

# Tools for Risk Estimation and Cost-Benefit Analysis of Road Geohazard Risk Reduction for Nonseismic and Seismic Events

Mikihiro Mori et al. Geosphere Engineering & Disaster Management Office, Environment & Water Resources Divisions, International Consulting Operations

## ○ Keywords

road geohazard, risk reduction, probabilistic risk assessment, seismic event, cost-benefit analysis

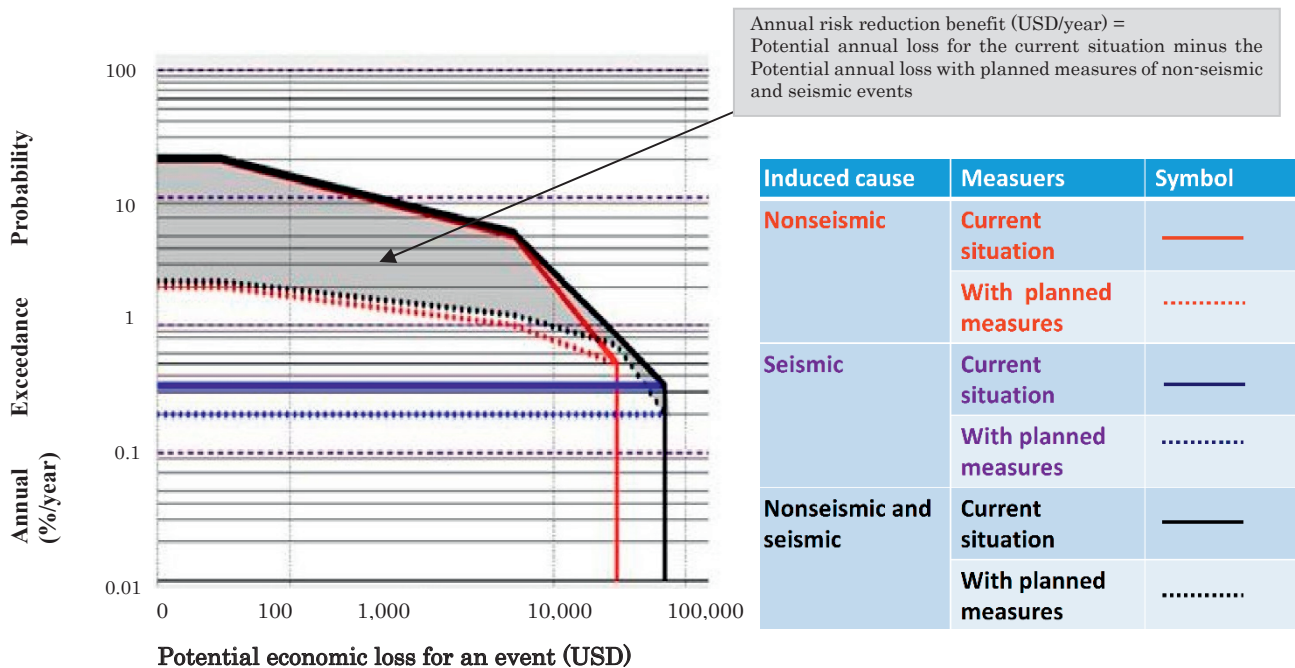
## ○ Summary

Practical spreadsheet tools have been developed to conduct a probabilistic risk assessment of potential annual losses and to evaluate the cost-benefit of risk reduction measures of road geohazards. The tools provide the basis to promote proactive investments for geohazard risk reduction for seismic and non-seismic events. The tools target both events to determine the viability of risk reduction investments. The tools have been developed as part of JICA's technical assistance project to El Salvador.

## ○ Technical points

The tools evaluate the safety degree of probability (SDP) of road geohazards for seismic and non-seismic events. For seismic events, the tool can estimate the critical peak ground acceleration (CPGA) that induces failures. The tools analyze seismic and non-seismic risks and cost-benefit of countermeasures and estimate the total risk for a specific road location by summing the weighted scores for each seismic risk, non-seismic risks, and the cost-benefit. Risk reduction measures effective for seismic and non-seismic geohazard risks are expected to show favorable cost-benefit analysis indicators.

## ○ Figures



Risk Curve (probability-loss plot) of Geohazard Damage of a Road Location

The probability-loss plot with/without measures, namely the risk curves, are derived from the plots of the annual exceedance probabilities of a road damage due to geohazards (the vertical axis) and their potential loss (the horizontal axis). The potential annual loss is indicated as the area within the risk curve and the two axes of the graph. The annual risk reduction benefit is the area between the risk curves of the current situation and with planned measures.