



Rapid Appraisal of Resilience to Floods and Landslides in Musanze, Nyabihu and Rubavu Districts, Northern Region, Rwanda

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Northern Region, Rwanda

Eastern Africa Resilience Innovation Lab



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ABBREVIATIONS AND ACRONYMS

CBHI	Community-based health insurance
DRR	Disaster risk reduction
FGD	Focus Group Discussions
KII	Key Informant Interview
MIDIMAR	Ministry of Disaster Management and Refugee Affairs
MINAGRI	Ministry of Agriculture and Animal Resources
NGO	Nongovernmental organization
RAB	Rwanda Agriculture Board
RAN	Resilient Africa Network
REMA	Rwanda Environment Management Authority
RNP	Rwanda National Police
RWF	Rwandan francs
UNDP	United Nations Development Program
VUB	Vision 2020 Umurenge Program
WASH	Water Sanitation and Hygiene





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SUMMARY

Rwanda is prone to a wide range of natural hazards. Areas of the northwestern part of the country experience recurrent floods and landslides, aggravated by steep slopes, soil instability, heavy rains and poor drainage. Rainy seasons in Rwanda are becoming shorter and more intense, leading to decreased agricultural production, droughts in dry areas and floods and landslides in areas experiencing heavy rains, especially in Northern and Western provinces. These heavy rains, coupled with a loss of ecosystems resulting from deforestation and poor agricultural practices, have resulted in destruction of crops, houses and other infrastructure as well as loss of life and livestock.

OBJECTIVE

This study was conducted by the Eastern Africa Resilience Innovation Lab as part of a Resilient Africa Network (RAN) project to identify, develop and scale up innovative solutions to strengthen the resilience of African communities affected by natural and human-made shocks and stresses. The aim of the study was to assess the factors that affect the resilience of communities in the Northwestern region of Rwanda to floods and landslides in order to develop resilience dimensions and metrics and identify possible innovations and interventions to improve resilience.

METHODS

A rapid assessment was conducted in 2013 in Busogo sector of Musanze District in Northern Province, Jenda and Jomba sectors of Nyabihu District and Rugerero sector of Rubavu District in Western Province. A grounded theory approach was used to guide the development of a theory of change and for understanding of resilience dimensions. Data were collected through six focus group discussions (FGDs) and 10 key informant interviews (KIIs). Key informants included Ministry of Disaster Management and Refugee Affairs (MIDIMAR) district focal persons, district and sector in-charges of Social Affairs, sector agronomists and district representatives of the Rwanda Environmental Management Authority (REMA). ATLAS.ti 7.1 was used for data management and analysis. The data analysis involved identifying initial codes and creating a codebook, forming code families/categories to develop resilience dimensions and refining those dimensions. The RAN resilience framework was used to identify the causes of floods and landslides, the factors underlying these causes, their primary and secondary effects and the capacities of the communities to adapt to the shock of floods and landslides.





RESULTS

The main shocks and stresses resulting from floods and landslides in the North-western region are loss of livelihoods, destruction of crops, houses and other infrastructures and the resultant descent into the cycle of poverty. The dimensions of resilience identified in the Rwanda study include *Wealth, Human Capital, Social Capital/Community Networks, Psychosocial Wellbeing, Infrastructure, Natural Resources/Environment, Health/Health Services* and *Governance*. Each dimension was defined and described in terms of adaptive strategies, coping strategies, vulnerability factors and causes and effects. Based on the findings, the research team then developed a context-specific resilience framework for chronic internal displacement. The framework helped conceptualize the linkages (cause/effect chain) among the dimensions and identify entry point dimensions for interventions that would have a positive effect on overall resilience.

Recommended interventions include deploying disaster management officers at district level, including disaster risk reduction in the secondary school curriculum, establishing first responder teams in all sectors, building anti-erosion ditches and planting anti-erosion plants and trees through community work (*Umuganda*), supporting community manufacture of resistant roofing material and strengthening disaster early warning, communication and reporting systems.





CHAPTER ONE: INTRODUCTION

The Resilient Africa Network (RAN) is one of eight university-based Development Labs that make up the Higher Education Solutions Network (HESN) established by the U.S. Agency for International Development (USAID). In Africa, RAN brings together 20 universities in 16 countries, with a secretariat at Makerere University in Uganda. RAN is structured around four Resilience Innovation Labs (RILabs). The Eastern Africa RILab is based in Uganda and hosted by Makerere University. By applying science, technology, innovation and partnerships and using evidence-based approaches, RAN seeks to identify, develop and scale-up innovative solutions to strengthen the resilience of African communities afflicted by natural and human-made shocks and stresses.

Over the past few decades, the burden of disasters has been on the increase (ECHO, 2013). Human factors underlie most disaster situations, contributing to either their causes or effects. Disasters often result in sudden shocks that disrupt the livelihoods of communities, infrastructure and institutions (UNISDR, 2009). Even without sudden events, communities face slow-onset and persistent stresses that affect their wellbeing and resilience. Among these stresses are the effects of climate change.

Until recently, the global approach to adverse events, shocks and stresses focused on response, but the need to reduce risk has become increasingly clear. There is therefore an increasing focus on disaster prevention, mitigation and preparedness (USAID/OFDA, 2013; UNISDR, 2009; UNESCO, 2013). Disaster risk reduction (DRR) needs to include a strong component of resilience building to help communities overcome their vulnerabilities and cope with shocks and stresses in a way that enhances their wellbeing (World Bank/GFDRR, 2009).

1.1. Challenges to Resilience in Rwanda

Rwanda is prone to a wide range of natural hazards. Areas of the northwestern part of the country experience recurrent floods and landslides, aggravated by steep slopes, soil instability, heavy rains and poor drainage. Rainy seasons in Rwanda are becoming shorter and more intense, leading to decreased agricultural production, droughts in dry areas and floods and landslides in areas experiencing heavy rains, especially in Northern and Western provinces. Soil erosion, rock falls, floods and landslides resulting from these heavy rains, coupled with a loss of ecosystems resulting from deforestation and poor agricultural practices, have destroyed crops, houses and other infrastructure (roads, bridges and schools) as well as human and animal lives (REMA, 2009).

Over the 10 months between December 2010 and September 2011, disasters produced a complex web of impacts spanning various sectors of the economy, killing 43 people and injuring 73 people,





destroying 1,854 houses and 100 classrooms and damaging 2,990 hectares of crops. The cost of the disaster response and recovery was around 515,520,000 Rwandan francs (RWF), the equivalent of US\$859,200 (MIDIMAR, 2011).

At least 10 people have been killed and hundreds displaced by flooding after heavy rains in northwestern Rwanda. In 2011, floods and landslides destroyed around 354 houses in Western Province and damaged about 3,000 hectares of farmland, forcing farmers to seek refuge on higher ground. On May 7, 2011, 14 people lost their lives in a landslide on a steep slope in Gakoro Cell in the Rugera Sector of Nyabihu District in Western Province. In November 2011, torrential rains caused flooding and landslides that caused enormous losses of life and large farms in the Kinyababa and Burera Sectors of Burera collapsed. Between January and May 2012, abnormally heavy rains caused floods and landslides that killed 32 people; destroyed houses, schools, roads, bridges and dykes; and washed away 2,227 hectares of crops (UNDP, 2012).

In all these emergencies, the Ministry of Disaster Management and Refugee Affairs (MIDIMAR) and partners responded with relief items to assist victims. The cost of the interventions in 2011 was estimated at 11 million RWF (MIDIMAR, 2011).

1.2. Background of the Rapid Assessment

RAN held a consultative partners' meeting in April 2013 in Kampala, Uganda, involving representatives of all four RILabs. To further focus their approach to resilience programming, the RILabs were involved in guided group discussions to select priority thematic areas of focus for their regional programming. The regional teams also proposed geographical areas of focus for targeted intervention. For each of these geographical areas, the teams highlighted a preliminary list of vulnerability factors and adaptive capacities for the target populations, as well as possible ways in which RAN can contribute to mitigating the vulnerability factors. The next step in RAN's strategy is to develop and validate a framework for understanding, measuring and monitoring resilience in vulnerable communities in sub-Saharan Africa and translating resilience challenges into an innovations agenda. This required a thorough understanding of the dimensions of resilience in the geographical areas of focus.





CHAPTER TWO: METHODOLOGY

The RILabs received support from Tulane University’s Disaster Resilience Leadership Academy (DRLA) and RAN’s secretariat for the qualitative data collection and analysis. This support included workshops, field data collection, virtual support, and guidance notes.

2.1. Study Setting and Study Populations

Sectors prone to floods and landslides were purposively chosen by the study supervisor in collaboration with the Director of Research and Awareness of the MIDIMAR. These sectors were Busogo in Musanze District, Jenda and Jomba in Nyabihu District and Rugerero in Rubavu District. Heads of households, victims of the shocks and stresses, and key staff in charge of agriculture, disaster management and social affairs were targeted.

2.2. Study Design

This analysis covers 16 primary documents concerning resilience to floods and landslides in three communities in northwestern Rwanda. These documents included transcripts of six focus group discussions (FGDs), three with women and three with men, and 10 key informant interviews (KII).

2.3. Sample Size and Technique

The in-charge of Social Affairs at sector level identified people recently affected by floods or landslides in the communities to participate in the FGDs. Each FGD included seven to 10 participants.

Key informants were selected according to their work related to flood and landslide disaster management at district or sector level. They included the focal person for MIDIMAR in Nyabihu District, the In-charge of Social Affairs at district or sector level, the sector agronomist and the representative of the Rwanda Environmental Management Authority (REMA) at district level.

2.4. Data Collection Procedures

A research assistant conducted and recorded the FGD and KIIs while a note taker took notes and transcribed.

2.5. Data Analysis

Data management and analysis was performed using ATLAS.ti version 7.



CHAPTER THREE: RESULTS

This chapter discusses the findings of the qualitative resilience assessment conducted by the Rwanda RILab. The research team analyzed the FGDs and KIIs to derive dimensions of resilience to floods and landslides in four sectors in Musanze, Nyabihu and Rubavu Districts in Rwanda that were identified by this study.

Data analysis identified eight dimensions of resilience for the study districts: *Wealth, Human Capital, Social Capital/Community Networks, Psychosocial Wellbeing, Infrastructure, Natural Resources/Environment, Health, and Governance*. To assess the capacity of communities in four districts to adapt to the stresses of floods and landslides, the study explored the following areas for each dimension:

1. **Adaptive strategies:** Factors that empower the communities to resist the effects of floods and landslides
2. **Coping strategies:** Behaviors to mitigate and absorb the impacts of floods and landslides; their effect on individuals, households and communities; and their sustainability
3. **Vulnerability factors:** Characteristics that make individuals, households and communities more susceptible to the negative impacts of floods and landslides and groups that are especially vulnerable
4. **Causes and effects** of each stress factor and the interrelationship among dimensions

3.1. Wealth

The *Wealth* dimension includes elements of livelihoods and food security. In the context of Rwanda, aspects of the wealth dimension include:

- Financial assets (liquidity) and non-financial assets, which could be measured by income, expenditures and forms of consumption
- Access to credit through saving, adherence to *ibimina* (tontines), rotating savings and credit associations in which each group member contributes a predetermined amount to a “pot” that is given to a needy member who is then excluded from receiving the pot in future meetings but obliged to continue contributing
- Access to non-food items (e.g., housing materials, clothing) necessary for survival
- The effects of floods and landslides on livelihood infrastructures (household assets such as ditches, clothes and housing materials)
- Income generating activities such as small trade, casual work and heavy labor to earn money to pay for community-based health insurance (CBHI) or rent another plot to cultivate to recover from the effects of floods and landslides

- Access (physical or economic) to sufficient, safe and nutritious food to meet dietary needs and food preferences
- Food access (systems for food production and distribution such as markets, prices and transportation and their functioning)
- Food availability (harvests/yields, livestock wellbeing, seeds for planting)
- Food utilization (nutrition, absorption of nutrients)

3.1.1. Adaptive Strategies

Both FGD participants and key informants mentioned various coping behaviors that improve resilience. These adaptive strategies include initiation of small projects, which were supported by loans from financial institutions; as well as proper farming practices to have enough crops and get the money from the market.

We created small projects like farming and we asked loans from the microfinance institutions. (Key informant)

Proper cultivation, following the land and use of chemical fertilizers, but meanwhile the poverty is the obstacle (Key informant)

Positive support that communities rely on to apply these adaptive strategies include the government support by public officials.

Provide them with basic domestic furniture (meal, pan, blankets, etc.) so that they can recover from the previous events (KII Informant)

The population is support in various ways (house building for the most vulnerable, others build for themselves and are supported with metal sheet; those whose plantations have been damaged are exonerated by RAB in reimbursing seeds, and they are provided with other seeds for the next season). (KII Informant)

However, the climate variability and lack some promised support by some officials prevented them from effectively improve their wealth.

Another effect is that we've promised assistance, but it has never come (Key informant)

Poverty, low financial means and climate variability with more sun; all prevent us from progress (Key informant)

Another challenge is that we are not able make terraces, because of the low financial means (Key informant)

3.1.2. Coping Strategies

Participants in both FGDs and KIIs mentioned the following coping behaviors that improve communities' resilience to floods and landslides:

- Cultivation using chemical fertilizers and fallowing to increase productivity on land remaining after floods and landslides by people who rely on agriculture as their sole livelihood
- Accessing credit through microfinance institutions

We created small projects like farming and we asked for loans from the microfinance institutions (FGD participant)

- Renting fields that are unaffected by floods and landslides
- Working harder

We roll up ourselves and change our thinking (FGD participant)

- Planting grasses in ditches on affected land to feed livestock
- Forming associations/cooperatives

[We] join tontines, where we contribute 200Rwf per week and share interest at the end of the year. This is commonly called 'to reach a target'. (FGD participant)

I joined the cooperative to borrow money so that I could build a stone fence, but because of hunger, I did not [get] the money and I went home empty handed (FGD participant)

- Doing small business/trade

We create our own jobs in order to get the income (FGD participant)

- Replanting bananas, especially in Rubavu District, where all people live on banana plantations, to retain soil and water.
- Practices to prevent erosion

Me, I created terraces and dug ditches in all my fields. I did as much as I could, though poverty is also a problem (FGD participant)

People rely on the following support to apply these coping strategies:

- Government aid

[The government] provides people with basic domestic furniture (meals, pans, blankets) so that they can recover from the previous events (Key informant)

- Government advice on effective disaster prevention strategies
- Seeds from the Ministry of Agriculture and Animal Resources (MINAGRI)

If someone has a field, the government provides maize and wheat seeds (FGD participant)

The population is supported in various ways—house building for the most vulnerable; others build for themselves and are supported with metal sheets. Those whose plantations have been damaged are exempted by Rwanda Agriculture Board (RAB) from repaying seeds and are provided with other seeds for the next season (Key informant)

- Job creation by the government, especially through the Vision 2020 *Umurenge* Program (VUP) (Annex 1)
- Fining of owners of animals found grazing in anti-erosion ditches

Anti-erosion practices, avoiding cultivation in high-risk areas and planting trees and grasses for livestock are the most effective strategies to adapt to floods and landslides in the study area. Working in cooperatives is also a helpful strategy for affected members.

Participants in FGDs and KIIs mentioned that the following coping behaviors were ineffective to mitigate and absorb the impacts of floods and landslides in the study areas in Rwanda:

- Digging ditches to retain rainwater. Once the ditches are full of water, they are destroyed and fields are flooded.
- Casual work for survival that does not generate enough income for long-term benefit or investment

We serve others, and in the morning we thank God (FGD participant)

3.1.3. Vulnerability Factors

The study found that the following characteristics make people, households and communities in Northern Region more susceptible to the negative impacts of floods and landslides:

- Poverty (belonging to the low wealth quintile)

You know, the rich men immediately rebuilt their houses, but poor people remained homeless (FGD participant)

Normally, people affected by floods and landslides are those who are already vulnerable, who cannot resist any event. The vulnerable person still has low economic status. Once he faces any event that negatively affects this status, it become worse; then the other effects become many (Key informant)

- Orphan hood

The houses have been destroyed. For us orphans, we don't have capacity. Even our crops have been damaged (FGD participant)

- Disability
- Having children, especially girls

Our daughters and sons do not have jobs so that they can resist the effects [of shocks]. This causes them to give birth to unwanted babies. (FGD participant)

- Pregnancy
- HIV

Floods and landslides don't select, but the mostly affected people are those who are already vulnerable (children, people living with disability, pregnant women and those who live with HIV)(Key informant)

- Limited financial means to resettle in safe areas, recover from the effects of floods and landslides, buy anti erosion plants or create terraces
- Large families, which make it difficult to afford compulsory CBHI premiums for all family members.

Lack of ability to pay for medical insurance, which is compulsory ... Thus, for a family of three or four children, you will need to sell the only piece of land you have, then poverty will prevail (FGD participant)

- Government policy

The issue is land consolidation; otherwise, erosion would not be such a problem. We used to plant various seeds before—maize, beans, sorghum—and those waters were stopped by the sorghum (FGD participant)

- Location of settlements in high-risk areas (slopes, foot of mountains or valleys)
- Fragile (permeable) volcanic soil
- Heavy rains that flood fields throughout the year
- Disappearance of banana trees, which were considered an anti-erosion crop

Because of insufficient anti-erosive [plants], the water flows from the hills without stopping ... until even a parked lorry disappeared (FGD participant)

- Premature harvesting of anti-erosion plants to feed livestock when the roots are not strong enough to retain the soil

We may fight it, planting anti-erosive trees, but these could not grow because of cattle keepers who harvest them too early (Musanze District resident)

- Climate variability that makes rain unpredictable

We can do nothing because we are desperate and hopeless, because it rains surprisingly, unless it stops raining. (FGD participant)

- Price increases due to insufficiency of crops on the markets, destroyed by floods and landslides

Have you ever seen a cabbage costing US50 cents, while it used to cost around US5 cents each? (FGD participant)

- Lack of government support to plant anti-erosion plants

We are not supplied with those agro-forestry trees. We are told to pay 50 RWF each (FGD participant)

3.1.4. Causes and Effects

The FGDs and KIIs indicated that the following conditions and practices contribute to floods and landslides in the study area:

- Lack of anti-erosion farming practices (ditches and terraces to retain water) after land consolidation – farming one common crop across different plots owners, according to the crops selected for a given region by the MINAGRI, in order to increase the food security in Rwanda – resulting in destruction of livelihoods and livestock, child malnutrition (*Health*) and landslides removing soil and trees (*Natural Resources/Environment*)

The origin of all these is hoeing one common seed, because long ago, we used to cultivate different seeds and these disasters did not occur. So they occur because of land consolidation, which is done without preventing the soil destruction while there is always rain (FGD participant)

- Heavy and frequent rains that damage fields and make rivers and streams overflow
- Permeable volcanic soil in this part of Rwanda
- Banana pest (*kirabiranya*, or banana Xanthomonas wilt) has ravaged Rubavu District, destroying the banana trees that used to prevent erosion. Erosion then affects *Infrastructures*, especially schools, roads, bridges, playgrounds, houses and other facilities downstream from the fields.
- Loss of human life and houses with all contents
- Children dropping out of school because crops have to be sold to pay tuition and materials have been damaged
- Poverty, the most frequently mentioned secondary effect of floods and landslides

There are many effects, because when the house is destroyed, one will need to use other savings, which would help another project or children in future, though it is a setback and a big loss for the family. One might be planning to buy a cow, so that it would be sold later to pay school fees. After disasters, it is no longer possible [for people] to buy it (Key informant).

3.2. Human Capital

Aspects of the *Human Capital* dimension include skills, knowledge and labor that together enable people to pursue different strategies and achieve their livelihood outcomes (generating income and meeting their needs). *Human Capital* covers socio-demographic factors that enable people to effectively address the effects of floods and landslides or prevent them from doing so. This dimension also includes education level and workforce capacity as they affect ability to generate incomes. Indicators of access to quality education include:

- Access to and quality of formal schooling and technical or vocational training
- Mentoring of children and youth by family members and community elders

- Education infrastructure and materials such as classrooms and textbooks. The influence of systems such as leadership, community involvement in education and food supply on education outcomes.

3.2.1. Adaptive Strategies

Both FGD participants and key informants mentioned various coping behaviors that improve resilience. These adaptive strategies include working hard to earn a minimal livelihood for the survival of families and joining cooperatives.

To work hard, with more efforts and better than before the events, so that the same disaster may not occur tomorrow and cause the same damage ... (Key informant)

Positive support that communities rely on to apply these adaptive strategies include non-food items and roofing material provided by MIDIMA Rand nongovernmental organizations (NGOs) to landslide and flood victims. However, the aid is not always sufficient to cover the number of people who need it. Another form of support is employment by some rural development projects of casual unskilled manual workers in tea plantations.

Even further, projects help us to get jobs ... a tea project, the Gishwati anti-erosion project. The government officials employ youth to make terraces in Gishwati forest (Key informant)

3.2.2. Coping Strategies

Many different temporary/casual jobs were mentioned by FGD and KII participants, including women going to the Democratic Republic of Congo for work, doing domestic work and other small jobs to make ends meet. Some focus group participants and key informants mentioned that people are forced to send their children to work to make money.

The children drop out of school and work for money in mining, carry bricks on the buildings and collect sand from the Sebeya River. It is a way of defending oneself, and they get sugarcane as supper. (FGD participant)

3.2.3. Vulnerability Factors

Illiteracy or low levels of education are root causes of lack of access to jobs, leading to lack of income and poverty. This leads in turn to lack of ability to send children to school and to child labor. The poor levels of education are often a root cause of resistance to behavior change. Illiteracy and poverty can be root causes of lack of family planning and lead to a vicious cycle of large households that can't feed their members and become poorer.

We did not go to school, so it's not easy to find a good job (FGD participant)

The groups most vulnerable to the effects of floods and landslides are women, particularly widows, and orphans, who may become street children or vagabonds.

3.2.4. Causes and Effects

The immediate effects of floods and landslides in the study districts in Rwanda are the destruction of crops, population, houses and other infrastructure and the resultant descent into the cycle of poverty. The main effects of poverty in the communities are an inability to afford health care and education for children, child labor, unwanted pregnancies among young girls, lack of family planning, malnutrition, and dependence on women as the only source of income for households.

Our crops disappeared, and houses fell down. The Mihigo Bridge that connects Terimbere, Nyundo, Gisa and Kabirizih has been destroyed. Our livestock disappeared, and, we are fed by our wives, who usually go to Congo and do small and ambulatory business. Even the playground built by the Catholic father was destroyed. (FGD participant)

3.3. Social Capital/Community Networks

This dimension includes forms of connectedness among individuals, households and groups (community networks and formal and informal institutions such as cooperatives, associations and saving schemes) and information about those resources that community members use to cope with and adapt to floods and landslides. The *Social Capital/Community Networks* dimension also connects to government, church, NGO/Red Cross and family support.

3.3.1. Adaptive Strategies

Most communities used cooperation, helping and serving one another and friendly charitable actions to adapt to floods and landslides. These were by far the most widely reported adaptive strategies, mentioned multiple times in every focus group and by all but one key informant. Joining cooperatives and small associations were also reported in every focus group, although by only one key informant. Both FGDs and KIIs cited the important role of community works projects to rebuild and prevent further damage. Organizing and participating in savings groups (tontines) was reported in two out of three women's focus groups and one men's focus group but only one KII.

A number of entities, such as the government, churches, families and NGOs/Red Cross, support communities in their efforts to rebuild their homes. They provide food and iron sheets for home

repair or construction, support ditch digging and tree planting to prevent erosion, repair roads and infrastructure and help people move to safer areas less vulnerable to flooding.

[We] associate in tontines, where we contribute 200 Rwf per week, and share interest at the end of year. [This] is commonly called “to get a target.” (FGD participant)

... I am a Jehovah follower. In our church, we took measures of resettling ourselves, and the church leaders will support us to build our houses. In order to get good livestock to help one another, they should support us with health insurance premiums. They can also ask help from followers to support people who suffered from the disasters. In Catholicism, Christians are sensitized to help one another by collecting clothes and food and organizing community works for disaster victims, called caritative action. (FGD participant)

3.3.2. Coping Strategies

Both women’s and men’s focus groups reported listening to others, sharing ideas and accepting themselves as ways to manage the effects of floods. Cash for work was also mentioned as a coping strategy.

Neighbors rent victims’ houses for temporary lodges. (FGD participant)

The benefits of community networks mentioned by participants were assistance from NGOs, faith-based organizations and government institutions.

3.3.3. Vulnerability Factors

Participants in FGDs highlighted the issue of community members not sharing the same vision on how to overcome challenges and lack of solidarity.

It not easy for us to cope with them [disasters]. We don’t have appropriate means, and we lack solidarity (FGD participant)

3.3.4. Causes and Effects

Even though Umuganda helps a lot in resettling people, because all their livestock and livelihood infrastructures are destroyed, the recovery is not easy. Most of the time, the whole work done by Umuganda becomes null due to the heavy rain that falls after the work.

3.4. Psychosocial Wellbeing

The psychological status and wellbeing of household heads is a dimension of resilience often adversely affected by disasters in the short term and potentially in the long term, depending in part on the nature and effectiveness of humanitarian assistance. This dimension makes connections between loss of assets and infrastructure and psychosocial wellbeing, based on the evidence from the study data.

3.4.1. Adaptive Strategies

FGD participants mentioned that adopting an attitude of acceptance, hard work, vigilance and determination helped ameliorate stress related to the effects of floods and landslides.

The way I got out of them [problems], I accept myself. We take hands out of our pockets and do casual work so that our children can survive. We give loans to one another in our associations (FGD participant)

Respondents said that in areas prone to floods and landslides, there are no psychosocial support interventions by any stakeholder.

3.4.2. Coping Strategies

Many FGD participants mentioned that they turn to God as a coping mechanism.

To serve others, and when you wake up in the morning, you say, “Thank you, God.” We accept life as it is, then in the morning, we gather at the blessing tree where people come to take us and we go to serve them. (FGD participant)

3.4.3. Vulnerability Factors

Some key Informants discussed the psychosocial status of community members, stating that a “bad understanding” or “attitude” was keeping these groups vulnerable. However, FGD participants mentioned poverty and illiteracy as the root causes of their vulnerability. Orphans, children and widows were mentioned as the most-vulnerable groups.

They become vulnerable because of the population mindset which is very low, on how they can maintain their infrastructure to prevent them from being affected, or even if they are affected, so that [the floods and landslides] cannot affect them seriously. (Key informant)

3.4.4. Causes and Effects

Floods and landslides repeatedly cause loss of assets (e.g., crops and homes). This loss has a long-lasting negative effect on the psychosocial status of the communities. Many FGD participants mentioned feelings of demotivation, discouragement and helplessness as a result of repeated floods and landslides.

When you cultivate and the waters take crops away repeatedly, once, twice and three times, you feel demotivated and give up. They [the floods] always occur and disappoint us. (FGD participant)

We suffered a lot and we are traumatized because we don't sleep at night. We stand near the door instead. (FGD participant)

Orphans and widows are the groups most affected by loss of income and homes.

3.5. Infrastructure

This dimension includes basic infrastructure and physical community or societal assets (roads, classrooms, playgrounds, bridges) that help people function productively. It also includes the ability of affected communities to develop effective mitigation strategies and afford to maintain them. In Rwanda, the infrastructure dimension focuses primarily on shelter and the impact of floods and landslides on homes based on location and construction quality.

3.5.1. Adaptive Strategies

FGD and KII participants said that people adapt to the possibility of floods damaging their homes mainly by:

- Building houses out of flood-resistant materials (cement, iron) or tying down roofs
- Rebuilding houses with assistance from the government
- Re-settling in less risky areas, often agglomerations. Agglomeration or “villagization” was originally a government policy to provide post-genocide housing for returnees from rural areas. Agglomerations (*imidugudu* in Kinyarwanda) are clustered in village communities and have basic services such as electricity and a common water supply point.
- Managing water near homes, for example, by digging ditches to reduce the effects of floods and building water catchment systems (roof capture)
- Adopting anti-landslide/flooding agricultural practices such as letting land lie fallow and planting trees
- Community work, locally known as *umuganda*, to repair damages and prevent or mitigate floods and landslides on the hills. *Umuganda* (“coming together in common purpose to

achieve an outcome”) is a Rwandan tradition in which community members call on family, friends and neighbors to help them complete a difficult task. It also refers to mandatory community service for able-bodied people 18–65 years old for a half day on the last Saturday of each month, when people clean streets, cut grass and trim bushes along roads, build or repair public facilities or build houses for vulnerable people.

Normally, there are some interventions that are carried out by the population itself, through umuganda, whereby they remove the mud from small roads and make them usable. But at this level, it is difficult for cars. Waiting for habilitated instances like RTDA [Rwanda Transport Development Agency], people—through community work—do whatever they can to allow communication. They try their best so that at least pedestrians can walk. (Key informant)

Positive support that people rely on to apply these adaptive strategies includes government assistance to build homes with better materials or better foundations. People also mentioned moving to agglomerations (often assisted by the government) or receiving small plots of land in less vulnerable areas.

The population is supported in various ways (house building for the most vulnerable—others build for themselves and are supported with metal sheets. Those whose plantations have been damaged are assisted by the RAB with seeds, and they are provided with other seeds for the next season. (Key informant)

3.5.2. Coping Strategies

To cope with the threat of recurrent floods, people dig ditches to keep water away from their houses. If the ditches overflow, the water destroys the houses. People also use ineffective ways of collecting and storing rainwater. Few key informants mentioned people resisting resettlement because they don’t want to leave their traditional land.

3.5.3. Vulnerability Factors

Factors that make people in the study districts vulnerable to flooding and landslides include living at the foot of hills or in high-risk areas and heavy and frequent rain that makes rivers overflow to flood schools and plantations. Many settlements are built on steep, sandy slopes and suffer from erosion, which turns into landslides in the rainy season. Moreover, the high population density of informal settlements threatens efficient evacuation in the case of disasters.

Lack of fiscal resources for both the population and the government make it difficult to repair damaged infrastructure, rebuild it with durable materials and maintain mitigation efforts. Lack of awareness of the need to plan for floods and landslides, a shortage of civil engineers and a lack of

surveillance and maintenance of public infrastructure such as roads, classrooms and bridges also contribute to communities' vulnerability to floods and landslides.

Normally, in disaster management, it is assumed that when a disaster happens, the infrastructure is repaired in such a way that it will resist another disaster likely to happen next time. So when this is not implemented, the concerned infrastructure keeps on being affected. (Key informant)

The first factor is that people live under mountains. When a person lives there, once landslides come, he/she is seriously affected. It is the reason why the authorities have recommended that people live in agglomerations. Their mindset also makes them vulnerable, in addition to limited means to leave the area. (Key informant)

3.5.4. Causes and Effects

Floods and landslides damage or destroy key infrastructure such as schools, health centers, roads, electricity poles, houses and household assets. Destruction of infrastructure in turn drives resettlement of affected communities, an increase in the price of staple foods and school dropouts. Camps of internally displaced persons (IDPs) are drivers of poor living conditions—poor shelter, shortage of water, poor sanitation, risk of epidemics and chronic diseases. The effect of floods and landslides on houses is related to the quality of construction and to deforestation and erosion. The effects of losing houses are hunger, poverty, missing school fees, stress and worry, insecurity, loss of assets and death in house collapse.

Effects are many; because once your house is destroyed ... you cannot take money and take your child to school when he/she doesn't have any shelter. First of all, you will need to find shelter and take her/him to school. You understand that the child will be alienated. If you have planned another development project with the available amount of money, you will be obliged to stop it, and you will undergo the refurbishment and reparation of destroyed items. Your planned activity will not be implemented at the time, and your economic growth will not be reached. Subsequently, the country's economic growth will be negatively affected. Because when an inhabitant improves his economic status, it is the country that improves its own. (Key informant)

3.6. Natural Resources/Environment

This dimension includes natural resources (soil, water, air, minerals, forests, water) and associated services (e.g., erosion protection, storm protection) upon which resource-based activities (farming, fishing) depend. It includes the management of natural resources—maintaining and enhancing natural resources through forest and range management, agroforestry, livestock rearing, water resources management and coastal and riverbank protection. *Natural Resources/Infrastructure*

also encompasses recognition of the value of natural resources and ecosystems. Prioritizing identification of natural resources concerns and addressing those concerns are critical to ensure the lives and livelihoods of women, men and children who depend on them. Finally, this dimension includes information on agricultural practices in the study communities and risks to crops, livestock and harvests from floods and landslides.

3.6.1. Adaptive Strategies

FGD and KII participants mentioned the following adaptive strategies and challenges in the study area:

- Planting anti-erosion trees, which are expensive and eaten by cattle whose owners let them graze on the new trees
- Developing terraces, although finances are limited to complete them
- Digging ditches the length of fields to divert water
- Fallowing land
- Using fertilizer and manure
- Seed diversification

One key informant remarked that the weather forecasting system needed to be improved so that communities could get timely information on flooding and landslides. It was also mentioned that the government should deviate or eliminate streams that flood. Some key informants indicated that people needed training on mitigation measures (fallowing fields, terracing, planting anti-erosion trees and plants), but others said that communities are already aware of and practicing these measures. FGD participants indicated a need for government support or other assistance to buy anti-erosion tree seedlings, vegetable seeds, fertilizer and livestock, as well as support to build terraces. Another suggested that the solution was to bring in infection-resistant banana plants. Bamboo was mentioned as another potential anti-erosion plant.

Erosion is prevented. Bench terraces are expanded in all areas with a lot of effort. People are hired by the district in collaboration with MINAGRI to manage their plots (terracing) and paid for it, even though terraced fields remain theirs and they can do anything there, but following provided instructions. (Key informant and government employee)

3.6.2. Coping Strategies

Respondents said that people dig ditches along the length of their fields to prevent water from flooding their land. However, this is an ineffective coping strategy if one farmer digs a ditch and the neighboring farmer doesn't.

Terracing is very expensive. We prefer to dig ditches. But when it rains heavily, these ditches

overflow. (FGD participant)

3.6.3. Vulnerability Factors

Participants mentioned that although trees are planted in ditches, they are not allowed to grow long enough to retain the soil.

We may fight it [flooding], planting anti-erosive trees, but these cannot grow because of cattle keepers who harvest them too early. (FGD participant)

Other factors that make communities in the study area vulnerable to floods and landslides are climate unpredictability, limited financial means to construct bench terraces (level or almost level strips of land running across a slope at vertical intervals, supported by steep banks or risers), inability to leave homes in valleys because of a lack of anywhere else to live, a lack of tree nurseries and the cost of tree seedlings.

We are not supplied with those agroforestry trees. We are told to pay 50 RWF each. (FGD participant)

3.6.4. Causes and Effects

Climate change and climate variability were cited as causes of floods and landslides, along with deforestation, poor soil quality and hilly terrain.

The main cause of landslides is that this area is so hilly. Water from all the hills collect in a very small stream, but the solution is still to build terraces. (FGD participant)

Floods and landslides cause poor harvests, which decrease income and increase poverty, which in turn makes it difficult for people to pay for health care and children's education. Many participants mentioned that the banana trees that used to border the riverbanks and hold the soil in place were eradicated by *kirabiranya*. They also said that road construction has diverted some streams and rivers, minimizing their curves and causing floods during heavy rains. A shift away from diversifying seed stocks was also credited with weakening soil quality.

3.7. Health/Health Services

Aspects of this dimension include physical health (illness and disease, epidemics, injuries, physical and financial access to health care, quality of health services and human resources for health) and water, sanitation and hygiene (WASH)—water supply and consumption, functioning of water and sanitation services, hygiene, behaviors that drive illness and disease and hygiene-related illness.

3.7.1. Adaptive Strategies

A few FGD participants mentioned that people attempt to move to less risk-prone areas to escape floods and landslides to save their lives.

3.7.2. Coping Strategies

Many FGD participants said they would like access to more affordable health insurance and health care.

We are always seeking for jobs in order to avoid joblessness. But the big issue is getting medical insurance for children. (FGD participant)

3.7.3. Vulnerability Factors

Poverty and food shortages were the most frequently mentioned causes of vulnerability in the *Health/Health Services* dimension.

3.7.4. Causes and Effects

The main problems related to *Health/Health Services* mentioned by participants were death caused by floods or landslides directly or by associated hunger and disease. Many FGD participants related destruction of crops to illness caused by hunger, especially kwashiorkor, which is a result of insufficient protein and energy. They mentioned the increased cost of food after crops are destroyed. They also reported that some flood victims have been psychologically traumatized. Finally, health insurance has become inaccessible for people who are unable to earn income from damaged crops.

3.8. Governance

Governance involves activities, processes and frameworks in which political, economic and administrative authority is exercised to help communities effectively mitigate the effects of floods and landslides. This dimension includes information on the role of the government and other external organizations and institutions that are either challenging the status or, alternatively, providing relief to affected communities. It also includes any issue in which politicians are involved (community work, sensitization, relocation, asset provision and humanitarian aid).



3.8.1. Adaptive Strategies

In this dimension, adaptive strategies specifically refer to what the government does for the population. FGD and KII participants mentioned that the government and other organizations provide in-kind assistance such as home goods, iron sheets, seeds, clothing and furniture. Some said that this was helpful, but others said that it was not enough. Also mentioned were the government's plan to resettle populations in agglomerations, appeal to external organizations such as the Red Cross for assistance and creation of jobs such as building anti-erosive terraces in Gishwati.

FGD participants mentioned that they looked to the government for information about flood and landslide mitigation and prevention. Some were aware of the government's disaster plan (resettlement, strengthening houses, terracing, and planting trees) but said that communities could not afford these measures.

Participants unanimously mentioned monthly community work (*umuganda*) to build roads or mitigate/prevent future disasters by deviating water and planting trees. Some found *umuganda* extremely helpful, but others considered it unsuccessful in preventing disasters.

Key informants mentioned alternative strategies to strengthen organizations and institutions in the area to strengthen resilience to floods and landslides. These included more research into preventing disasters, development of strategies to solve problems and more advocacy from the government to raise funds for agglomerations, tree planting and terraces. One key informant mentioned the need for staff with expertise in disaster management and suggested that the budget allocated to disaster management should be decentralized at district level. Existence of the legal framework for disaster management and mapping of floods and landslides in high-risk zones were also mentioned as existing resources to help effective disaster management across the country.





Police join other citizens in monthly community work (*umuganda*) (photo: <http://eng/IGIHE.com/news/>, September 29, 2013)



President Kagame joining residents of Masaka Sector, Kicukiro District, during monthly *umuganda* to build homes for genocide survivors (photo: <http://eng/IGIHE.com/news/>, February 23, 2014)



3.8.2. Coping Strategies

Community work during the rainy season was ineffective in preventing floods and landslides.

3.8.3. Vulnerability Factors

Many of the FGD participants said that government taxes kept them in poverty, making it impossible to start small trading businesses to cope with the effects of floods and landslides. School fees and health insurance were also mentioned as heavy burdens.

The challenges are based on taxes, because they prevent us from progress. The taxes are challenges because they keep us in poverty ... The government does not support school fees, [and] we are not able to pay for our children, not even medical insurance.

Others said the government was slow to respond after a disaster and the assistance it provided immediately after a disaster was not enough to help people cope with the longer-term effects of floods and landslides. Even MIDIMAR was said to lack adequate resources. A few focus groups mentioned that the safe areas where the government wanted people to resettle did not have adequate infrastructure. Moreover, anti-erosion tree seedlings are sold, not free, and very expensive.

3.8.4. Causes and Effects

The lack of disaster management professionals at district level and lack of early warning systems were blamed for weak community disaster preparedness. As the rain is now unpredictable, farmers cultivate at any time until they are surprised by the rain and suffer death and damaged infrastructure. Lack of money in families to pay school fees leads to children dropping out of school, which in turn leads to child labor and unwanted pregnancies. The price of crops has increased because there is no way to get them to market due to destroyed roads.

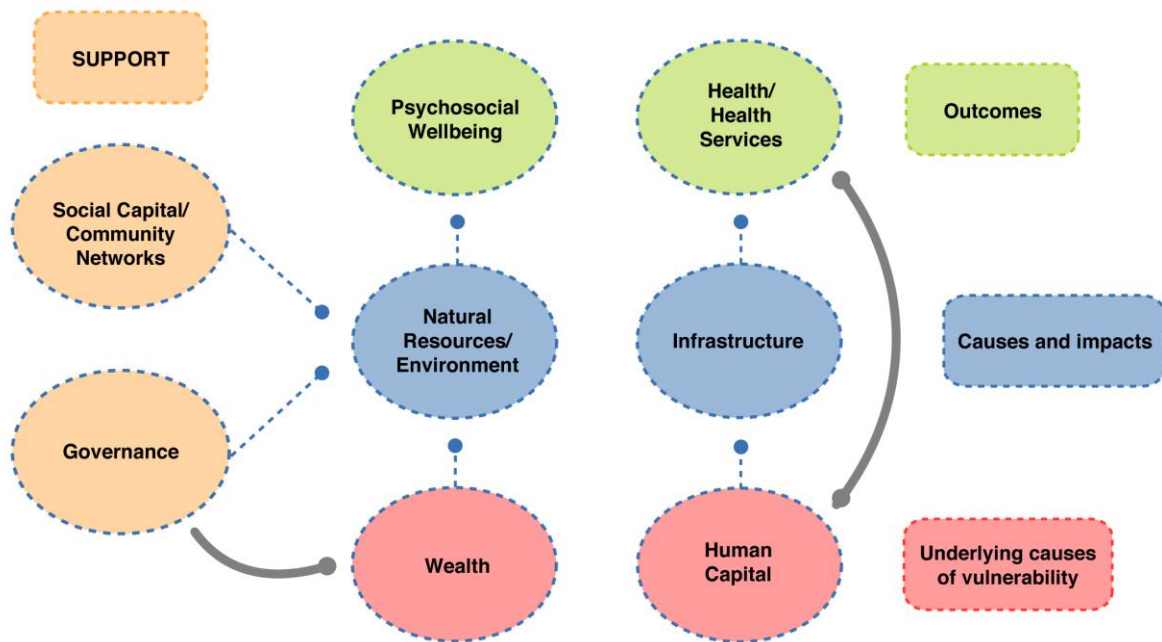


CHAPTER FOUR: CONTEXT-SPECIFIC RESILIENCE FRAMEWORK

This chapter discusses the findings of the qualitative resilience assessment conducted in rural communities in Musanze, Nyabihu and Rubavu Districts in Rwanda’s Northwestern region.

The context-specific framework in figure 1 illustrates the relationships between dimensions in the context of floods and landslides, based on an analysis of the FGD and KII transcripts from this study. The dimensions are grouped and positioned according to underlying causes, immediate causes/effects, outcomes and supporting enabling factors. The arrows show linkages and the cause/effect (driver) pathways between dimensions and dimension groups. The relationships among the dimensions are explored in detail in each of the sections of this chapter.

Figure 1. Context-Specific Resilience framework for floods and landslides in Musanze, Nyabihu and Rubavu Districts, Northwestern Region, Rwanda





4.1. Underlying Causes of Floods and Landslides and/or Vulnerability to the Shocks/Hazards

Participants highlighted the *Wealth* and *Human Capital* dimensions as the underlying causes of vulnerability to floods and landslides. The analysis showed that these dimensions were closely related thematically because of the cycle of poverty. Poor families cannot afford school fees and may be forced to take their children out of school to work. This results in undereducated people who are unable to engage in more diversified livelihoods but instead continue to farm in vulnerable areas. Participants were aware of national plans to reduce the effects of floods and landslides (resettlement to safer areas, strengthening houses, creating terraces for farming, tree planting) but said that the communities did not have the financial means to follow those plans.

4.2. Immediate Causes/Effects of the Shock/Hazard

Immediate causes and effects in the flood- and landslide-prone areas relate to the *Natural Resources/Environment* and *Infrastructure* dimensions. Agriculture is the main source of income for communities in Northern and Western provinces, but the high price of land forces families to farm (and live) on small, flood-prone fields. The year-round need to produce crops for income and sustenance makes many families unable to let fields lie fallow. Not allowing fields to lie fallow decreases soil quality and the output from these small fields. Many also lack the means to develop terraces to prevent landslides. On a larger environmental scale, deforestation and stream deviation from construction projects, eradication of stream-bank stabilizing banana plants by plant disease and certain agricultural practices have increased the frequency and severity of floods and landslides in the area.

Poor farming practices and lack of anti-erosion practices contribute to environmental destruction. The impact of the lack of anti-erosion ditches and anti-erosion plant varieties that are meant to be mixed with crops include increased floods and landslides that directly impact *Health* and *Psychosocial Wellbeing* and the subsequent loss of houses, assets and other *Infrastructure*. These factors all have an eventual negative impact on *Wealth* and *Human Capital*.

The local building style and materials, hazard-prone location of homes, fields and people's preference to stay in their home areas are the main factors that make people in the area vulnerable to floods and landslides. People see their houses and all their assets transported by the heavy rain and erosion from the slopes to the valleys. On the other hand, fiscal barriers prevent the construction of flood-resistant houses and roads, as well as the resettlement of populations in safer areas (agglomerations). Repeated destruction of roads by floods and landslides has also caused the price of food to increase because there is no way to get crops to markets after roads are damaged.





4.3. Outcomes of the Shock/Hazard

The outcomes of floods and landslides in the study area fall under the dimensions of *Psychosocial Wellbeing* and *Health/Health Services*. Destruction of crops and loss of assets leads to feelings of helplessness and discouragement. Crop destruction also leads to hunger and malnutrition-related disease and illness. Many participants cited the high cost of health insurance as a burden to accessing health care. The dimension of *Wealth* is also relevant to outcomes of floods and landslides, as these shocks deplete resources.

4.4. Support/Enabling Dimensions

The dimensions of *Governance* and *Social Capital/Community Networks* support adaptive strategies in other dimensions. *Governance* also describes the burden on communities of taxation, school fees and health insurance costs. *Social Capital/Community Networks*, on a smaller scale, includes joining community cooperatives and associations as a way to cope with the effects of floods and landslides. On a larger scale, the government and NGOs provide in-kind post-flood/landslide assistance. Participants mentioned that the government appeals to external groups (NGOs) for disaster relief support on behalf of affected communities.

A supportive/enabling factor cited by almost all FGD and KII participants was the government-sponsored *umuganda*, a social program that organizes communities to complete common interest projects to improve infrastructure such as road building or to mitigate or prevent disasters through stream deviation and tree planting. *Wealth* is an underlying factor in resilience to floods and landslides, whose outcome is increased poverty.

Table 1 shows the number of times FGD and KII participants mentioned issues under each dimension of resilience, grouped under the areas of analysis in the context-specific resilience framework (adaptive capacity, immediate causes and effects, coping strategies, underlying drivers of vulnerability). Participants highlighted the dimensions of *Wealth* and *Infrastructure* as most affected by floods and landslides. Many highlights were made on infrastructures in terms of adaptation whereby most efforts were made to adapt to floods and landslides by strengthening the building with strong materials and managing the rain water to avoid the destruction of public infrastructures and living houses. So many effects have been reported which highly affected the socioeconomic status of the affected population, referring to wealth. FGD and KII responses indicated that the dimensions of *Wealth*, *Infrastructure* and *Natural Resources/Environment* were the most important underlying drivers of vulnerability as well as enablers of coping and adaptation. Fortunately, there very few issues in regards to mental disturbance, which lead to few quotes in regards to psychosocial dimension.



Table 1. Code co-occurrence of dimensions and analysis framework points

Resilience dimension	Adaptation	Adaptive strategies	Causes	Coping strategies	Drivers	Effects	Fulfilled life	Shock/stress	Suggested solutions	Vulnerability factors	Vulnerable groups	Total
Wealth	67	9	33	54	78	117	12	18	10	56	8	462
Human Capital	10	6	0	16	17	9	26	0	7	12	4 7	150
Social Capital/ Community Networks	43	35	0	4	8	2	10	1	2	1	0	106
Psychosocial Wellbeing	15	4	1	9	4	18	20	0	0	3	7	81
Infrastructure	208	12	31	12	29	115	6	13	13	44	2	485
Natural Resources/ Environment	152	1	92	33	41	23	6	41	13	85	0	487
Health/Health Services	5	0	2	5	2	63	1	11	6	4	4	103
Governance	173	58	0	24	36	6	18	0	56	16	0	387

Table 2 codes the data from the FGD and KII transcripts by dimension according to the number of times issues relevant to each dimension were mentioned. The table shows the greatest co-occurrence between *Wealth* and *Infrastructure*, between *Wealth* and *Natural Resources / Environment* and between *Governance* and *Infrastructure*.

When infrastructure was destroyed or damaged, it was the whole wealth status of the family that was affected. The money or resources that could be used for improving the socioeconomic status were rather used to repair or resettle the affected houses once they were destroyed or damaged by the landslides. The agriculture sector was highly affected whereby crops were taken away by the landslides or floods, which also highly affected the wealth of the victims. But, the government has tried all its possible to help victims in recovery from those situations.

Table 2. Dimension by dimension code co-occurrence

Resilience dimension	Wealth	Human Capital	Social Capital/ Community Networks	Psychosocial Wellbeing	Infrastructure	Natural Resources/ Environment	Health/Health Services	Governance	Total
Wealth	0	18	7	5	75	63	27	32	227
Human Capital	18	0	2	10	4	0	3	9	46
Social Capital/Community Networks	7	2	0	2	6	3	1	27	48
Psychosocial Wellbeing	2	10	10	0	4	4	6	2	33
Infrastructure	75	4	6	4	0	42	16	68	215
Natural Resources/ Environment	63	0	3	4	42	0	3	36	151
Health/Health Services	27	3	1	6	16	3	0	6	62
Governance	32	9	27	2	68	36	6	0	180

Table 3 codes the data from the FGD and KII transcripts by dimension according to the number of times issues relevant to each dimension were mentioned in specific FGDs and KIIs. The table shows that participants most often mentioned issues under the dimensions of *Natural Resources / Environment*, *Infrastructure* and *Governance*, in that order.

Table 3. Primary documents by dimension code co-occurrence (number)

Primary document	Governance	Health/Health Services	Human Capital	Infrastructure	Natural Resources/ Environment	Psychosocial Wellbeing	Social Capital/ Community Resilience	Wealth	Total
P 1: FGD_MEN_FLOODS-LANDSLIDES_MUSANZE	42	19	14	55	49	17	13	63	272
P 2: FGD_MEN_FLOODS-LANDSLIDES_NYABIHU	24	2	5	43	43	9	6	48	180
P 3: FGD_MEN_FLOODS-LANDSLIDES_RUBAVU	39	20	23	69	58	15	26	80	330
P 4: FGD_WOMEN_FLOODS-LANDSLIDES_MUSANZE	30	10	13	31	43	13	9	36	185
P 5: FGD_WOMEN_FLOODS-LANDSLIDES_NYABIHU	19	7	15	31	26	4	9	30	141
P 6: FGD_WOMEN_FLOODS-LANDSLIDES_RUBAVU	46	12	32	56	76	9	12	58	301
P 7: KII 1_FLOODS-LANDSLIDES_NYABIHU_JOMBA	29	3	4	29	22	2	3	14	106
P 8: KII 10_FLOODS-LANDSLIDES_RUBAVU	18	3	2	10	15	5	5	8	66
P 9: KII 2_FLOODS-LANDSLIDES_MUSANZE_BUSOGO	17	2	6	14	22	1	2	13	77
P10: KII 3_FLOODS-LANDSLIDES_MUSANZE_BUSOGO	20	2	5	12	18	1	3	10	71
P11: KII 4_FLOODS-LANDSLIDES_NYABIHU_JENDA	22	2	3	14	16	0	2	12	71
P12: KII 5_FLOODS-LANDSLIDES_RUBAVU_RUGERERO	12	2	5	15	15	0	3	10	62
P13: KII 6_FLOODS-LANDSLIDES_RUBAVU_RUGERERO	14	1	3	10	18	0	2	7	55
P14: KII 7_FLOODS-LANDSLIDES_RUBAVU_RUGERERO	13	2	3	14	15	1	0	7	55
P15: KII 8_FLOODS-LANDSLIDES_MUSANZE_BUSOGO	15	2	2	18	13	0	1	10	61
P16: KII 9_FLOODS-LANDSLIDES_NYABIHU	13	2	6	16	11	0	3	15	66
Total	373	91	141	437	460	77	99	421	2,099

Table 4 codes the data from the FGD and KII transcripts by dimension according to the percentage of mention of issues relevant to the various dimensions in specific FGDs and KIIs. Issues

mentioned by participants fell most often under the *Natural Resources/Environment* dimension, followed by the *Infrastructure* and *Governance* dimensions.

Table 4. Primary documents by dimension code co-occurrence (percent)

Primary document	Governance	Health/Health Services	Human capital	Infrastructure	Natural Resources/ Environment	Psycho-social	Social Capital/ community Networks	Wealth	Total
P 1: FGD_men_floods-landslides_Musanze	15%	7%	5%	20%	18%	6%	5%	23%	100%
P 2: FGD_men_floods-landslides_Nyabihu	13%	1%	3%	24%	24%	5%	3%	27%	100%
P 3: FGD_men_floods-landslides_Rubavu	12%	6%	7%	21%	18%	5%	8%	24%	100%
P 4: FGD_women_floods-landslides_Musanze	16%	5%	7%	17%	23%	7%	5%	19%	100%
P 5: FGD_women_floods-landslides_Nyabihu	13%	5%	11%	22%	18%	3%	6%	21%	100%
P 6: FGD_women_floods-landslides_Rubavu	15%	4%	11%	19%	25%	3%	4%	19%	100%
P 7: KII 1_floods-landslides_Nyabihu	27%	3%	4%	27%	21%	2%	3%	13%	100%
P 8: KII 10_floods-landslides_Rubavu	27%	5%	3%	15%	23%	8%	8%	12%	100%
P 9: KII 2_floods-landslides_Musanze	22%	3%	8%	18%	29%	1%	3%	17%	100%
P10: KII 3_floods-landslides_Musanze	28%	3%	7%	17%	25%	1%	4%	14%	100%
P11: KII 4_floods-landslides_Nyabihu	31%	3%	4%	20%	23%	0%	3%	17%	100%
P12: KII 5_floods-landslides_Rubavu	19%	3%	8%	24%	24%	0%	5%	16%	100%
P13: KII 6_floods-landslides_Rubavu	25%	2%	5%	18%	33%	0%	4%	13%	100%
P14: KII 7_floods-landslides_Rubavu	24%	4%	5%	25%	27%	2%	0%	13%	100%
P15: KII 8_floods-landslides_Musanze	25%	3%	3%	30%	21%	0%	2%	16%	100%
P16: KII 9_floods-landslides_Nyabihu	20%	3%	9%	24%	17%	0%	5%	23%	100%
Total	18%	4%	7%	21%	22%	4%	5%	20%	100%

CHAPTER FIVE. INTERVENTION ENTRY POINTS

The context-specific resilience framework helped identify entry point dimensions for interventions that would have a positive effect on overall resilience of flood-and and-landslide-affected communities in the Northern Region of Rwanda.

5.1. Human Capital

The entry points for this dimension include:

- Deployment of disaster management officers at district level in order to coordinate all disaster management activities including response and recovery, awareness and capacity building, early warning systems and communication systems
- Creation of disaster risk reduction (DRR) clubs in secondary schools countrywide, which can later be merged into the environmental clubs initiated by REMA
- Mainstreaming of DRR into the secondary school curriculum from senior to senior 6 in the general paper course
- Establishment of first responder teams in all sectors to intervene and respond in case of disasters, to be trained and provided with basic skills of search and rescue, evacuation and post-disaster needs assessment

5.2. Social Capital/Community Networks

For effective prevention or mitigation of the effects of floods and landslides, the line ministries—MIDIMAR, Ministry of Agriculture (MINAGRI), Ministry of Natural Resources (MINIRENA) and Ministry of Local Government (MINALOC) should emphasize community work as a *Social Capital/Community Networks* channel to achieve the positive impact of anti-erosion practices.

Strengthening the early warning system for hydro-meteorological hazards and the disaster communication and reporting system is a key entry point for innovation to enhance disaster preparedness while increasing community resilience to disasters. In a community early warning system, information related to disaster risks is transmitted from the central level in the Ministry of Infrastructure to the mobile phone of a focal point person at sector level. The focal point person informs the central level by SMS of the occurrence of a disaster in his or her area. Finally, a toll-free line should be set up for reporting disaster-related cases and refugee issues.



5.3. Infrastructure

The entry point in this dimension should be to reinforce existing global initiatives. For example, the manufacture of resistant roofing material at community level would provide employment and income during disaster response and recovery phases for individuals, cooperatives, associations and others and improve vulnerable communities' economic status and welfare.





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