International Journal of Civil Engineering
(IJCE)
ISSN (P): 2278–9987; ISSN (E): 2278–9995
Vol. 14, Issue 2, Jul–Dec 2025; 1–10

International Academy of Science, Engineering and Technology
Connecting Researchers; Nurturing Innovations

STABILITY AND REINFORCEMENT ANALYSIS OF GABION RETAINING WALLS IN TOLOKIBIT, BANGGAI LAUT

Syaiful Ibrahim[1], A. Rahayu[2] & S. Nurdin[3]

[1,2]Master of Civil Engineering, Tadulako University, Palu, Indonesia

[3]Associate Professor, Department of Civil Engineering, Tadulako University, Palu, Indonesia

ABSTRACT

Banggai Laut Regency is an archipelago with a high level of vulnerability to landslides, particularly on the banks of the Tolokibit River in the village of the same name. Landslides are typically triggered by seasonal flooding and fluctuations in river water levels, which cause soil saturation and decrease slope stability. This study aims to analyze the stability of river walls and evaluate the effectiveness of gabion structures as a slope reinforcement solution against landslides and erosion. The methods used include calculating peak flood discharge with a 10-year return period using the Rational method, as well as modeling the stability of slopes and gabion structures using Geo5 software. The analysis results show that the peak flood discharge of 54.5282 m³/s with a water level between 1.407–1.512 m produces significant hydrostatic and erosional forces on the river slope. The designed gabion groyne structure is able to withstand these pressures with a safety factor (Fs) value between 1.81–4.77, exceeding the safe threshold. Fluctuations in groundwater levels have been shown to significantly affect the overturning and sliding Fs values, where increasing fluctuations cause a decrease in stability. Of the two gabion configurations tested, Model 2 was deemed optimal due to its high stability, material efficiency, and ease of construction. This study recommends implementing Model 2 as a practical and effective solution for landslide mitigation in the Tolokibit Village River area, reducing the risk of infrastructure damage and socio-economic impacts on the local community.

KEYWORDS: *River Landslide, Gabion Stability, Water Level Fluctuation.*

Article History

Received: *13 Dec 2025* | ***Revised:*** *16 Dec 2025* | ***Accepted:*** *20 Dec 2025*