



ACTION RESEARCH REPORT

SUPPORTING BEHAVIOURAL CHANGE AMONG
AT-RISK INHABITANTS OF RUMONGE
PROVINCE, IN THE REPUBLIC OF BURUNDI, FOR
CLIMATE CHANGE ADAPTATION AND DISEASE
PREVENTION AND RESPONSE

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EXECUTIVE SUMMARY

This report highlights the methodologies, results and lessons learned from an IOM Development Fund funded project implemented by IOM Burundi between September 2019 and August 2021, entitled “Enhancing Natural Disaster Preparedness and Response Capacity in At-Risk Communities in Burundi”.

Burundi is a country facing a range of catastrophic events that often result in a loss of livelihoods, displacement and an elevated risk of disease outbreaks. Most recently, the waters of Lake Tanganyika have been rising steadily, and specifically since the beginning of the rainy season in March 2021, flooding many neighbourhoods and causing significant property damage and population displacement.

To enhance natural disaster preparedness and response in this context, the IOM Burundi Disaster Risk Reduction (DRR) department, Transition and Recovery Division (TRD) and Migration Health Department (MHD) implemented activities focused on addressing the adverse effects of climate change using an integrated approach that combines DRR and the procurement of health and non-health related equipment to prevent water and vector-borne diseases linked to climate change in the province of Rumonge in Burundi.

An initial baseline assessment as well as a vulnerability and risk assessment (VRA) was conducted to identify relevant approaches, methodologies and areas of intervention of project activities, including, Training of

Trainers (ToT) on disaster mitigation infrastructures and on the prevention and response to disaster-related diseases, implementation of soil conservation infrastructure using community-based labour, and the capacity strengthening of local health systems through the provision of basic equipment and material.

Tests conducted both before and after the VRA workshop and ToT sessions showed a significant increase of knowledge among participants concerning the causes, effects, prevention and response to natural disasters, including related diseases (Annex 1 and 2). Participants in both of these exercises, as well as in the implementation of soil conservation infrastructure expressed a willingness to spread their knowledge within the community and implement similar activities in the future, both with support from organizations such as IOM, and by their own means. The project also had additional positive impacts on community members by offering short-term job opportunities during the implementation of soil conservation infrastructure activities, which proved to be particularly important for vulnerable women in the communities.

The flexibility of the programming and heavy focus on context adaptation makes good practices and methodology used in this project suitable for replication both in Rumonge and in disaster-prone communities elsewhere throughout the country.



A child tries to cross a completely flooded road due to heavy rains. © IOM BURUNDI 2020

1. INTRODUCTION

Burundi is a country subject to catastrophic events that often result in a loss of livelihoods, increased displacement, and elevated risk of disease outbreaks. In response to the recurring effects of climate change, natural disasters (e.g. torrential rains, landslides and flooding) and potential disease outbreaks (e.g. malaria and cholera), IOM Burundi implemented a project funded by the IOM Development Fund between September 2019 and August 2021, with the aim to address the adverse effects of climate change using an integrated approach that combines DRR and health promotion for disease prevention and response.

The project's stated purpose was to facilitate capacity-building through: 1) working closely with local authorities and community leaders on designing responses to prevention of disasters and climate change events; 2) collaborating and implementing concrete successful DRR activities to prevent flooding in a manner that can be replicated in other areas of the country; 3) training local authorities and community leaders in public health and providing equipment at health centres in close cooperation with the Ministry of public Health (MoH); and 4) conducting action research to ensure sustainability of project efforts and dissemination of lessons learned throughout the country.

This report is conceptualized based on the question of; how capacity-building trainings support can be effective on behavioural change among at-risk inhabitants of Rumonge, to support climate change adaptation and disease prevention and response.

The aim of the research report is to raise further awareness on population movements and adaptation as a result, and in the prevention of climate change and disease outbreaks towards larger institutional capacity-building for Burundi. The research specifically focuses on how DRR awareness-raising activities can support safety needs of populations affected by natural disasters.

Throughout project implementation, IOM closely observed community beliefs and behaviour related to climate change movements of population and other epidemic diseases coming across natural disasters in order to implement a culturally adapted behavioural change strategy. The process ensured that the chosen DRR responses fit with local values and were appropriate to the environment, and taking into account the perspectives and rights of vulnerable populations. Particular attention was attributed to women's safety and security linked to climate change displacement.

The action research report compiles the methods, results and lessons learned from three key components of the project; the VRA, the ToT on disaster mitigation infrastructures and prevention and response to disaster-related diseases, and the implementation of soil conservation infrastructure using community resources and skills.

2. CONTEXT

Burundi faces risks that combine the devastating effects of natural disasters and disease outbreaks. Environmental migrants and host communities suffer not only from the direct consequences of the events, such as the inundation and destruction of agricultural fields that impact the livelihoods of Burundians living in rural areas, but also from secondary ones such as collapsed infrastructure, the closing of schools, and overcrowded safe spaces. The negative impact on agricultural fields especially disrupts the livelihoods of Burundians living in rural areas. Burundi is primarily an agricultural society and one of the poorest countries in the world, and rural farmers who depend on subsistence farming are disproportionately affected by adverse climate events. Extreme weather events such as torrential rains resulting in flooding and landslides significantly contribute to displacements within the country and increase the risks of diseases being spread.

Since 2015, the negative impact of torrential rains has increased considerably due to climate change. Among the persons that were displaced by the beginning of 2021, 54 per cent were displaced during the previous year, and 80 per cent were displaced due to natural disasters, including flooding (52%), torrential rains (33%) landslides (8%) and strong winds (7%). The majority of displaced persons in Burundi (53%) are women. Studies suggest that by 2050, the average annual temperature in Burundi will increase by three degrees Celsius per year (currently increasing by one), rainfall will rise by 10 per cent, and precipitation patterns will drastically change, whereby only two dry seasons will exist instead of four. These changes will increase environmental risks including the flooding of swamps and lowlands, land degradation and loss of soil fertility, shortage of groundwater resources, extreme weather events, and changes to the growing seasons of crops and forests. Climate change also poses significant public health threats including an increase in the frequency and distribution of water and vector-borne diseases as well as a range of other health and well-being outcomes associated with extreme events.

The province of Rumonge is specifically affected by natural disasters, such as floods, and therefore the local population is particularly vulnerable to the spread of communicable diseases.

The topic of disaster prevention and management was found to be new to the inhabitants of Rumonge during the initial context analysis, both in terms of vocabulary and knowledge, and has yet to be widely popularized. The municipality is still at the stage of structuring the community into various committees at all levels, and of implementing the related action plan. The main constraints to the consolidation of security and the good management of disasters are, among other elements, the lack of means of transport for security agents in case of necessity and lack of training and flexibility among members of the joint security committees. Disaster reduction and management is also impeded by the lack of efficient implementation and monitoring mechanisms, emergency equipment and public awareness on the topic, among others. Some potential for development of the sector exists however, and include the existence of a communal police station, judiciary, joint human security committees at all administrative levels, health facility representatives in the existing communal platform for risk prevention and disaster management and access to disaster management and prevention services, although this too has not yet been popularized at the local level.

This project was initiated shortly after the onset of unexpected and irregular heavy rains in 2018 and 2019 that caused the destruction of 288 fields and 107 homes in Rumonge, displacing 505 persons. During the course of project implementation, the people of Rumonge were also affected by the rising waters of Lake Tanganyika since the beginning of rainy season in March 2021. Three communes out of five in Rumonge were severely hit, namely Bugarama, Muhuta and Rumonge. Nearly 68 hectares of farmland were flooded in the town of Rumonge and in Bugarama. Access to some properties by the lake was also blocked by stagnant waters. Some infrastructures such as the port of Rumonge and the isolation and referral centre for suspect COVID-19 cases, were only a few metres from the water. From 12 April 2021, many households near the shores in Rumonge were flooded and families were forced to leave to evacuation centres or host families. UN OCHA reported that around 8,000 families were affected and 2,000 displaced by flooding in lakeside communities in the area.

3. BASELINE ASSESSMENT

The baseline assessment tool used to inform the project the implementation strategy, including the choice of areas of implementation, ensured synergy between this project's activities and those of the nationwide European Union-funded DRR project entitled: "Strengthening Resilience to Natural Disaster Risks in Burundi (2020-2023)". As such, the assessment conducted at the outset of the project captured more integrated data and took into consideration local actors' perspectives and technical options to select the four collines (hills) for the implementation of disaster mitigation infrastructures. The assessment also supported the development of a countrywide multi-hazard assessment and risk mapping, including all of the communes of the province of Rumonge (see Annex 3 – Dashboard developed based on the baseline assessment conducted in the province of Rumonge).

In September 2020, with the support of Burundian Red Cross volunteers at provincial level, a baseline assessment was conducted throughout the province of Rumonge through a Displacement Tracking Matrix (DTM)/DRR Key Informant (KI) questionnaire to identify the eight most disaster-prone collines in the province of Rumonge, namely Mutambara, Mugara, Birimba, Mugomere, Kanyenkoko, Nkayamba, Kizuka and Mwange. Focus group discussions with six to ten people including women, men, youth and the elderly were subsequently held in order to identify which four of these collines were most fit for the intended project activities; training of local authorities and community leaders on disaster response related to diseases, soil conservation infrastructure and capacity-strengthening of local health systems.

Following the processing and analysis of collected data, the selection of four collines (Kizuka, Mugomere, Mwange and Mugara) was finalized by the local administration and community members. Amongst various challenges raised, the following risks specific to each colline were highlighted during focus group discussions and field visits (see Annex 4 and 5):

1) Kizuka: A large part of the colline located upstream is only slightly covered with trees. During the rainy season, erosion washes away the crops and destroys the soil. As a result, the soil becomes infertile, which can lead to famine.

2) Mwange: Strong winds and torrential rains often wash away houses, latrines and fields. The Dama River also washes away houses and fields when it overflows. In addition, the river has split in two and one of the mouths now leads directly through crops.

3) Mugomere: Heavy rains often cause road damage, which can lead to areas becoming inaccessible. The Mugomere Cemetery is also threatened by run-off water from neighbourhoods and sub-collines upstream and requires protection. The most important need identified by the community was the protection of the road and cemetery by anti-erosion measures.

4) Mugara: Some of the sub-collines are at a high altitude leading to landslides when heavy rains occur. As a result, the roads become inaccessible and bridges and crops are destroyed.

The focus group discussions were found to highlight additional aspects not captured by the quantitative assessment conducted through DTM questionnaires, and resulted in a different choice of collines than, not that would have been the case otherwise. For example, the choice of Mugomere colline over the collines of Kanyenkoko or Birimba, was justified because of the runoff damages on the road. This same water continues to flow at high speed and also affect the colline of Birimba, causing the destruction of houses and latrines, while also damaging the fields.

As for the choice of Mugomere colline, anti-erosion activities there were expected to avoid floods caused by the overflow of the Murembwe river, but also greatly reduce the impact of hazards (torrential rains, landslide) in the collines of Birimba and Kanyenkoko which are situated downstreams from Mugomere.

Lastly, the data collected through KI interview questionnaires combined with other DTM data related to communes with the most displacements due to disasters, were further analysed to select the most relevant health districts to be equipped. Based on this assessment, three health facilities were chosen including Rumonge hospital, Mwange health centre and Mutambara health centre. Needs assessments (see Annex 6) were conducted together with the head of the health province and the head of Rumonge health district in the three health facilities, based on which a selection of material was provided by IOM according to priority (see Annex 7).



4. VULNERABILITY AND RISK ASSESSMENT

In the initial stages of the project, a VRA workshop was conducted in the commune of Rumonge in the province of Rumonge. The VRA methodology, put in place by Oxfam and further developed by IOM, aims to develop a common understanding among a wide range of stakeholders with regards to the main risks and problems affecting people in the area, and to jointly design measures to reduce these risks. The methodology consists of a participatory process of identifying vulnerabilities, risks, capacities and future and existing ambitions. Community leaders in the four intervention collines of this project used the results of the VRA to identify activities to reduce disaster risk in these collines.

In the context of VRA, the term “vulnerability” includes risks, but also the capacities of individuals and the municipality to react, adapt and overcome these risks. The VRA brings together actors from different sectors of the decentralized services of the municipality to better understand the links that unite these levels of governance. The aim is to inspire stakeholders to come up with proactive approaches and ensure that development initiatives are guided by inclusive and locally responsive decision-making that benefit poor and marginalized people. The VRA thus aims to create a sense of empowerment and collaboration among stakeholders. In addition, the participatory, democratic, and inclusive aspect of this type of context analysis, makes it possible to set up a real dynamic process of social change.

Moreover, including administrative officials and local leaders (traditional, political, economic, religious) in these analyses allows not only for defining a solid basis for the appropriation of the strategies identified and validated in the action plan resulting from these analyses; but also to initiate an intervention approach integrating gender and advocacy at the local level.

In summary, the four steps of the VRA process can be described as follows:

- **Step 1. Identification of hazards:** This phase allows the knowledge group to make the initial assessment of major hazards and prioritize between them, and to conduct a mapping of the municipality taking into account the capacities of the latter and the location of the places affected by these hazards.
- **Step 2. Analysis of capacity and vulnerability:** Analysis of the severity of damage caused by a hazard and identification of factors that increase or decrease negative impacts.

- **Step 3. Analysis of the impact chain:** The exercises in this step allow the knowledge group to assess the chain of causes of risks as well as short and long-term implications (consequences), by relating their impacts on the entire operating system of the municipality. This step also generates ideas on measures / solutions that can be implemented to reduce the impact of hazards on the community.

- **Step 4. Alignment of results and possibilities:** This stage allows members of the knowledge group, in collaboration with local leaders, to locate the major risk among those identified relevant to each sector of intervention. Furthermore, local stakeholders in each sector of intervention are identified, and actions to be taken in the short and long term are determined for the different sectors. This activity also enables participants to examine which of the identified measures could be included in the current annual investment plans.

Results

The VRA workshop conducted in the commune of Rumonge allowed for the identification of preliminary community-based action to be implemented to address short and longer-term disaster risks in the commune. Generally, the VRA aims at developing a common understanding among a wide range of local stakeholders about the main hazards, vulnerabilities, strengths and needs for further support in the community, to then jointly design measures to reduce risk, enhance well-being and promote resilient development in that landscape.

During the first visit to the commune of Rumonge, the objective was to choose the members of the knowledge group, including 15 people from the Communal Platform for Risk Prevention and Disaster Management representing the various concerned departments of the administration, as well as representatives of the vulnerable social groups and associations in the municipality in the field of disaster risk reduction.

The workshop started with an introduction by the facilitators, a more in-depth presentation of the participants and the establishment of the rules of conduct during the workshop, especially how the logistics management of the workshop would be organized.

After initial introductions, the workshop presented key DRR terms in Kirundi for further understanding by the participants. These key terms are among others: hazards, disaster, risk, vulnerability, capacity, conflicts and issues. The presentation continued with the different examples of disasters and their impacts on people and their property.

The workshop participants expressed themselves by showing their concerns about the capacity of the community to deal with different climate-related hazards.

The lead facilitator presented the VRA methodology as well as the VRA core principles: participation, facilitation rather than training, democracy and inclusiveness. The concepts of exposure and sensitivity were also explained so that participants could better understand the VRA process.

Step 1: Identification of hazards

The participants made the distinction, in order of priority, between landslides, floods and heavy winds as the most pressing risks in the commune of Rumonge, and they pinpointed which areas were most affected by these risks. Landslides and floods were, according to the participants, mainly observed between November and April, while strong winds between September and April during the last three years.

Step 2: Analysis of capacity and vulnerability

Participants analysed vulnerability and capacity in five dimensions for each of the three hazards. In summary, based on the cross-checked results, the most vulnerable groups were found to be children, women, the elderly and the disabled. Their vulnerability is compounded by the occurrence of diseases such as cholera and malaria, which often result in loss of life within these groups. In addition, the identified hazards cause loss of arable land and crops, the demolition of mountains and infrastructure (roads, bridges, water supplies, schools, health facilities, etc.), deforestation and a lack of grazing land, which can lead to conflicts between inhabitants and incidents of crime. Social life was also found to be affected through an increase in school dropouts and migration. From an economic point of view, the occurrence of these hazards impacts the commercial, agricultural and pastoral sectors and causes a general increase in food market prices.

In terms of capacity, the presence in the commune of other humanitarian actors working in the field of disaster risk reduction, such as GIZ through its ACCESS project, contributes greatly to the resilience of the population. The latter intervene in the reinforcement of institutional capacities but also of the population, notably in the development of contour lines and the planting of trees and soil-fixing grasses. The population also has telephones, drums and a community radio station called "IZERE FM" broadcasting from this commune, which can contribute in different ways in this area, notably by transmitting alerts in the event of a disaster.

Step 3: Chain of causes and impacts

In the third step, the participants identified causes of disaster, and possible solutions. As in the previous step, these two elements were analysed for each of the three hazards. The synopsis allowed for the identification as main causes climate change, deforestation, environmental destruction, non-respect of urbanization rules, anarchic river cleaning in search of rubble, gravel and sand, unprotected mountains (slopes), etc. As consequences, the loss of land and infrastructure, soil infertility, reduced production, loss of human and animal life, increased gender-based violence, reduced fish production, etc. were reported. The main solutions cited included reforestation of collines, development of contour lines, construction or rehabilitation of gutters, household water management, adoption of appropriate agricultural methods, awareness-raising on the eradication of bush fires, planting of trees and soil fixing grasses and awareness-raising respecting relevant laws related to environment, water codes, etc.

Step 4: Alignment of results and opportunities

The final step of the VRA process enabled the solutions identified in the previous step to be grouped into six pathways for social change, namely securing and strengthening livelihoods, gender justice and empowerment, knowledge and information, learning and innovation, flexible long-term planning and responsible governance and accountability.

For the first pathway, participants singled out as solutions for the three hazards consisting of planting agroforestry trees, building houses with sustainable materials, digging contour lines, planting trees on mountains or along rivers, planting trees of resistant varieties, cleaning contours and gutters, digging rainwater drainage channels, cleaning up rivers, setting up tree nurseries, and raising awareness on environmental protection.

For the second pathway, the participants mentioned sharing of decision-making power related to DRR, working with organizations that are inclusive and representative of different vulnerable social groups, joint decision-making on actions to be taken to protect the environment, participation of men and women in the management of family assets, joint decision-making on actions to be taken within families and communities, and working with associations representing the social strata of the community.

Regarding the third pathway, the participants underlined the creation of a radio programme to talk about DRR, training on different methods of prevention and management of violent winds at school level, awareness-raising on environmental protection in schools, reinforcement of youth clubs focusing on environmental protection, and capacity-building of organizations able to work in DRR domain.

For the fourth pathway, the participants raised the organization of practical sessions on the installation of agroforestry nurseries, awareness-raising on short-slope house construction, launching communiqués in crowded places like churches, placards and the preparation of related sketches, the setting up of early warning systems in public places, and sensitization of the community through sketches and theatres.

With regards to the fifth pathway, the participants singled out the installation of nurseries during the month of August and their regular monitoring until maturity, inclusion of activities in Community communal Development Plan, organization of meetings for prevention activities in DRR, sensitization of the population to dig the marshes, building of retaining walls around infrastructure, and planting trees and grasses.

Relating to the sixth pathway, it was mentioned that a strategic fund for hazard management must be established, and its use monitored. Also, the administration should focus on raising funds for DRR activities, rebuilding public health infrastructures, setting up public waste bins, organizing training on DRR for the local administration members and putting into practice procedures for holding environmental destroyers accountable.

In order to assess whether the workshop had improved the participants' knowledge of risk and vulnerability analysis following the workshop, a test was carried out both before and after the group work and the discussions on different notions of the DRR theme. The questionnaire dealt with some terminologies in the field of DRR. In the pre-test, the lowest score obtained was 5/20, and the highest was 18/20. After the training, the lowest score was 12/20 while the highest was 20/20. In sum, 84 per cent of the participants demonstrated a very high level of progress by obtaining a score of 70 per cent or higher after the training. The participants also expressed their satisfaction with the content and the form of the workshop informally as well as showed interest in exchanging on the content of the workshop with peers for a better appropriation and integration of the concept of DRR in the community of the Municipality of Rumonge. Given their local knowledge, community members are well placed to indicate the areas and localities at risk and giving examples of real or potential victims of the hazards.



The devastating effects of the floods, caused by the heavy rains, are undeniable. © IOM Burundi 2020

Lessons learned and recommendations

The VRA workshop is a knowledge building exercise for participants who come from the municipal platform and other existing social groups in the municipality, which was not an entirely new notion for the people of Rumonge. The participants came from different social groups and did not have the same level of understanding of more technical concepts such as risk, vulnerability, hazard, exposure, etc. Nevertheless, participants with less education progressed at the same pace as the others because all exchanges were done in Kirundi.

Before getting to the heart of the workshop, participants expressed their expectations for the entire period of the workshop. Most of their expectations centred on the hazard “flood”, caused by Lake Tanganyika, threatening the inhabitants of the capital of the commune of Rumonge. At the outset, the participants expressed wanting “direct” technical support for household protection. Gradually during the course of the workshop, the participants understood at what stage this intervention was, more specifically the identification of hazards as real as probable and the potential of the municipality for the protection of the population and their assets.

The inclusion of people with an interest and technical expertise in the socioecological issue at hand, as well as people from vulnerable social groups local authorities, enabled the identification of hazards and associated risks and their causes and consequences. It also ensured that proposed solutions were adapted to the local context and took into account the perspectives of vulnerable groups and persons in the commune.

Future efforts aimed at identifying risks, vulnerabilities, capabilities and developing action plans by local, national or international actors would also benefit from ensuring a broad representation of different actors throughout the process.

The final step, which allowed for the identification of avenues for social change towards realizing the identified solutions, was particularly appreciated by the participants, as it offered concrete suggestions for how community members can contribute to resilience against disaster and related health crises. Actors working with disaster risk reduction should therefore aim to make the elaboration of avenues for social change together with community members an integral part of their efforts to support community resilience.

Lastly, it is of utmost importance that humanitarian and development actors at all levels coordinate their efforts for the same goal and for the benefit of the same communities for better risk and disaster management.

5. TRAINING OF TRAINERS ON DISASTER MITIGATION INFRASTRUCTURES AND PREVENTION AND RESPONSE TO DISASTER-RELATED DISEASES

The province of Rumonge has been affected by a range of different disaster risks, including in particular cholera epidemics, malaria epidemics, flooding, gullies and road accidents. To enhance the resilience and preparedness to disasters and subsequent effects on lives and livelihoods, two sessions of training of two days each for 62 key community leaders and local authorities (27% women and 73% men) were carried out on disaster response related to diseases. One of the training objectives was to identify a network for effective coordination of prevention and response activities to health emergencies caused by natural disasters. The training focused on the prevention, preparedness, and response to disaster-related diseases such as cholera and malaria. Additionally, the participants were trained to disseminate the acquired information to all members of the affected communities.

The participants included representatives of local administration, police, Rumonge community leaders, and health centres. The facilitators during the training included one official from the Ministry of health (MoH) headquarters; the Health provincial Director, the Health District Director of Rumonge and one member of the Communal platform. IOM staff supported the event through facilitation and logistics. The purpose of the training was to strengthen the capacities of local authorities and community leaders in the commune of Rumonge on prevention, preparation and response to health emergencies linked to natural disasters.

The methodology applied was interactive and participatory, focusing on the techniques and principles of andragogy related to disaster risk management and disaster-induced health emergencies. Such an approach enabled participants to better assimilate the material and pass it on to others in turn. In general, this involved interactive dialogue or brainstorming; group works and practical exercises with feedback in plenary; and viewing of a documentary film on the impacts of natural disasters in Burundi followed by discussions, debates and PowerPoint presentations on the material to be developed later.

Participants were eager to learn about health emergencies induced by natural disasters (and questions asked during the training). IOM staff, local authorities and MoH facilitators replied to these questions according to their fields of expertise and demonstrated how they can help in the prevention of diseases induced by natural disasters in their respective community with means of a good collaboration and continued dialogue among all stakeholders.

A knowledge assessment on key points of the training for the 62 participants was carried out by the facilitators. As a result, 69 per cent (n=43) of the trained participants demonstrated an enhanced knowledge on disaster mitigation, prevention, and response by scoring 70 per cent or higher, compared to 0 per cent of the participants achieving this score before the training.

In conclusion, the local authorities and community leaders participating in the training expressed their commitment to mitigate, prevent and respond to any disease related to climate change by adopting specific health measures coupled with promoting community members engagement to preserve the environment.

The survey conducted four months after the training further showed that out of 185 respondents, 91.35 per cent disseminated climate change adaptation measures in their community, 83.24 per cent revealed that adaptation measures were being implemented in their community, 92.4 per cent testified that disaster risks were identified in their community and 80 per cent said that they had provided suggestions in their community for better integration of climate change adaptation measures. Based on the positive results observed, IOM will seek opportunities to replicate similar actions in other at-risk regions identified, such as Bujumbura Mairie and Bubanza (see Annex 8).

After the training, it was agreed with the trainees that they would coordinate with IOM to organize awareness-raising sessions in their communities of origin on preparation and response to climate-related disasters and related disease outbreaks. Due to delay caused by the COVID-19 preventing IOM staff from going to the field, the community sensitization activities were delayed. As a result, a refresher training was organized prior to the trainers' deployment to further raise awareness in their respective community. To ease their work, image boxes were developed and distributed to all the trainers with information about disasters and related diseases in Kirundi (see Annex 9).

Community awareness-raising sessions were carried out during three days in the collines of Kizuka, Mwange, Mugomere and Mugara. In order to respect physical distancing and avoid the spread of infection of COVID-19, the sensitizers adopted a door-to-door strategy. A total of 2,789 households, equivalent to 11,515 family members, were reached with messages on prevention and response to infectious diseases induced by natural disasters (see Annex 10).

The training, as well as the community sensitization, led to the following lessons:

Lessons learned and recommendations

1. Bringing together different strata of the community in a training on health emergencies induced by natural disasters allowed an exchange of ideas and the elucidation of certain ungrounded beliefs prevalent at the community level;
2. The organization of supported community awareness sessions resulted in the coverage of a large number of households in a short time;
3. The sensitization conducted by ToT participants in their own communities using illustrations and examples from the community enabled community members to better understand how they can reduce the risks of being affected by natural disasters and related diseases.
4. Door-to-door sensitization allowed community members to openly express the problems affecting them.

Actors working with disaster risk reduction and disaster-related diseases are recommended to:

1. Extend the training on health emergencies induced by natural disasters to community leaders from other collines of the commune of Rumonge and even to other communes that present the same risks as Rumonge;
2. Provide participants with manuals on the themes developed in local languages;
3. Organize the training sessions in places far from the commune of Rumonge to avoid disturbance during the training period;
4. Organize other community sensitization sessions to reach as many people as possible in the commune;
5. Organize mass distributions of long-lasting insecticide-treated nets;
6. Organize mass distributions of at home water treatment products in the quarters affected by floods;
7. Provide the communal platform with products and materials for systematic disinfection of households to fight against cholera and malaria;
8. Facilitate access to health care for community members living in poverty through the provision of medical assistance cards.

6. SOIL CONSERVATION

Based on the choice made during the baseline assessment, soil conservation infrastructure was implemented in the four collines of Kizuka, Mugomere, Mwange and Mugara in the commune of Rumonge. As Mugomere colline was found to be most affected by, and at risk of, natural disasters, the activities were conducted on a greater scale and the colline was thus divided in two as Mugomere 1 and Mugomere 2.

The purpose of the soil conservation activities was to address some of the ecological root causes to disasters and soil erosion to enhance the resilience of communities at risk. To this end, IOM implemented five Quick Impact Projects (QIPs) consisting of the construction of soil conservation infrastructure designed to slow down the velocity of water, essentially creating protection from flooding. The activities were as follows:

- Soil erosion barriers were to be dug on steep slopes in vulnerable areas pre-identified in coordination with the authorities. For this purpose, two comparative anti-erosion control systems were set up. On each colline, both continuous and discontinuous contour lines were dug out, in order to be able to compare the different impact from the two methods.
- Trees and grasses were planted contributing to soil conservation, slowing down the velocity of water to protect against flooding, and positively contributing to a healthy ecosystem.
- The development model was used including hiring local community members to dig soil erosion barriers and plant trees, rather than hiring people from other areas to do the work. These short-term job opportunities were provided with the aim to support economic development of the most vulnerable beneficiaries, including returnees, internally displaced persons (IDPs), host community members, people with disabilities, and women, especially single mothers head of households. This allowed families to earn an income while contributing to the improvement of their ecosystems.

- A training on techniques for implementing soil conservation was provided to 50 community members per intervention, totaling 250 beneficiaries. The training was conducted jointly by IOM staff, the commune agronomist and agriculture monitor for each colline, and focused on soil conservation, reforestation, and the value of protecting ecosystems.

Key community leaders and local authorities were engaged at every level of implementation to strengthen their understanding of flood prevention through an ecologically and environmentally sound way.

Results

The soil conservation QIPs were implemented in a satisfactory way in the five areas of Kizuka, Mugomere 1, Mugomere 2, Mwange and Mugara. The local administration was fully implicated throughout project implementation, strengthening project ownership and sustainability. These aspects were further strengthened by using community members as labour to implement soil conservation infrastructure as Cash for Work (CfW) beneficiaries. The CfW beneficiaries included 151 women and 99 men from the three social categories, returnees (16,4%), IDPs (36,8%) and host community members (46,8%). A total of 63,542 metres of contour lines were dug on the five collines, distributed as follows: 10,585 metres in Kizuka, 15,220 metres in Mugara, 13,971 metres in Mugomere 1, 14,019 in Mugomere 2 and 11, 402 in Mwange.

Additionally, 50,000 tree seedlings are currently growing in biodegradable germinators, and grasses will be planted together with grasses along the contour lines by community members. The trees and grasses will be planted during October and November 2021 when the rainy season has started, and function as vegetative barriers to control soil erosion. The water flowing down the slope picks up soil and when it reaches a contour barrier it slows down, the soil particles settle out, and more water enters the soil instead of continuing down the collines.

TABLE 1: METRES OF CONTOUR LINES DUG PER WEEK ON EACH COLLINE

COLLINE	KIKUZA	MWANGE	MUGOMERE I	MUGOMERE II	MUGARA	TOTAL
Week 1	791	800	520	520	1,560	4,191
Week 2	1,133	1,239	2,500	2,500	2,710	10,082
Week 3	1,697	1,073	2,400	2,400	2,740	10,310
Week 4	1,512	2,190	2,400	2,400	2,820	11,322
Week 5	2,031	2,000	2,400	2,400	2,590	11,421
Week 6	1,761	2,050	2,250	2,250	2,200	10,511
Week 7	1,255	1,600	1,125	1,125	600	5,705
Week 8	405	450	376	424	0	1,655
Total	10,585	11,402	13,971	14,019	15,220	65,197

The result of the two comparative anti-erosion systems will take several years to appear, but if maintained and followed up by the communities and IOM, it will be able to inform future soil conservation initiatives in Burundi and beyond.

It was the first time this kind of activity was conducted on the selected collines. Local authorities and the local community were appreciative of IOM's intervention for the protection of the environment in their communes, indicating that the activities have contributed to changing their mindset and showing them that establishing contour lines is a good way of preventing soil erosion and protecting the environment. The local authorities expressed a willingness to continue this kind of the activity on a smaller scale. Specifically, the communities are planning on digging additional contour lines during community works that are often done in the province. The local communities as well as the beneficiaries also requested the support of IOM to implement similar projects on other collines in the province of Rumonge.

The overwhelming majority, over 98 per cent, of the 621 respondents in the endline survey claimed to be familiar with anti-erosion techniques and 92.75 per cent claimed to be familiar with watershed protection techniques. Some of these techniques included mulching, agroforestry, and the construction of ditches and terrasses. Ninety (90) per cent of the respondents had received training on soil conservation techniques, and 90 per cent said they would continue using some of these techniques in the future.

The main reason (61%) for not intending to continue using the soil and water conservation techniques was that they had already been implemented. Sixteen (16) per cent claimed that the techniques would be too expensive, and another 16 per cent that they were too difficult to implement. Only 5.5 per cent said they would not use any of the techniques because they considered them to be ineffective (see Annex 8).

The CfW received during project implementation enabled beneficiaries to pay debts and rent, invest in their children through school fees and glasses, buy small pieces of land and invest in livelihood by buying livestock or initiate small trade in fruit, vegetables, fish, beverages or charcoal. In terms of streamlining gender throughout implementation, the CfW beneficiaries included a higher number of women (151) than men (99). Women head of households are often vulnerable and lack sufficient livelihood opportunities, and the participation in the construction of soil infrastructure gave the beneficiaries the opportunity to work and receive income. For women in particular, the earned income allowed them to resolve family issues that they had prior to the project activity. Beneficiaries also mentioned that if these kinds of activities, or other development projects using the approach of CfW, were to be replicated in other parts of the province, it could considerably reduce the number of persons, especially women, wanting to travel to the Middle East to find job opportunities. In turn, this could mitigate the risk of women and young girls becoming victims of human trafficking outside of Burundi.

Lessons learned

During the first three weeks of work it was noted that the picks and shovels were very stressed due to the hardness of the ground. The work sites in Kizuka and Mwangi collines were found to be very rocky compared to those in Mugomere and Mugara collines, as showcased by the distances dug per colline (see table 1).

As pickaxes were breaking, the beneficiaries were made aware of how to borrow tools from their neighbours, while some beneficiaries took to the initiative to bring the broken tools to welding shops for repair. This good practice was subsequently being picked up on another colline as well. There were also other types of material were damaged due to bad quality and presence of trees and shrubs, such as decametres. In order to continue their work, beneficiaries organized themselves in groups of five to lend material and tools from each other. They also organized their work so that one person could dig while the other cleared the excavated earth. This meant that work could move further without frustration or significant delays despite lack of tools. It was also noticed that at the start of the campaign for the digging of anti-erosion pits, it would have been necessary to provide some human resources for staking the isohypse curves indicating the contour line for the beneficiaries to follow while digging. Lacking these resources, the agricultural monitors mobilized three people in each team to be responsible for supporting the teams in the picketing when the other beneficiaries were digging pits. Through this practice, the agricultural monitors managed to avoid the under-employment of the beneficiaries.

One of the lessons learned in this regard is to be vigilant to acquire good quality performance picks in order to improve the quality of the work and also the physical achievements in the development of the contour lines. High-performance equipment kits in sufficient numbers (especially pickaxes and shovels) would allow beneficiaries to move quickly in terms of volume of work and the time taken to complete their task. At the same time, overcoming the challenges faced together allowed the beneficiaries to engage in problem-solving and support each other within and between communities, showcasing the social cohesion benefits of using a CfW modality in development programming.

Another challenge faced during implementation was that the soil seemed easy to dig at first, but became harder as the beneficiaries were digging. This was further exacerbated by the dry season.

The conclusion that can be drawn from this was that the results of soil conservation QIPs heavily depends on the season. The best period for conducting these kinds of activities in Burundi seems to be one to two months before the end of the great rainy season (March-May), which should be taken into account in further activities of this kind in the rest of the country.

Recommendations

Resilience to disaster.

Catastrophic events, including natural disasters such as floods and heavy rains, can result in loss of livelihoods, displacement and elevated risk of disease outbreaks. Implementation of soil and water conservation activities in at-risk communities can increase resilience through protection crops, public infrastructure, and houses. These kinds of activities can also increase agricultural harvests, and prevent disaster-related diseases such as malaria and cholera.

Community work initiatives.

Considering that natural disasters affect all of Burundi, many communities could benefit if national and local authorities set up a rigorous system of community work for soil and water conservation activities. Such a system would support community ownership and sustainability.

Working together.

In areas with a high number of returnees and IDPs, implementing soil and water conservation activities together across different social groups gives community members an opportunity to work together for the common good of the community, while also building stronger relationships between community members.

Soil conservation through contour lines.

Contour lines or anti-erosion ditches dug in watershed slopes can help protect communities from flooding due to heavy rain. With the help of a slope triangle, community members in charge of activities can determine the appropriate depth and width of contour lines, as well as the interval between. In the commune of Rumonge, the communities dug contours from upstream to downstream of the watershed with 8 x 6 cm dimensions, which proved to provide satisfactory protection according to local authorities. There are different ways to dig contour lines, and in Rumonge, the communities implemented two different types; continuous and discontinuous contours, to determine in the long run which technique is most suitable in this specific area.

As it will take a minimum of five years until results can be meaningfully compared, the community was sensitized to observe the progression of the two types of contours and continue practicing the best method in future soil conservation activities in the area.

Organization of work.

Team leaders, ideally a specialist in soil conservation (agronomist or colline agricultural monitor) together with chiefs of collines, can instruct community members in the soil conservation techniques suitable for the area in question, and assign tasks and responsibilities. The appropriate distance to be dug by each person per day will have to be adapted according to the availability and capabilities of each community member, and will also need to take into account the structure of the soil (cultivable soil or rocky soil which is hard to break). In Rumonge, community members were able to work for nine hours per day, and could dig between seven and 10 metres each.

Equipment for contouring.

In order to dig contour lines, communities need to have access to farming equipment (hoes, poles, peels, handles and pickaxes) and protective gear (boots and gloves). A slope triangle is also needed to measure the slope of the watersheds in order to determine the interval between one contour line and another, the depth to be dug and the width to be respected. Hoes are used to dig the sandy soil part, pickaxes are used to dig the clay soil part, digging bars are used to dig rocky soil and a shovels are used for collecting the excavated soil and clearing the inside of the contour lines.

Tree nurseries.

Collines can be even better protected against floods by planting trees and grasses along the edges of contour lines. To do this, tree seedlings of different kinds can be planted in shaded tree nurseries until they are big enough to be planted along the contour lines. Nurseries should ideally be set up close to a water source (river or well) to be able to irrigate during the dry season.

The choice of the species to be germinated should be adapted to the area in question. In Rumonge, the species of trees were adapted to the region of Imbo (where Rumonge is located) and the germinators used were biodegradable germinators made of banana leaves, with the aim of preserving the ecosystem and avoiding the pollution of nature.

Season for implementation.

In countries with dry and rainy seasons, the soil conservation/contouring activity should be done during the rainy season. During the dry season, the soil is too hard to dig, and it is not possible to plant the contour-fixing trees and grasses. The best season to dig contour lines in Burundi is the cultivation season called Season A, from September to February.

During this time, it is easy to follow the action of the contour lines in the decrease of the runoff water, and it is also the season that is the best for the plantation of trees and fixative grasses on the contour lines because the rainwater is sufficient for the recovery. For the nursery, the best season is the cultivation season called Season B, from February to June. Based on the species of trees, those with a lot of dormancies should be installed in nurseries in March and April, and those with direct germination (without dormancy), should be put in nurseries during the month of June.

Spreading awareness.

Local authorities and community members who have had the opportunity to receive training in soil conservation practices can lead implementation in their own communities or properties to serve as a model for other community members and members of neighbouring communities. They should further try to spread their knowledge about avoiding soil exposure, planting soil-fixing trees/grasses and fallowing arable land for better harvest to others in order to raise awareness more broadly in at-risk communities on proper soil conservation/protection.

7. CONCLUSIONS AND WAY FORWARD

This action research was guided by the question of how capacity-building trainings support can be effective on behavioural change among at-risk inhabitants of Rumonge, to support climate change adaptation and disease prevention and response.

Already positive indications of behavioural change could already be observed during the project implementation. The test conducted before and after the DRR training showed a drastic increase in knowledge among the participants, from 0 per cent to 69 per cent responding correctly to more than 70 per cent of the questions. While this does not account for behavioural change, knowledge is a fundamental prerequisite. The endline conducted four months after the training confirmed the behavioural change, indicated by 80 per cent of the respondents claiming they had made suggestions in their community for better integration of climate change adaptation measures. These results indicate the positive effects of the ToT approach, as local leaders take ownership of disaster risk reduction efforts and spread their knowledge within their communities.

For the TRD component, providing training to community members on soil conservation techniques has arguably been instrumental for the expressed motivation in the communities to apply similar techniques in the future. This also supports the sustainability of the projects, as community members are responsible for the maintenance of the irrigation canals, tree nurseries, and planting of trees and grasses during the upcoming rainy season. If the QIPs would have been implemented by an external workforce, or community members without complimentary training on the methods, the knowledge needed for maintenance and replication might not have been present in the communities after the end of the project.

As apparent from the endline survey, 90 per cent of the respondents said they would use the techniques learned during project implementation in the future, indicating a behavioural change among community members to undertake soil conservation activities and thereby contributing to the resilience of communities in the face of natural disasters.

The combination of VRAs, ToTs on disaster mitigation infrastructures and prevention and response to disaster-related diseases, and soil conservation infrastructure enabled IOM and local communities to reduce the risks and effects of natural disasters in the areas of intervention through a range of complementary approaches. To complement this further, the project included a component whereby health facilities were equipped with material to better combat diseases brought by or exacerbated by natural disasters. By adopting the methodologies of ToTs as well as community-based labour, community members were provided with the knowledge needed to replicate the activities to further strengthen their disaster risk reduction capacities. Given the flexibility of the methodologies used, this kind of project could effectively be replicated by IOM and other stakeholders both in Burundi and in other areas affected by natural disasters. Furthermore, the positive reception among community leaders and members of the project activities, and expressed willingness to replicate these not only with outside support but also by communities themselves, indicates that the approach used did indeed bring about behavioural change among at-risk inhabitants in Rumonge.



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