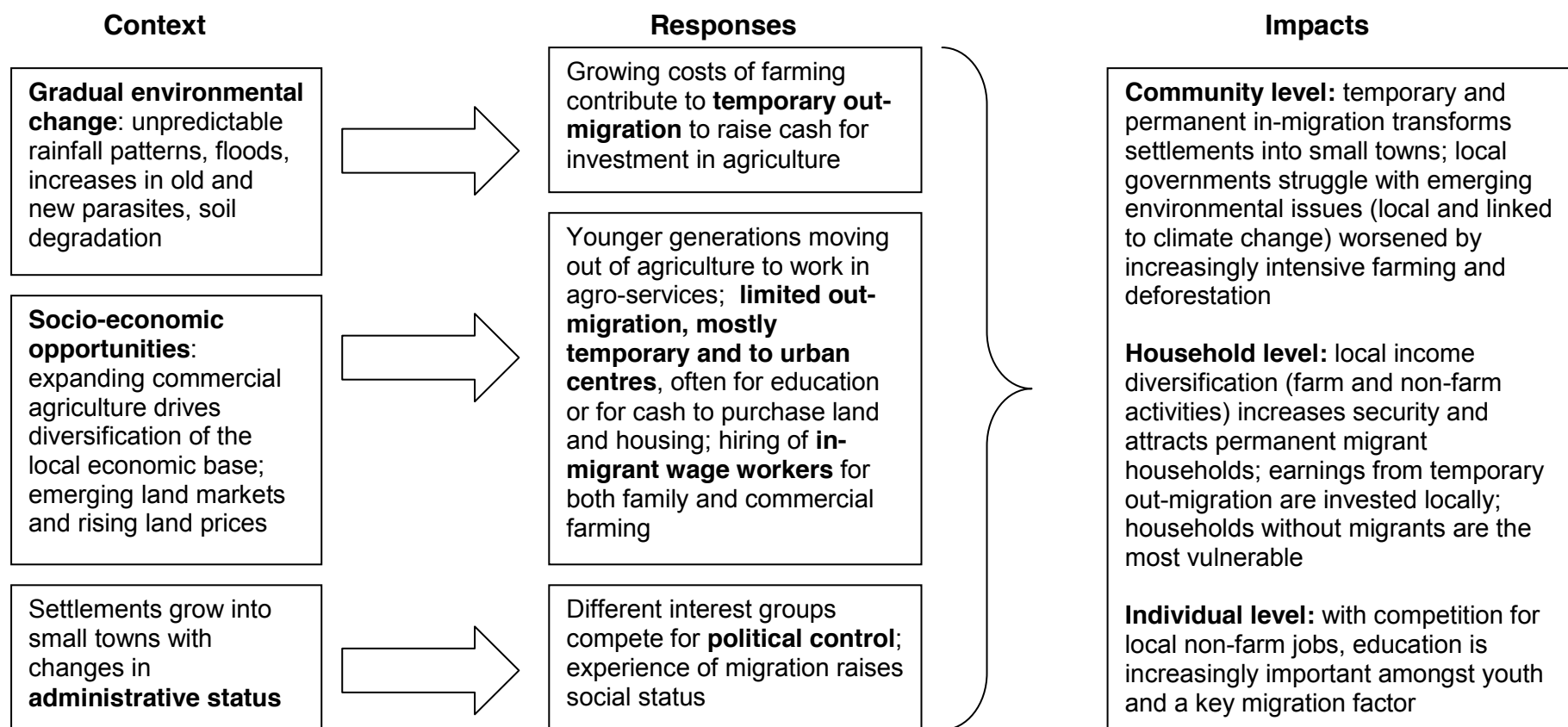
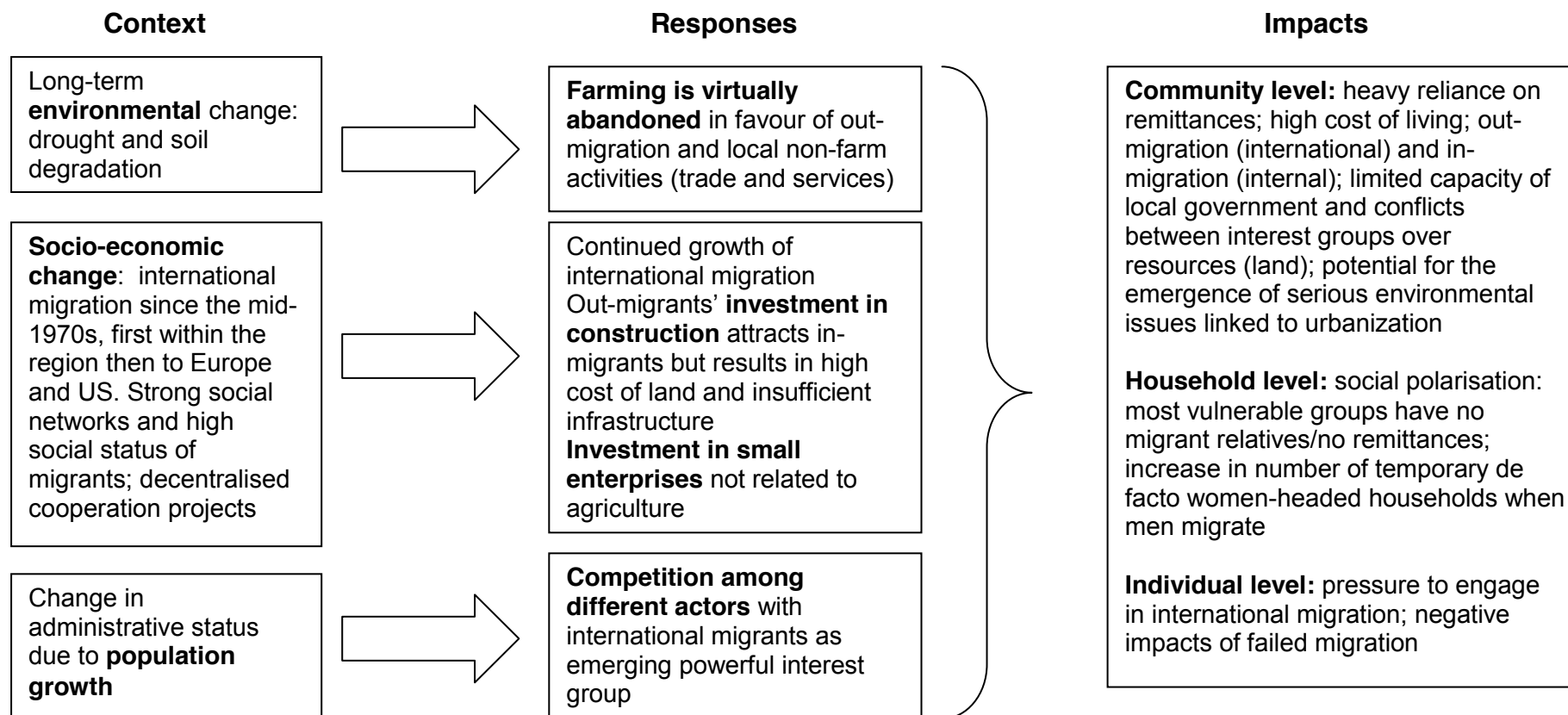


Figure 11: Environmental change, international migration, small town growth and in-migration – Ourossogui (Senegal)



4 - Accommodating migration and supporting migrants: the implications for policy and development cooperation agencies

Migration is typically considered either a problem that needs to be managed, often in the sense of restricting it, or an essentially private concern of the migrant or her/his family. As a result, policies tend to veer between controlling migrants and ignoring them, with little in between. A central problem is that by considering migration in isolation, it becomes very difficult to understand, and address, the broader socio-economic, political and environmental dimensions that shape, and in turn are transformed by, people's movement. In other words, it is important to consider both the causes and the consequences of migration (and the ways in which they in turn affect migration patterns), and address them in migrants' home areas as well as destinations. With this in mind, this section highlights the main implications for more pro-active policies and offers some pointers for development cooperation.

4.1 - Linking urban and rural perspectives

Although migration plays an essential role in reducing vulnerability and increasing resilience, it is not mobility per se that is important but the income diversification it supports. This is especially the case for seasonal and temporary migration. The key characteristic of income diversification strategies is that farming continues to be an important element of livelihoods, even if not the main one. Hence, supporting initiatives to adapt small-scale agriculture to the impacts of climate change remains fundamental. In the context of environmental change, access to land becomes ever more critical, especially for the most vulnerable groups such as pastoralists; addressing non-environmental factors that increase inequality in access is a priority, to avoid the creation of vicious circles whereby restrictions in access to land due to socio-economic factors limit the ability to resort to traditional as well as new strategies of adaptation, as shown in the case of Tanzania's Maasai.

Equipping younger rural generations with improved education and skills is another critical entry point. Better-educated workers may have access to better-paid jobs with better working conditions. Realistically, however, the labour market is and will remain largely determined by macro-economic factors, and it is unlikely that the formal sector will be able in the short term to absorb large numbers of workers, let alone migrant ones. However, better education enables migrants to access information about their rights as workers and as citizens. For example, in Tanzania employers of watchmen and domestic helpers are under the legal obligation to draw up a contract and pay a minimum wage to their employees, but because the latter are not aware of the law they do not expect it to be respected.

Initiatives that encourage non-farm activities in rural settlements are in many cases intended as a way to slow down out-migration. The fact that this is obviously not the case should not mean that they should be written off. Several factors contribute to the success – or lack of it – of rural non-farm activities. Access to markets, transport systems and sufficiently large demand are some of the key ones, and clearly require policies that go well beyond the local level. However, local non-farm activities can be an important part of adaptation to climate change for the poorer groups, and the nature of the activities can contribute to a relative reduction in local environmental change. On the other hand, they can also contribute to further environmental degradation: for example, expansion of mining in Norte Potosí could increase water pollution, itself already a major problem for agriculture and domestic use – and by extension, a contributing factor to out-migration.

Migrants in many cases move between rural and urban areas. This is not only in terms of origins and destinations, but also in terms of investment. Migrants from areas with a declining agricultural sector tend to invest in towns and cities, while migrants from areas where farming offers employment and incomes are more likely to invest there. In many cases such investments are very small because of migrants' low earnings, but the important point is that they can have a significant impact on local economies. Paradoxically, however, this can result in further environmental degradation.

In San Julián, for example, deforestation along the river banks to make room for commercial farming increases the risk of floods. Construction in urban centres, especially smaller ones where migrants' investment tends to concentrate both because they are within their area of origin and because costs are lower than in large cities, often contributes to environmental problems (see, for example, Klaufus 2010). Smaller urban centres are often neglected in debates on climate change, but they are home to a substantial and growing proportion of the population in many countries (Tacoli 2008; Sall et al. 2010) and critical for both mitigation and adaptation initiatives and policies. But local governments in small towns often lack the technical capacity and administrative authority to ensure that their growth does not contribute to the problem more than to the solution.

4.2 - Local governance systems

Voluntary migration in its many forms is and will become increasingly important as an element of strategies of adaptation to the impacts of climate change and other transformations. In this it draws on a long history of mobility amongst people living in fragile environments such as the Bolivian Andes, the Sahel and the East African drylands. Despite this, migration is hardly mentioned in climate change-related policies in the three countries. The only national government that explicitly addresses population distribution (although not in relation to climate change) is Bolivia's, where there is a long tradition of resettlement of communities from the highlands to the sub-tropical eastern region of the country. The 2007 National Development Plan reiterates that land redistribution is an important element of the government's poverty reduction strategy targeting small-scale farmers and indigenous groups. Learning from the problems of the previous resettlement programmes, it also plans to provide basic services, technical and logistical support and strengthen social cohesion by giving a key role to community organisations.

Local level organisation and the establishment of systems of governance that allow voice and influence to the poorer groups is without doubt the most important element of any successful policy that aims to support adaptation. In the case of migration, this needs to extend beyond permanent resettlement programmes. Remarkably, the role of local governments and local governance systems is systematically overlooked in current discussions of migration and climate change. However, there are several reasons why this should be a priority for both national policies and development cooperation.

The first reason is the high levels of diversity in migration and mobility patterns, both between and within areas. It would be difficult if not impossible for national governments to take into account and accommodate the sometimes wide differences in duration, destinations and composition of flows. Moreover, local governments in both sending and receiving areas effectively need such information in order to better plan adaptation initiatives and provide services to populations that may shrink or grow at different times. But local governments in many cases lack the capacity and

financial means to gather basic information on their existing population, let alone on migrant flows.

It is also important to note that migration in many cases has important implications for social polarisation and power relations. As pointed out in all the case study locations, households who do not receive remittances from migrant relatives are considered to be the most vulnerable. In some locations migration equates with higher social status, and migrants can become important players in local affairs. This, in turn, can increase access to and control over resources such as land for them and their relatives, who effectively constitute a new powerful interest group; this can, however, result in the marginalisation of other groups (see, for example, Sall 2010 on Ourosogui in Senegal). On the other hand, declining access to land can be a cause for migration – and often is the major cause, as in the case of Tanzania's Maasai. A key issue is the lack of representation of specific groups at the local and national levels. Local governance systems that include (in the sense of giving voice and influence to) all groups, including non-migrants, in-migrants and out-migrants are a first, essential step towards accommodating migration in climate change adaptation and broader development goals, including making local governments more accountable.

This does not mean that regional, national and international levels should be overlooked. Indeed, it is difficult for local governments to be effective without national governments' support. Education and better skills for new, often non-farm, activities enhance the possibilities of income diversification, whether or not it is linked to migration, but are often beyond the capacity and revenue of local governments. At the same time, national economic strategies, often linked to regional and international actors, have a key role in determining the locations of investment and thus attracting migrants through the creation of employment, or negatively affecting environmental conditions for those living in surrounding areas. The development of the Senegal River delta, with the construction of dams and the creation of irrigated farmland, is a case in point. Infrastructure to reduce the use of fossil fuels is certainly likely to increase in the next decades, but its impact on local livelihoods and thus on migration is hardly ever considered. It is very difficult for poor groups to be heard at those levels, let alone have any influence.

4.3 - Practical implications for policy and development cooperation

Reducing vulnerability and increasing the resilience of people living in areas affected by environmental change needs to be the explicit overall goal of any policy addressing migration and of initiatives of development agencies in this field. Specific policies and interventions can be categorised under three main headings: protecting livelihoods in home areas; supporting migrants at destination; and avoiding vicious circles that worsen environmental degradation.

4.3.1 - Protecting livelihoods in home areas

In many cases, temporary and seasonal migration is a strategy to enable people to stay in their home areas. This should be supported by addressing the impact of both environmental and non-environmental factors on local livelihoods. Access to natural resources is affected by both categories of factors, and land is the most contested asset. Land rights are complex and in many countries changes in legislation – often with the aim to make access more equitable – go hand in hand with the emergence of land markets that tend to marginalise poorer groups and those with little political representation. Land is not often seen as an issue related to migration, but the case

studies described here show that there is a clear link between the two. Hence, **ensuring access to land is a policy priority**.

Supporting initiatives to **preserve and better manage natural resources** at the local level is equally important; perhaps most importantly, such initiatives should be de-linked from the aim of reducing migration, and should instead explicitly make a positive link with migration by building on the ways in which different groups and different communities are able to use earnings from migration – for example in consumption or investment.

Education, access to roads and transport networks and access to markets are all linked to increases in migration (see, for example, Deshingkar 2004; Henry et al. 2004). By facilitating mobility-related income diversification, they effectively contribute to the reduction of vulnerability and increase resilience to the impacts of climate change.

4.3.2 - Supporting migrants at destination

Most migrants move to locations where they have existing networks of relatives and friends, often from the same home areas. These networks provide crucial support in securing jobs and accommodation. However, especially in the case of migrants from poorer backgrounds, they may not have the resources to ensure that their **rights are protected**. Education is a powerful factor in increasing migrants' options at destination, as it is the first step towards accessing information on legislation and regulations related to work and housing.

As migrant flows grow in size, their composition also changes to include younger people of both sexes. These are in many cases the most vulnerable to exploitation by employers – for example in domestic service – but receive little protection or indeed interest from local governments at destination. **Local organisations that support young migrants** will become increasingly important in ensuring that their voice is heard and that they can influence policy decisions on matters that affect them. More generally, **strong civil society groups that support the representation of marginalised groups, including migrants and non-migrants**, are a key element of inclusive governance systems and need to be an integral part of development cooperation's support to decentralisation processes.

4.3.3 - Avoiding vicious circles

Initiatives for adaptation and mitigation can in some cases have disastrous consequences on the livelihoods of people who were not initially targeted. The example of Gandiole in Senegal is an obvious example of how initiatives to improve agriculture elsewhere through the construction of dams for irrigation projects, and to reduce the risk of floods in urban centres through new infrastructure, have effectively destroyed the local economy, leaving migration as one of the few options. **Perhaps the most overlooked type of migration is that triggered by infrastructure construction**. Such infrastructure will become increasingly important in the context of climate change, and it is imperative that projects address their impacts on settlements and populations within a much wider area than is currently the case.

The other type of potential vicious circle is caused by **the rapid growth of urban centres**, often (albeit not always) fuelled by the remittances of migrants, especially but not only international ones. Especially in the case of smaller urban centres, local authorities lack the technical and revenue capacity to ensure that such growth does not contribute to greenhouse gas emissions and that it does not marginalise poorer

groups – both of which are typical consequences of urban development models that privilege gated communities and suburban expansion (Klaufus, 2010). Smaller urban centres have traditionally attracted limited attention from national governments and development cooperation aside from their potential (but often unfulfilled) roles as economic growth centres. Their growing importance in many countries' urban systems and the need to ensure that urbanization contributes to mitigation require renewed attention.

4.4 - Key points

- The tendency to consider migration in isolation makes it very difficult to understand and address the broader contexts that shape and are shaped by mobility. Policies need to address both causes and consequences of migration, in migrants' home areas and at their destinations, and link rural and urban perspectives.
- Mobility is closely linked to income diversification and, in the case of seasonal migration, to on-going reliance on farming and livestock. Ensuring equitable access to natural resources, especially land, and reducing the negative impact of socio-economic factors on marginalised groups' ability to construct resilient livelihoods is key to decreasing their vulnerability to environmental change.
- The availability of local rural non-farm activities does not slow down out-migration and in some cases accelerates it. However, it also provides crucial income-generating opportunities for the poorest groups who may not have the resources to move.
- Better education may not provide better jobs in tight labour markets, but it makes better citizens and workers aware of their rights and responsibilities.
- Local governments are typically overlooked in discussions of migration and climate change but they have key roles to play. These include: providing services to often very mobile populations; reducing the impacts of increasing social polarisation; and, especially in small urban centres, ensuring that investment by migrants (for example in construction and commercial farming) does not result in further environmental degradation.
- Any policy addressing migration needs to explicitly aim to reduce the vulnerability and increase the resilience of people living in areas affected by environmental change. This means tackling both environmental and non-environmental factors, and involves protecting livelihoods in home areas, supporting migrants at destination and avoiding vicious circles whereby infrastructure intended to support adaptation and mitigation has unintended and possibly disastrous consequences for the people living in the surrounding area.

5 - Conclusions

Addressing migration has long been an aim of policy-makers but, at the same time, one that has had limited success whether it attempted to promote or, more often, limit population movement. This paper highlights a different approach, with a focus on the causes and especially on the impacts of migration on the resilience of individuals, households and communities to environmental degradation linked to climate change.

The case studies show that even within the context of gradual climate change, it is possible to identify precipitating events, such as unusually harsh droughts, as tipping points from which livelihoods need to change radically in order to ensure survival. Equally important is the fact that it is largely the socio-economic context that makes

these events so catastrophic, specifically by restricting people's ability to rely on well-tested strategies of local diversification of activities, both within the agricultural sector and in the non-farm sector. This is a clear pointer for policies that aim to support adaptation to climate change of the need to address socio-economic as well as environmental issues.

The second important point that emerges from the case studies is the strong interrelation between in- and out-migration, and the diversity in the duration, destinations and composition of migration flows. The links between mobility and socio-economic and environmental change are complex and dynamic, and vary between locations. Hence it is not possible to address the impacts of migration, and especially its potential to increase social polarisation and deepen local environmental degradation, in the absence of local governance systems that are inclusive, accountable and equipped with the necessary technical capacity and financial resources. Support to local institutions and civil society is thus an integral element of adaptation and mitigation policies.

Finally, while migration and mobility are clearly important elements of adaptation strategies, they are also relevant to mitigation, especially in the case of rural-urban movement. The concentration of population in both large and small urban centres has the potential to reduce pressure on natural resources for domestic and productive uses; however, for this potential to be fulfilled there is a need for better planning and regulation, especially in fast-growing small towns. There is also a need to better understand the environmental impacts of different types of non-farm activities, especially the urban informal sector, at the neighbourhood, local, regional and local levels. Linking adaptation and migration initiatives and policies is the next, unavoidable challenge for development cooperation.

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