

## LANDSLIDES IN EQUATORIAL AFRICA:

Identifying  
culturally, technically and  
economically feasible resilience strategies

---

# LANDSLIDES POLICY BRIEFS

---



Copyright © 2018, AfReSlide

All rights reserved. This booklet, or any portion thereof may not be reproduced or used for commercial activities or without the written permission of the authors, except for the use of brief quotations, mentioning the full reference provided below.

The content of this booklet falls under the sole responsibility of its authors.

How to cite this document:

Mertens, K., Jacobs, L., Maes, J., Bih Che, V., Bwambale, B., de Hontheim, A., Dewitte, O., Kabaseke, C., Kagou Dongmo, A., Poesen, J., Vranken, L., Kervyn, M. 2018. Landslides Policy Briefs. *AfReSlide: Landslides in Equatorial Africa, Identifying culturally, technically and economically feasible resilience strategies*. 12p.

ISBN: 9789090308173

EAN : 9789090308173

Depot nummer (Belgium): D/2018/Kewan Mertens, uitgever

This manual is intended for policy makers in the Global South that are interested in landslide risk and their impacts. It presents findings and practical recommendations from a project titled:

**“AfReSlide - Landslides in Equatorial Africa: Identifying culturally, technically and economically feasible resilience strategies”**

The manual provides specific policy recommendations that could help to reduce landslide disaster risks.

Each leaflet in this book addresses one specific question and provides policy recommendations regarding hazard and impact assessment, risk management at individual and policy level, as well as guidelines to identify appropriate disaster risk reduction techniques. The AfReSlide project focused on Uganda and Cameroon, but the findings are relevant for many countries affected by landslides in the Global South.

AfReSlide is a research project conducted by four Belgian universities and research Institutes (VUB, KU Leuven, ULB, RMCA) in collaboration with several Universities in Uganda (Mountains of the Moon U.) and Cameroon (U. Buea, U. Dschang). This project was supported by the Belgian Science Policy BELSPO in the framework of the BRAIN-be programme and the VLIR UOS South Initiative, ZEIN2013Z145, called 'Diagnosis of land degradation processes, their socio-economical and physical controls and implications in the Mt. Rwenzori region'.



# WHAT IS A LANDSLIDE?



Landslides are the sudden movement of soil material down a slope. They vary greatly in size and speed. Most landslides are triggered by rainfall and/or earthquakes. In some cases, human activities can favour landslide occurrence. Landslides cause poverty, loss of lives, crops and property, worldwide.

## How to read



Recommendations for local government representatives



Recommendations for national government representatives



# 1

## WHY LANDSLIDES SHOULD BE REPORTED AND REGISTERED

### Findings from the AfReSlide project:

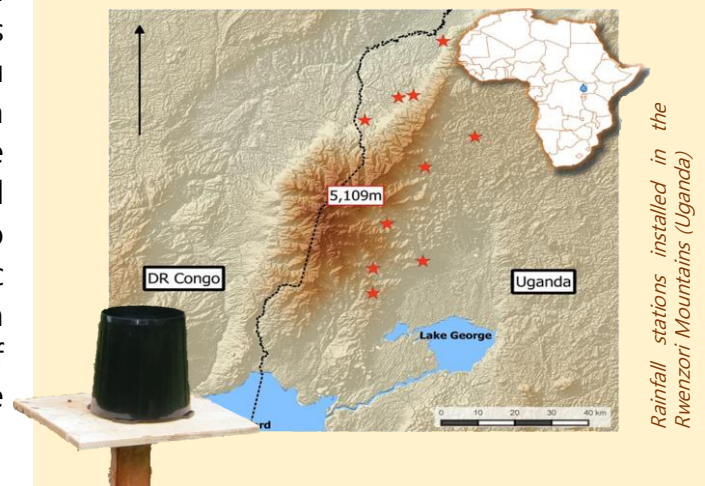
Global landslide inventories are intended to highlight landslide-prone areas. However, landslides in central-Africa are virtually absent from these inventories, which could falsely create the perception that they do not occur in these regions. The Rwenzori Mountains and the Cameroon Volcanic Line are an example of this. They were not recognized at the international level to be landslide-prone before the start of the AfReSlide project.

Data collection on landslide events and the damage they create is necessary to understand landslide triggers and predict their geographical and temporal occurrence. Detailed archive analysis and field surveys in the Rwenzori and Elgon regions in Uganda, the Kivu region in DRC and in the Bamboutos in Cameroon provided extensive landslide inventories. These inventories enable to study which rainfall and earthquake events trigger landslides. They allow to understand the topographic, geologic and climatic factors controlling the spatial and temporal distribution of landslides. This leads to the production of susceptibility maps which provide insight on where landslides are likely to occur in these regions.

Recently, a continuous registration network of landslide events was set up in the Rwenzori region. Geo-observers are registering new landslide events in their communities using a smartphone application. This will provide the necessary data to do landslide hazard assessments, i.e. to predict when and where landslides can occur.

Putting landslides on the map is needed, and it is **the first step** in recognizing, assessing, investigating and tackling the risk they entail for the population.

*Mountains of the Moon University maintains 10 automatic tipping buckets which measure rainfall each hour.*



*Information from geo-observers, combined with your information on new landslide events (when and where did they occur?), can help the researchers to understand the relation between heavy rainfall and landslides, so that the establishment of early warning systems becomes possible.*



### What can I do as a government representative?

- Develop and maintain a database containing the information on new landslides, including their location, timing and impact so that you can assess who, and which area, is affected and how the situation evolves.
- Identify a service in charge of maintaining such database, which can act as a contact point for the population and bridge the gap between the population, academics, NGOs and other organizations
- Record new landslide events and motivate the residents of your district to report new events to your authorities. It increases the awareness locally and abroad (NGO's, national government, international research agencies,...), but it is also needed to better understand what triggers the landslides. This knowledge is crucial to predict future events.

### FURTHER READING

Jacobs, L., Dewitte, O., Poesen, J., Delvaux, D., Thiery, W., Kervyn, M., 2016. The Rwenzori Mountains, a landslide-prone region?. *Landslides*.



## 2

# THE IMPACT OF LANDSLIDES IS SERIOUS AND LONG-LASTING

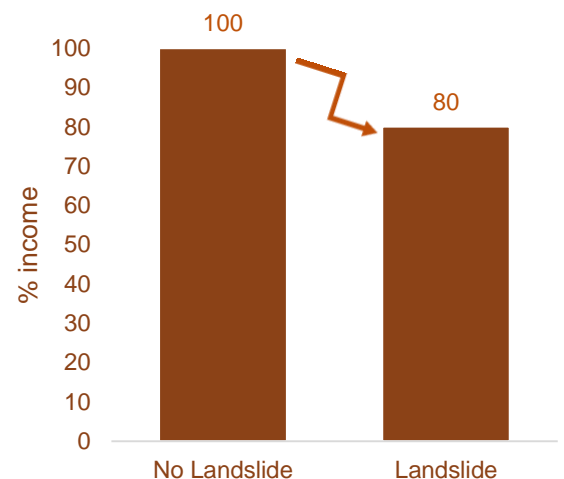
### Findings from the AfReSlide project:

Landslides cause poverty and destroy lives, property and crops in the affected areas. An average loss of 20 % of income from agriculture has been observed among farmers in the year that follows the occurrence of a landslide. Due to long-term consequences of this shock, a sustained loss in income is found among affected farmers for two to three years after the landslide. This has serious and long-term consequences for the wellbeing of the farmers and their family members. The significant impact of landslides for the livelihood of farmers is overlooked by media and national reports which are frequently limited to fatalities and destroyed houses and infrastructure.

All farmers that are affected by landslides see their income decrease for several years following the landslide, but the consequences of a landslide for those farmers that are close to subsistence level are most important. These farmers depend on a small amount of land to feed their family. After a landslide they have to resort to borrowing money from their neighbours and families or to accepting petty jobs.

Due to the serious impact of landslides, the help from neighbours and families is often not sufficient to cover their losses. The affected farmers therefore have to reduce their consumption. This has long-term consequences for welfare and wellbeing of the farmers and also puts stress on the overall community.

**20 % less**  
*income on average*



*In the Rwenzori Mountains farmers face a serious income shock for several years after a landslide. Landslides cause poverty, loss of lives, crops and property.*



### What can I do as a government representative?

Punctual assistance, immediately after a landslide, is useful but often not sufficient to reduce suffering due to landslides. Therefore, relief funds should be made available for several years after severe landslides. Landslide impacts are long-lasting!

When a landslide happens, those that lost a significant proportion of their income should be helped first with immediate relief and with aid to restore their rural livelihoods. The development of a solidarity scheme or insurance against landslides, as well as off-farm employment opportunities or access to fertile land that is not affected by landslides could therefore be promoted at village or Sub-County level. Identifying most severely affected farmers requires detailed impact assessment, accounting for socio-economic characteristics of impacted households.

Poorer and less connected farmers do frequently not have sufficient information about possible assistance. Reaching out to these farmers requires active dissemination of information about the availability of disaster relief funds, as well as field investigations of the impact.

### FURTHER READING:

Mertens, K., Jacobs, L., Maes, J., Kabaseke, C., Maertens, M., Poesen, J., Kervyn, M., Vranken, L., 2016. The direct impact of landslides on household income in tropical regions: a case study on the Rwenzori Mountains in Uganda. *Science of the Total Environment*.



# 3

## LANDSLIDES, FOREST FIRES, FLOODS AND EARTHQUAKES

### Findings from the AfReSlide project:

Landslides are often referred to as 'secondary hazards' because they occur as a result of intense rainfall or earthquakes. In mountainous areas, floods, landslides, earthquakes and other hazards can co-occur and cause complex interactions. This often results in very damaging multi-hazards impacting the population on a large scale. Understanding and predicting these multi-hazards is very challenging due to their complexity. Being informed about recent events in your area, and preparing for cascading events is therefore necessary.

An example is the occurrence of flash floods after large earthquakes or rainfalls. Earthquakes and heavy rain can cause landslides which can block or hamper river flow. This can result in debris rich floods which may occur without warning, for example, when a landslide-dam on the river breaks and water is suddenly released. Other environmental conditions such as forest fires can also interfere with hazards (see text box on the right). It is therefore crucial to know which hazards can occur in your area and how they can reinforce each other.



*In the Nyamwamba catchment (Rwenzori) a severe flash flood occurred on May 1st, 2013. The combined occurrence of intense rainfall, a forest fire and the occurrence of 29 landslides, induced a debris-rich and very destructive flash flood which caused several fatalities, the destruction of 70 buildings, several bridges, a hospital and a school, as well as several life lines. The rainfall amount that fell before the flood was not sufficient to explain the magnitude of the flood and the related damage: landslides and the forest fire aggravated the situation. The forest fire decreased the ability of the natural system to stop or slow down the rainfall running to the river: this can cause unexpected flooding. When landslides occur at the same time or just before the flood, they can provide debris to the river, making the flood more destructive.*

### What can I do as a government representative?

After an earthquake, the likelihood that landslides occur in a large region around the earthquake increases: it is important to remain vigilant for this in the weeks and months after the earthquake. If an earthquake or heavy rainfall has caused landslides in the catchment, be aware that floods could occur days and weeks after these landslides because of the changes these hazards may have made to the river further upstream.

- Keep regular contacts with local stakeholders and authorities that are aware of the situation within the catchment, including the non-inhabited zones of the catchment, e.g. national parks.
- Survey the valley for river blockages, either in the field or using satellite data.
- Keep the alluvial plains and river banks free of construction.
- Be aware of and take precautionary measures against the increased probability for floods in the years after major fires.

### FURTHER READING

Jacobs, L., Maes, J., Mertens, K., Sekajugo, J., Thiery, W., van Lipzig, N., Poesen, J., Kervyn, M., Dewitte, O., 2016. Reconstruction of a flash flood event through a multi-hazard approach: focus on the Rwenzori Mountains, Uganda. *Natural Hazards*.





# 4

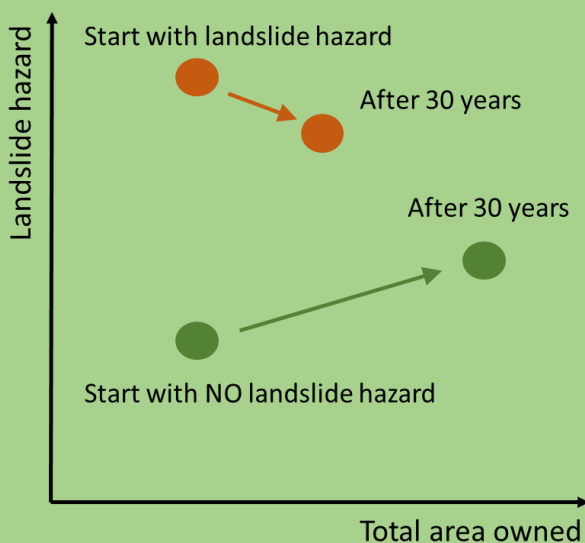
## EXPOSURE TO LANDSLIDE RISK IS NOT RANDOM

### Findings from the AfReSlide project:

Not everyone is equally exposed to landslide risk. Within a region, there are pieces of land that are likely to have landslides and others that are landslide-free. Only those farmers that have land in landslide-prone areas are exposed to landslide risk. The exposure of a farmer to landslide risk is therefore determined by the type and amount of land s/he inherits and acquires over time.

We investigated two different explanations for why some farmers have agricultural land in landslide-prone regions, while others don't. The distinction between the two explanations is related to the availability of financial resources to the farmer:

In the Rwenzori region, farmers that start with a plot which has a low landslide probability generally manage to acquire more land in the course of their lifetime than farmers that inherited or purchased a plot with a high risk of landslides.



- Farmers with limited resources have the majority of their land in landslide-prone areas because that is the only type of land they managed to acquire. It could be that they inherited land in a landslide-prone area or that they purchased such land because it was very cheap due to the high landslide probability. These farmers frequently have a limited amount of land and are more vulnerable to severe impacts of landslides.
- Wealthier farmers might have both land with and without a high landslide risk. Over time, these farmers may buy plots in landslide-prone regions because these plots offer an interesting investment opportunity. As such they acquire land in landslide-prone areas to increase their land holdings. Obviously, these farmers are less vulnerable to falling into poverty when a landslide happens.

The distinction between the two groups implies that the consequences of a landslide depend on the availability of financial resources to the farmer. Farmers with more land and financial resources have a stronger ability to cope with the income shock due to a landslide.



### What can I do as a government representative?

When providing relief against landslides it is important to be aware that some farmers voluntarily acquired land with a high landslide risk, while others are pushed towards these lands because of a lack of resources.

In the light of limited budgets, it is sensible to target relief and capacity building towards those farmers most in need. This includes farmers who have little land and for whom a large part of their land is affected or could be affected by landslides in the near future. Identifying these households requires detailed impact assessment but also accounting for the socio-economic characteristics of the households. Local networks and community boards could be used to target support to those that are most in need. Yet, this should be done with care, since local power relations might prevent the poorest to access the resources.

### FURTHER READING

Mertens, K., Vranken, L. Investing in land to change your risk exposure? Land transactions in a landslide prone region. Submitted to *World Development*.





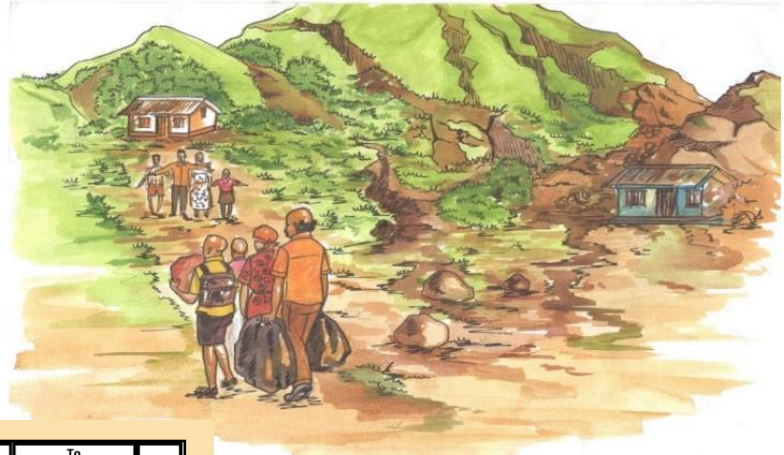
# 5

## SOCIAL RULES ALREADY LIMIT EXPOSURE OF THE POOR

### Findings from the AfReSlide project:

Within the local communities there often exist behavioural rules - often informal and unwritten, but widely supported and considered as appropriate - that guide actions towards households that are affected by landslides. These rules have developed over time due to the continuous exposure of farmers to landslides and can be considered as local risk reduction mechanisms that are already in place and functioning:

- In many communities, strong expectations exist to help those in need due to landslides. This pressure is the largest when the affected person is a family member or a neighbour. Such a commitment is helpful for the affected farmers, but it can also put a lot of pressure on the communities if no additional support is given from outside.



In the AfReSlide project we made use of choice experiments to reveal normative preferences governing the sale of a plot to fictional buyers.

Regarding land that has no landslides, a clear preference is found to sell it to family members with a limited amount of land, while there is not preference to sell a landslide-prone plot to poor farmers.

	To Extended Family <i>(Clan member)</i>	To Clan members (not family) <i>(Clan member)</i>	To Others (not clan/family)
	Has a lot of land	Has one other plot	Has no other land
wealth			
origin	Not from nearby village 	Not from nearby village 	From this or neighbouring village 
price	Somewhat expensive 	Average cheap 	Very expensive 
	None of these		

Example of a choice card that was presented to the farmers.

when selling or giving away land there is a preference to only transfer plots with a high landslide susceptibility to those farmers that do have the resources to cope with the potential income shock of a landslide. This is particularly true when plots are being transferred to members of the (extended) family. This social norm could have developed to reduce the impact of landslides on individual farmers and thus on the community as a whole.

### What can I do as a government representative?

- Identify local disaster risk reduction strategies and customs that promote solidarity.
- Do not implement policies that disrupt existing structures and cohesion.
- Enhance existing strategies of disaster risk reduction and solidarity.



It is in the interest of society as a whole to promote behaviour that prevents the most vulnerable to be exposed to landslide hazard. Social norms and customs that promote equity and solidarity can therefore be expected to exist among farmers in local communities. Strengthening these existing customs is easier than to create new systems. As a government representative it is thus necessary to be aware of the mechanisms that can be at play, even when these are non-formalized unwritten traditional practices.

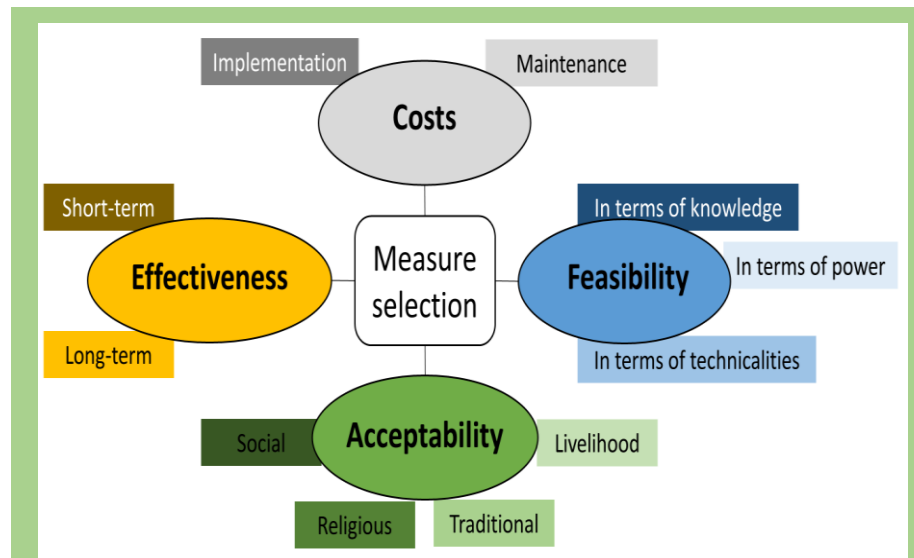


# 6

## IDENTIFYING LANDSLIDE RISK REDUCTION MEASURES

### Findings from the AfReSlide project:

Rigorous scientific evaluations are still unavailable for identifying appropriate disaster risk reduction (DRR) measures against landslides. We propose a social multi-criteria evaluation tool as a valid participatory methodology, i.e. involving all relevant actors, to support decision-making on these measures. This tool allows to identify which measures are effective and economically, culturally and technically adapted to the local context. We refer to 'Policy Brief 7' for a concrete example of how this methodology support the identification of (in)appropriate DRR measures



*Example of the list of evaluation criteria used in the Rwenzori Mountains region to assess the various landslide risk reduction measures.*

Practically, you first need to gather experts with interest in DRR. This includes members of sub-national disaster platforms, such as technical and environmental advisors, construction engineers, NGO and private sector representatives and other professionals involved in disaster risk management.

These experts should then be asked to evaluate and rank potential DRR measures, through applying the following steps:

1. Select a set of potential DRR measures (e.g. 'temporary evacuation' and 'tree planting').
2. Select a set of evaluation criteria (e.g. 'short-term effectiveness' and 'implementation costs').
3. Score each DRR measure for the different evaluation criteria (e.g. 'tree planting' might score low on short-term effectiveness while 'temporary evacuation' might score high).
4. Weigh the relative importance of each evaluation criteria (e.g. 'short-term effectiveness' might be more or less important than 'implementation costs').
5. Calculate the relative scores of the DRR measures by multiplying each score with the respective criteria and ranking them (e.g. 'temporary evacuation' might be ranked higher or lower than 'tree planting' as an appropriate DRR measure).

After these steps, decision-makers should be gathered to discuss the evaluation and ranks of the DRR measures. This discussion allows for a dialogue between decision-makers and scientists to support decision-making on appropriate DRR measures.

### What can I do as a government representative?



Work together with researchers or use the social multi-criteria evaluation to identify appropriate landslide risk reduction measures for your specific region. This information can support debate about current and potential policy actions for future planning and budget allocations related to disaster risk management.



The decision-making concerning suitable DRR measures should be transparent and inclusive, meaning all stakeholders should have a saying in the final decision. Otherwise, this support system might give negative results in terms of DRR.



# 7

## WHICH RISK REDUCTION MEASURES ARE APPROPRIATE

### Findings from the AfReSlide project:

Landslide risk reduction measures can be categorized into five domains:

1. Governance (e.g. make disaster risk management a local government priority),
2. Risk assessment (e.g. produce landslide risk maps),
3. Knowledge and education (e.g. regularly sensitize communities-at-risk on disaster risk reduction),
4. Risk management and vulnerability reduction (e.g. reduce the slope angle of the earth wall next to houses on steep slopes),
5. Preparedness and response (e.g. encourage temporarily evacuation during rainy season).

### **Appropriate landslide risk reduction measures in the Rwenzori Mountains region**

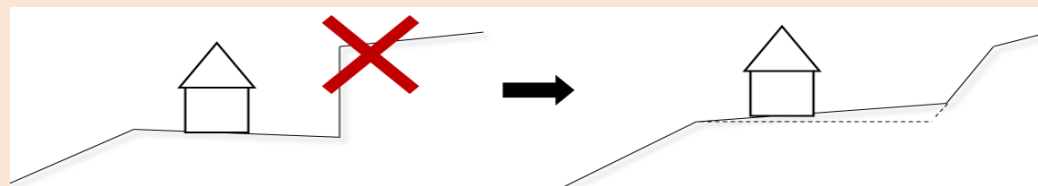
*Top-down and bottom-up landslide risk reduction measures in the Rwenzori Mountains region are scarce and isolated. Based on our social multi-criteria evaluation in Kasese and Bundibugyo districts, we identified potential landslide risk reduction measures for the Rwenzori Mountains. According to the assessment made by district and sub-county disaster management committees, the most appropriate measures are:*

- Regularly inform communities on causes and consequences of landslides and possible landslide risk reduction measures.
- Include representatives of communities-at-risk in meetings of the district/sub-county disaster management committee.
- Distribute fast-growing tree seedlings to promote reforestation of landslide-prone areas.
- Encourage the creation of saving and credit cooperatives to improve capacities of people to cope with landslides.
- Include a course on disaster risk reduction and first aid in the curriculum of primary or high school.
- Promote levelling the slope angle of the earth wall next to a house on all steep slopes, also known locally as back-sloping (see Figure).

*Noteworthy is that two policy actions of the Ugandan national policy on disaster risk management (OPMRU, 2010) are ranked amongst the least appropriate measures for all studied districts and sub-counties. These include: forbid any new house construction in landslide-prone areas and relocate communities-at-risk with proper compensation.*



Drama performance for awareness raising on disasters



Sketch of back-sloping practice. Back sloping is a practice to reduce the slope angle of an earth wall next to a house on steep slopes. As such, the chance that the earth wall will collapse, fall on the house and destroy property or kill people is reduced.



### What can I do as a government representative?

- Use the results of this evaluation as background information to stir debate about current and potential policy actions for future planning and budget allocations of local governments.
- Identify, implement and evaluate disaster risk reduction strategies.



# 8

## EMPOWERING FARMERS AGAINST LANDSLIDES

### Findings from the AfReSlide project:

Contrary to what is often said, **awareness about landslide risk** among farmers in the affected regions is generally **high**. 78 % of the interviewed farmers consider that the impact of landslides is severe, while 65 % of the farmers consider that a landslide could occur on one of their agricultural lands. Most farmers are able to recognize plots which have a potential for landslides, since the landslide probability reported by farmers often corresponds to the probability that was calculated by our scientific team.

However, **awareness about possible measures** to reduce landslide risk **is low**. Farmers are aware of the stabilizing role of trees against shallow landslides, but do not know other risk reduction measures.

*“ I planted trees to prevent landslides on my land.*

*My father levelled the slope behind the house to protect us from landslides.* ”

These sentences show the attitude that is allowing farmers to effectively reduce landslide risk in their communities.

*“ Landslides are a natural process. We just live with it.*

*Landslides are caused by Gods and Spirits.* ”

These are a few sentences recorded in the Rwenzori region. Sometimes these fatalistic attitudes prevent the adoption of measures that can effectively reduce the impact of landslides.

Moreover, farmers have a **very low sense of empowerment** (self-efficacy) with regard to planting trees against landslides. They do believe that trees are effective, but do not believe that, as individual farmers, they are themselves capable of reducing landslides on their land. Landslides are too often considered as a 'natural' or 'supernatural' process that cannot be influenced by physical human intervention.



### What can I do as a government representative?

There is a need to increase the farmers' trust in their capacity to do something about landslides. This can be done in several ways:

- Identify effective landslide risk reduction measures.
- Organize trainings or demonstration plots about how the impact of landslides can be reduced. These trainings would aim at increasing farmers' sense of empowerment against landslides.
- Provide organisational, technical and financial support to local initiatives that aim at reducing landslide risk.
- Since the occurrence of landslides on a plot partially depends on the presence of trees on neighbouring plots, collective action around tree planting and other soil and water conservation measures should be promoted at village level. Trees can be considered a public good!

### FURTHER READING

Mertens, K., Maes, J., Jacobs, L., Kervyn, M., Poesen, J., Vranken, L., 2018. Disaster Risk Reduction Among Households Exposed to Landslide Hazard: a Crucial Role for Self-Efficacy? *Land Use Policy*.



# 9

## DECENTRALIZED PLATFORMS FOR DISASTER RISK MANAGEMENT

### Findings from the AfReSlide project:

Disaster platforms are governance structures that bring together representatives from civil society, public and private sectors to share and coordinate disaster risk management practices. These platforms can be implemented at the national and sub-national administrative levels and are increasingly being promoted by the international Disaster Risk Reduction (DRR) community.

These platforms have proven to enhance the exchange of risk information and improve coordination. However, we found that, in some cases, these platforms are ineffective. More specifically, DRR platforms without financial resources, clear responsibilities and mechanisms to ensure downward accountability are ineffective in reducing disaster risk.

### *Disaster management committees in the Rwenzori Mountains, Uganda*

*While disaster management committees at district and sub-county level could be excellent tools for exchanging information, their potential remains not fully used in Uganda. In the Rwenzori Mountains, disaster management committees do not always function in an optimal way at these levels.*



*Currently, the implementation of sub-national disaster committees is often problematic: politicians transfer the responsibility to reduce landslide risk to these committees so that they cannot themselves be blamed for disasters. The committees often prioritize access to DRR measures and relief items to only a few people that are well-connected to the national government.*



### What can I do as a government representative?

- It is important to recognize the need to adapt disaster risk management to the local context, including clear roles and responsibilities for different platform partners as well as mechanisms to hold accountable those who are responsible for policy, planning and implementation.
- It is advisable to allocate at least one percent of the national and district budget to pre-disaster activities and to emphasise the actual implementation of policies at the different administrative levels, based on clear targets and evaluation criteria.
- At district level, the efficiency of disaster management committees can improve if risk information (on location, time and damage of disasters) is shared amongst the members and if meetings are held regularly (e.g. monthly or two-monthly), both in post-disaster and quiet periods.
- Capacity building in terms of skills (e.g. on hazard and risk assessment, vulnerability and capacity assessment, selection and implementation of suitable DRR measures) and financial support is needed for disaster management committees at district and sub-county levels as well as for disaster management actors at village level, including village health teams and civil society actors.
- Bottom-up initiatives for landslide risk reduction, such as awareness raising by drama groups and stimulating back-sloping of earth wall, for landslide risk reduction should be recognized and evaluated. If proven effective, these initiatives should be systematically promoted.



# 10

## DISASTER RISK ZONATION IN CITIES OF THE GLOBAL SOUTH

### Findings from the AfReSlide project:

Disaster risk zonation consists of defining high risk zones and applying regulations in these zones. These regulations can consist of use restrictions (e.g. of land), maintenance requirements (e.g. of water drainage systems) and development standards. Disaster risk zonation policy has proven to considerably reduce exposure to natural hazards, like storms and wildfire, in settings where human population is limited.

In some cases, however, disaster risk zonation for landslides and floods in urban areas has led to perverse effects. We found that disaster risk zonation leads to increased exposure and vulnerability, instead of risk reduction, whenever underlying causes of disasters, like social, political and economic factors, are neglected.

Poorly implementing this disaster risk zonation frequently provides an easy way for politicians to justify unequal urban development: they can claim that they are taking action to protect citizens while actually policies are not optimally implemented.



Markation of risk zone (RZ) in Limbe city

*In Limbe city, Cameroon, the current implementation of risk zonation policy is characterized by ad-hoc risk assessment and enforcement of the law which makes that people continue to live in high risk zones but with limited access to public services and without being able to rely on relief aid if they are affected by a landslide or flood. Turning a blind eye when people settle illegally in these risk zones has led to a situation where more people and assets are exposed to natural hazards because no prevention measures are taken. People became also more vulnerable due to less access to facilities and increased legal and economic insecurity.*



### What can I do as a government representative?

**Either** improve urban risk zonation policy:

- Provide equal public services to all citizens and compensate in case of disasters.
- Identify risk zones based on up-to-date scientific assessments, develop and communicate clear regulations per type of risk zone.
- Provide safe and affordable housing for urban development in risk-free zones and alternative housing for people currently living in risk zones.
- Guarantee corruption-free and transparent policy-making, providing mechanisms to hold accountable those that are responsible for defining and implementing the risk zonation.
- Produce risk assessments, which account for the vulnerability of exposed population and properties, instead of hazard assessments only. Engage decision-makers in the translation of the risk assessments into risk zonation policies and disseminate this risk information widely to citizens.
- Lobby for rights and educate people-at-risk on their rights.

**Or** develop alternative policies, based on more democratic, participatory decision-making. Decision-makers therefore need to acknowledge differences in interests and perceptions of the various people and institutions involved, including authorities, scientists and people-at-risk.

### FURTHER READING

Maes, J., Molombe, J., Parra, C., Mertens, K., Che, V., Poesen, J., Kervyn, M., expected in 2018. Socio-political drivers and consequences of landslide and flood risk zonation: A case study of Limbe city, Cameroon. Submitted to *Environment and Planning C: Politics and Space*.



# PREPARING FOR THE FUTURE

The sustainable management of natural hazards to avoid disasters is a complex task. Natural factors, like landslide proneness, are important in the process, but equally important are the societal factors.

Although some measures can reduce the occurrence of landslides, these natural processes will continue to take place and we need to live with them while reducing their negative consequences.

The AfReSlide project has highlighted some of the multiple factors that have to be taken into account for achieving a sustained disaster risk reduction: landslide hazard, poverty, inequality, administrative structures, culture and power relations all play a role in determining who is affected by disasters and to what extent.

Being aware of these factors and taking them into account during the development and implementation of disaster risk reduction measures and policies is an important step towards disaster risk reduction. Documenting all aspects of the risk management processes, from disaster events and their impact, to the cost and efficiency of implemented disaster risk reduction, is essential to support evidence-based efficient disaster risk reduction policies.

For more information you can contact the authors of these policy briefs or visit our website

**[afreslide.africamuseum.be](http://afreslide.africamuseum.be)**

## Authors

Kewan Mertens<sup>1</sup>, Liesbet Jacobs<sup>2,3</sup>, Jan Maes<sup>1,2</sup>, Armand Kagou Dongmo<sup>4</sup>, Vivian Bih Che<sup>5</sup>, Bosco Bwambale<sup>6</sup>, Astrid de Hontheim<sup>7</sup>, Olivier Dewitte<sup>3</sup>, Clovis Kabaseke<sup>6</sup>, Jean Poesen<sup>1</sup>, Liesbet Vranken<sup>1</sup>, Matthieu Kervyn<sup>2</sup>

<sup>1</sup> Department of Earth and Environmental sciences, KU Leuven, Geo-instituut, Celestijnenlaan 200E, B-3001 Leuven-Heverlee

<sup>2</sup> Department of Geography, Vrije Universiteit Brussel, Pleinlaan 2, B-1050 Brussels

<sup>3</sup> Department of Earth Sciences, Royal Museum for Central Africa, Tervuren

<sup>4</sup> Department of Earth Sciences, Faculty of Sciences, University of Dschang, Cameroon

<sup>5</sup> Faculty of Science, Geology Department, University of Buea, Cameroon

<sup>6</sup> School of Agricultural and Environmental Sciences, Mountains of the Moon University, Fort Portal, Uganda

<sup>7</sup> Department of Human and Social Sciences, UMon, Mons