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Policy Brief

Reducing Landslide Hazard and Risk in Gamo & Gofa Highlands (South Ethiopia)

Policy Actions for Safer Communities, Resilient Livelihoods, and Risk-Informed Development

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Executive Summary

One of the most severe environmental and humanitarian hazards in southern Ethiopia is the risk of landslides. Studies in the Maze and Zenti catchments, the Maze watershed, the Herigo catchment (Gezie Gofa), and the Lake Abaya-Chamo Watersheds (Kulfo, Sile-Elgo, and Shafe-Baso catchments) have demonstrated that landslides are strongly linked to heavy rainfall, steep slopes, highly weathered and fractured volcanic rocks, geological structures, thick soil layers, groundwater conditions, deforestation, and land-use pressures on unstable terrain. The effects are devastating: loss of life, destruction of homes and farmland, displacement of households, damage to infrastructure, and long-term insecurity of livelihoods. This is no longer a hypothetical risk. Rain-induced landslides in the Gamo Zone districts of Gacho Baba, Kamba, and Bonke first claimed the lives of at least 50 people and left 125 missing in March 2026. The death toll rose to at least 80 within days, and Reuters later reported it had reached 125. Over 3,400 individuals were reported to be displaced. Scientific data also clearly show that a significant portion of southern Ethiopia already falls within moderate, high, or very high landslide susceptibility categories. A number of studies indicate that GIS-based landslide susceptibility models are sufficiently robust to inform policy. Landslide-prone areas need to shift from reactive response to proactive risk reduction. Priority measures include revised hazard mapping, land-use regulations in high-risk areas, community-based early warning, slope stabilization and watershed restoration, and relocation planning for the most vulnerable settlements.

1. Background / Context

A landslide is the downward movement of soil, rock, or debris due to the effect of gravity. Slopes that are steep, saturated soils, heavy rainfall, less vegetation cover, and weak or highly fractured geological materials increase the likelihood of landslides. Even minor alterations in drainage, land cover, or land use can enhance instability in mountainous and escarpment areas (Kebeba et al., 2024). Southern Ethiopia is especially susceptible due to the combination of steep topography, seasonal heavy precipitation, active erosion, weak lithological structures, and the increasing human pressure on the land (Shano et al., 2020) (Figure 1). The studies indicate that there are frequent landslide issues in various landscapes in southern Ethiopia, particularly in the Gofa and Gamo zones and the surrounding area. These are not isolated cases but a larger trend of recurring slope failures in populated rural settings (Ayele et al., 2025; Getahun et al., 2025). The problem is particularly acute at the moment due to three reasons. First, the recent fatal incidents prove that the risk of landslides is not hypothetical but real and active (Mulugeta et al., 2024). Second, many communities still reside, cultivate, and construct on unstable slopes (Oyda et al., 2024). Third, poor land-use control, inadequate monitoring, ineffective early warning, and incomplete incorporation of geospatial evidence into local planning contribute to disaster losses (Shano et al., 2021). After a week of heavy rains, landslides hit several districts, killing dozens of people, leaving many missing, displacing thousands, and causing national mourning (Shano et al., 2022). The authorities also advised people to relocate to safer areas as the rainfall persisted, and the climate forecasts in the region showed that there was a possibility of above-average rainfall in the March-May period (Getahun et al., 2025).

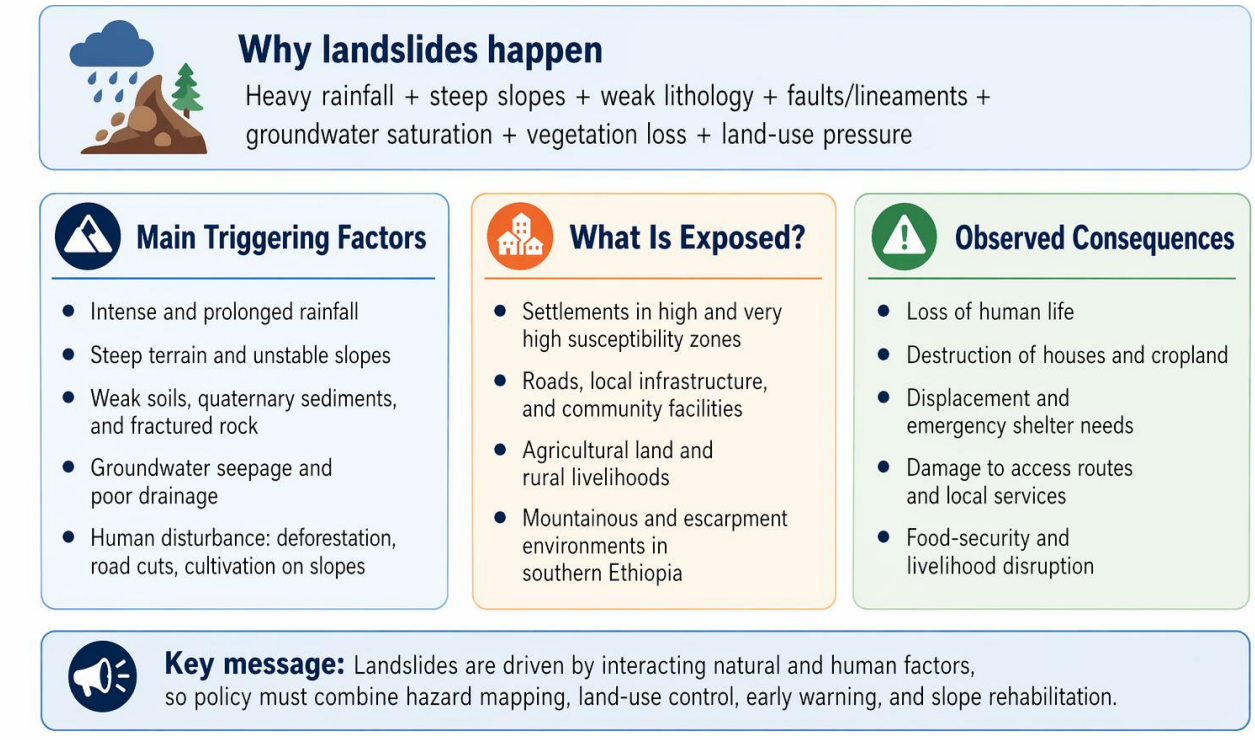

Figure 1. Main drivers, exposure, and impacts of landslide risk in the Gamo and Gofa area, South Ethiopia

2. Problem Statement

The policy issue is that the southern part of Ethiopia is at high and frequent risk of landslides, yet disaster prevention and land governance have not kept up with the risk. The research studies carried out in this region indicate that the landslide-prone areas are not new; key causative factors have been identified repeatedly, and effective susceptibility mapping techniques have been proven to be effective (Ayele et al., 2025; Getahun et al., 2025) (Figure 2). However, vulnerable communities are still left exposed. High-risk terrain is still occupied by settlements, roads, churches, and farmland (Kebeba et al., 2024). Deforestation, uncontrolled cultivation, disturbance of drainage, and other human activities that lead to slope degradation persist in various regions (Shano et al., 2020). There are weak or no early warning systems (Shano et al., 2021). Hazard evidence is not always used in land allocation and the development of infrastructure, leading to ill-informed decision-making (Mulugeta et al., 2024). Preparedness is usually triggered when disaster strikes, rather than by proactive planning (Oyda et al., 2024). This creates a vicious circle: slope failure is caused by heavy rainfall; rescue and emergency relief are provided; temporary displacement occurs; and people tend to go back to the same risky situation due to the lack of long-term mitigation, relocation, and land-use reform. The outcome is the recurrent loss of life and property. The issue is not just the presence of landslide hazards, but also the failure to translate scientific evidence into enforceable planning, prevention, and community protection measures (Shano et al., 2022).

Figure 1. Landslide problem and consequences in Gamo and Gofa area, South Ethiopia

3. Key Evidence

3.1 Landslides in southern Ethiopia are widespread and recurring

The research carried out in this area has indicated that landslides are frequent in the southern part of Ethiopia, particularly in the Gofa-Gamo highlands and other catchments (Figure 3). A study of the Maze watershed found 793 landslides, and a study of the Gamo Zone used 1,554 landslides to analyze susceptibility (Kebeba et al., 2024; Ayele et al., 2025). This means that the risk is geographically large and well-established, not just a few localized failures. The Gamo Zone landslides of March 2026 also confirm the repetition of high-fatality events in the same larger area. At least 50 deaths and 125 missing after landslides struck Gacho Baba, Kamba, and Bonke were recorded by initial Associated Press news agency reports on March 12, 2026 (AP, 2026). At least 80 people were killed and more than 3,400 displaced, according to AP news agency, and on March 16, Reuters news agency reported that the number of people killed had increased to 125 (Reuters, 2026).

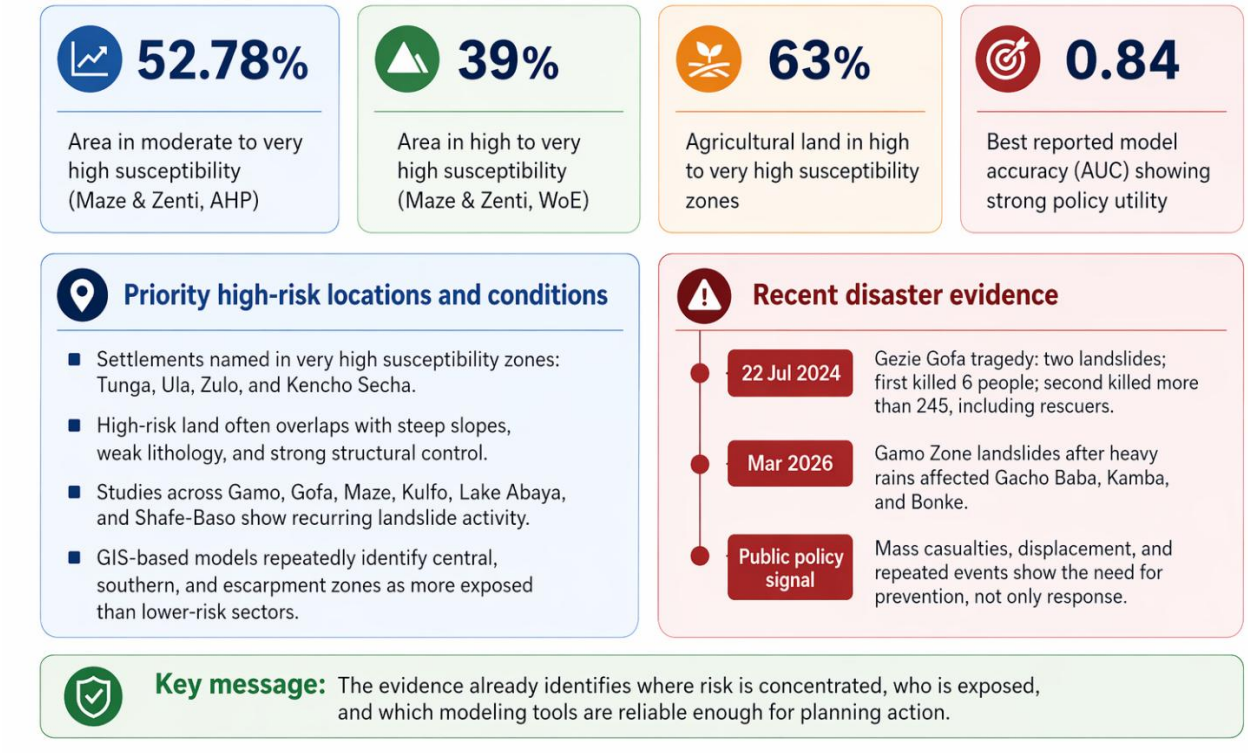

Figure 2. Evidence snapshot of susceptibility, hotspots, and disaster consequences Gamo and Gofa area, South Ethiopia

3.2 The main drivers are well established

Across the different landslide studies in this area, the most common landslide conditioning and triggering factors are:

- intense rainfall and prolonged wet periods
- steep slopes
- weak lithology and quaternary sediments

- geological structures, including faults and lineaments
- groundwater and saturated soils
- land use and land cover change
- curvature, aspect, and elevation
- low vegetation cover or degraded slopes
- proximity to streams, roads, and structural discontinuities

3.3 Large shares of land already fall into moderate-to-very-high susceptibility classes

The research indicates that highly exposed terrain is extensive:

1. In the Maze and Zenti catchments, the AHP model found 52.78% of the study area in moderate to very high susceptibility zones, including 18.05% high and 6.96% very high susceptibility (Kebeba et al., 2024).
2. In the same study, the WoE model classified 39% of the total area as high to very high susceptibility (Ayele et al., 2025).
3. In the Gamo Zone frequency ratio study, 17.52% of the area was classified as high susceptibility and 6.91% as very high (Getahun et al., 2025).
4. In the Shafe and Baso catchments, 18% of the area fell into the high hazard class and 8.2% into the very high hazard class (Shano et al., 2022).
5. In Maze watershed study using AHP, 36% of the area was categorized as high susceptibility and 28% as very high susceptibility (Shano et al., 2021)..

Together, these findings show that landslide-prone land is not marginal in extent. It occupies a substantial share of the landscape and directly overlaps with settlement and agricultural production areas.

3.4 Settlements and agricultural lands are directly exposed

The Maze and Zenti research found settlements in very high susceptibility areas including Tunga, Ula, Zulo and Kencho Secha (Getahun et al., 2025). It also found that 63 percent of agricultural lands are located in high to very high susceptibility areas Getahun et al., 2025. This is a significant policy issue as it directly correlates landslide risk with food security, rural livelihoods, and the security of inhabited regions. This conclusion is supported by the July 2024 disaster characterization study, which reports the destruction of houses, loss of agricultural lands, evacuation of survivors, and sheltering of the affected people under tents and in churches. The greatest and most destructive impact, though, was the loss of human life.

3.5 Recent events show catastrophic human consequences

One of the most fatal instances was the July 22, 2024 Kencho Shacha Gozdi disaster in Gezie Gofa woreda. There were two landslides that morning. The former killed six and burnt three houses. The second one killed over 245 people including those who had arrived to assist in retrieving bodies of the first slide. The Gamo Zone disaster of March 2026 demonstrates that such high-casualty incidents are still a threat. According to Ethiopian authorities, media coverage, and humanitarian reports, the number of deaths increased during a few days, individuals were still

missing, roads and access were disrupted, and thousands displaced. The magnitude of the event was also highlighted by Ethiopia declaring three days of national mourning.

3.6 GIS-based susceptibility mapping is useful for policy

The recent studies have demonstrated the practical value of GIS-based susceptibility mapping. Several modeling approaches were used, including AHP, Weight of Evidence (WoE), Frequency Ratio, and Logistic Regression. Reported model performance values were generally good, with high accuracy rates across various regions (Ayele et al., 2025; Kebeba et al., 2024; Getahun et al., 2025). These results suggest that the science is already sufficiently mature to support zoning, planning, and targeted intervention. The key gap is implementation, not a lack of evidence (Shano et al., 2022; Shano et al., 2021).

4. Policy Options

The following table 1 and figure 3shows the different landslide risk reduction options for southern Ethiopia.

Table 1. Policy options for landslide risk reduction

Option	Description	Main benefit	Main limitation
1. Land-use zoning	Use hazard maps to guide land use and development.	Prevents unsafe expansion.	Needs enforcement and relocation alternatives.
2. Early warning	Use monitoring, alerts, and evacuation planning.	Saves lives quickly.	Needs trust, communication, and maintenance.
3. Relocation	Move people from extreme-risk areas.	Protects the most vulnerable.	Socially sensitive and costly.
4. Slope rehabilitation	Use terracing, drainage, afforestation, and bioengineering.	Improves long-term slope stability.	Needs sustained investment and coordination.

5. Recommended Actions

a. Short-term actions (0-2 years)

The Ethiopian federal government, regional and local governments should rapidly identify and verify landslide hotspots in south Ethiopia, particularly in the Gamo, Gofa, Maze, Kulfo, Shafe-Baso and Lake Abaya area. Research findings should be integrated into hazard maps, rather than remaining as stand-alone studies. Vulnerable settlements, schools, churches, roads and agricultural lands should be quickly mapped against these. Meanwhile, early warning and preparedness systems should be trialled at the woreda level in the most vulnerable areas. These should include rainfall thresholds, local monitoring, evacuation plans and basic risk communication during the rainy season. Public education should raise awareness of the signs of slope failure, including cracks in the ground, seepage on slopes, sudden leaning of trees or buildings, and drainage blockage (Figure 4).

b. Medium-term actions (2-5 years)

Landslide hazard information should be required by the regional planning authorities in land-use decisions, road and infrastructure planning, and settlement expansion approvals. High and very high susceptibility zones should not be allowed to be subjected to public construction and new housing development unless there are risk reduction measures. In degraded highlands, agricultural and environmental programs ought to promote terracing, re-vegetation, bioengineering, drainage management, and watershed restoration. District administrations are to find out households that already reside in extreme-risk areas and start planning phased relocation in areas where losses are likely to occur repeatedly (Figure 4).

c. Long-term actions (5+ years)

Ethiopian government needs to be establish a national framework for landslide risk management that integrates geospatial hazard assessment, climate-sensitive planning, engineering guidance, relocation standards, and community protection measures. This framework must connect disaster risk reduction to environmental restoration and climate adaptation. Integrated landslide databases, enhanced local technical capacity, regular updating of susceptibility maps, and hybrid modeling methods that integrate GIS, field verification, geophysical investigation, and climate information should be included in long-term investments. Considering the contribution of heavy rainfall to recent fatal incidents, rainfall variability and climate forecasts should be clearly included in future risk planning (Figure 4).

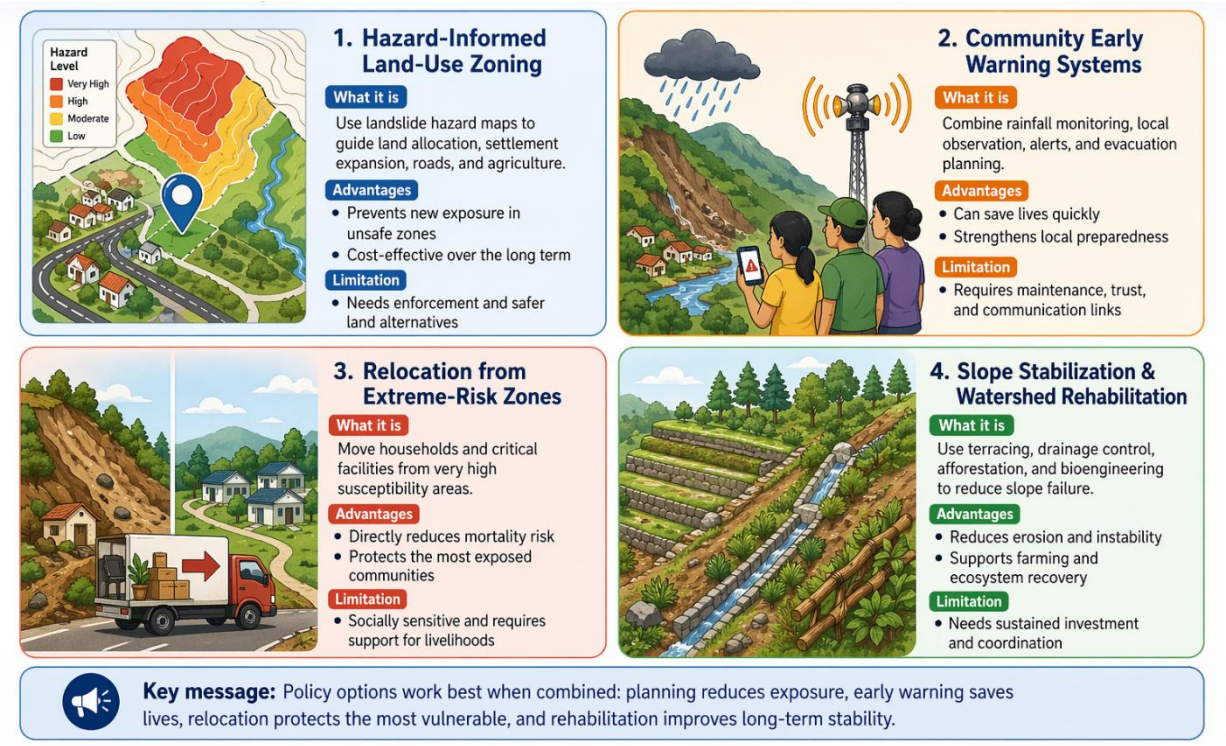

Figure 3. Policy options for landslide risk reduction Gamo and Gofa area, South Ethiopia

6. Implementation Considerations

This will need coordination at various levels of government offices to be effectively implemented. The local administrations, geological and environmental agencies, agricultural bureaus, and planning authorities should collaborate instead of acting independently. Model refinement, field validation, and capacity building should be supported by universities and research institutions. Awareness, monitoring, and relocation dialogue should involve community organizations, faith institutions, and local leaders. The sources of funding may include a mix of disaster risk reduction funds, climate adaptation funds, watershed restoration funds, development partners, and humanitarian resilience funds. Capacity building is necessary. Local officials must be trained not only to read hazard maps, but also to make decisions based on them regarding roads, housing, farmland, and emergency planning. Participation of the community is particularly significant. Without consultation, relocation or land-use restrictions will probably not be implemented (Figure 5). Risk communication should thus be realistic, locally comprehensible, and connected to actual options to the affected households.

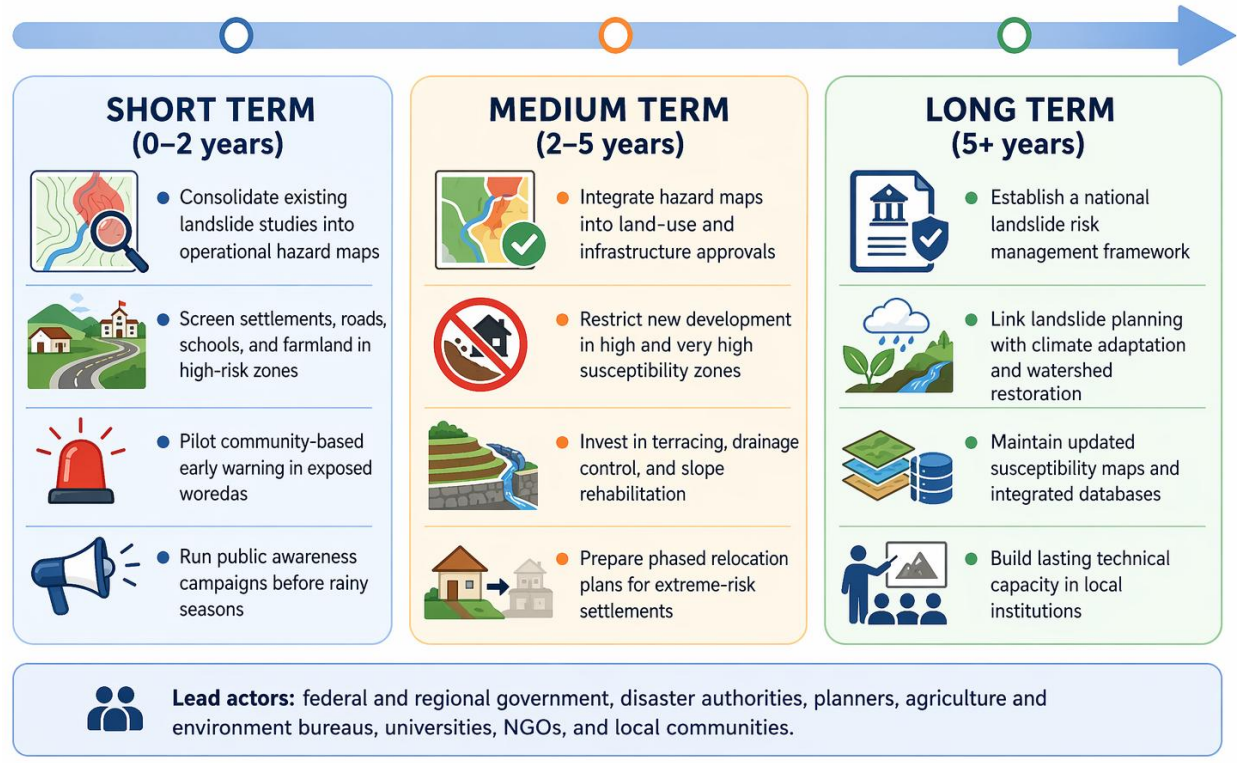

Figure 4. Policy roadmap for landslide risk reduction in Gamo and Gofa area, South Ethiopia

Figure 5. Policy implementation Gamo and Gofa area, South Ethiopia

7. Conclusion

The evidence from southern Ethiopia is consistent and compelling. Landslides are widespread, destructive, and increasingly urgent in areas where steep terrain, intense rainfall, weak geology, and land degradation overlap. Research across multiple watersheds and districts shows that large portions of the landscape already fall into moderate to very high susceptibility classes, while settlements and agricultural lands remain directly exposed. The July 2024 Gofa tragedy and the March 2026 Gamo Zone disaster show the cost of delayed action. The March 2026 event alone moved from an initial report of 50 deaths and 125 missing to at least 80 reported deaths within a day, and Reuters later reported 125 deaths, alongside large-scale displacement and national mourning. The studies already identify the main drivers, the most exposed areas, and the results that work best for hazard assessment. The policy challenge now is to convert this knowledge into action: safer land-use decisions, stronger early warning, slope rehabilitation, and protection or relocation of people living in the most dangerous zones. If that does not happen, recurring landslide disasters will continue to cost lives, livelihoods, and public resources.

References

Ayele, N. A., Engda, E. M., Terefe, T. T., Leta, E., Reda, T. M., & Jothimani, M. (2025). Geospatial analysis of landslide susceptibility and safe relocation zones: Insights from recent disasters in Gofa Zone, Southern Ethiopia. Quaternary Science Advances, 17, 100272. https://doi.org/10.1016/j.qsa.2025.100272

Getahun, E., Jothimani, M., Shano, L., Dawit, Z., Regassa, H., Oyda, Y., Ekaso, D., & Gissila, B. (2025). Modeling Landslide Susceptibility and Risk Assessment Using GIS–Based AHP and WoE Methods: A Case Study of Maze and Zenti Catchments, Southern Ethiopia. Advances in Civil Engineering, 2025(1). https://doi.org/10.1155/adce/5861780

Kebeba, O., Shano, L., Chemdesa, Y., & Jothimani, M. (2024). Integration of geospatial analysis, frequency ratio, and analytical hierarchy process for landslide susceptibility assessment in the maze catchment, omo valley, southern Ethiopia. Quaternary Science Advances, 15, 100203. https://doi.org/10.1016/j.qsa.2024.100203

Mulugeta, T., Shano, L., & Jothimani, M. (2024). Landslide susceptibility modeling in the Kulfo river catchment, rift valley, Ethiopia: An integrated geospatial and statistical analysis. Quaternary Science Advances, 14, 100191. https://doi.org/10.1016/j.qsa.2024.100191

Oyda, Y., Jothimani, M., & Regasa, H. (2024). Assessing landslide susceptibility in Lake Abya catchment, Rift Valley, Ethiopia: A GIS-based frequency ratio analysis. Journal of Degraded and Mining Lands Management, 11(3), 5885–5895. https://doi.org/10.15243/jdmlm.2024.113.5885

Shano, L., Raghuvanshi, T.K. & Meten, M. Landslide Hazard Zonation using Logistic Regression Model: The Case of Shafe and Baso Catchments, Gamo Highland, Southern Ethiopia. Geotech Geol Eng 40, 83–101 (2022). https://doi.org/10.1007/s10706-021-01873-1

Shano, L., Raghuvanshi, T.K. & Meten, M. Landslide susceptibility evaluation and hazard zonation techniques – a review. Geoenviron Disasters 7, 18 (2020). https://doi.org/10.1186/s40677-020-00152-0

Shano, L., Raghuvanshi, T.K. & Meten, M. Landslide susceptibility mapping using frequency ratio model: the case of Gamo highland, South Ethiopia. *Arab J Geosci* **14**, 623 (2021). https://doi.org/10.1007/s12517-021-06995-7