

## INTI SARI

Kota Palu merupakan wilayah dengan tingkat kerentanan tinggi terhadap tsunami akibat konfigurasi Teluk Palu yang sempit, kedekatannya dengan Sesar Palu-Koro, serta tingginya kepadatan penduduk pesisir. Peristiwa tsunami tahun 2018 mengungkap lemahnya sistem peringatan dini dan rendahnya kesiapsiagaan masyarakat, yang memperparah dampak bencana. Penelitian ini bertujuan mengintegrasikan pemodelan inundasi tsunami dengan penilaian kerentanan dan kapasitas masyarakat guna merumuskan strategi mitigasi yang adaptif dan berbasis zona prioritas di wilayah pesisir Kota Palu. Metode penelitian menggunakan pendekatan *mixed methods* dengan desain *explanatory sequential*. Pemodelan tsunami dilakukan menggunakan perangkat lunak MIKE 21 untuk tiga skenario magnitudo (7,5 Mw; 8,0 Mw; dan 8,5 Mw). Penilaian kerentanan dan kapasitas masyarakat dilakukan melalui survei terhadap 202 responden dan wawancara mendalam, mencakup aspek fisik, sosial-ekonomi, dan institusi. Hasil pemodelan dan penilaian kemudian diintegrasikan menggunakan analisis TOWS untuk menyusun strategi mitigasi struktural dan nonstruktural. Hasil penelitian menunjukkan bahwa skenario terburuk (8,5 Mw) berpotensi menimbulkan genangan tsunami hingga 16 meter dengan jarak inundasi lebih dari 700 meter di beberapa titik pesisir selatan dan muara Sungai Palu. Wilayah dengan tingkat kerentanan tinggi dan kapasitas rendah teridentifikasi di Kelurahan Besusu Barat, Mamboro, Watusampu, dan Nunu, yang ditetapkan sebagai zona prioritas mitigasi. Strategi yang disusun mencakup penambahan shelter tahan tsunami, penguatan jalur evakuasi dan sistem peringatan dini, pelatihan tanggap darurat, edukasi kebencanaan, serta penguatan kelembagaan dan koordinasi lintas aktor. Kesimpulannya, integrasi pendekatan fisik melalui pemodelan tsunami dengan analisis sosial berupa kerentanan dan kapasitas menghasilkan strategi mitigasi yang lebih kontekstual dan berbasis bukti. Pendekatan ini tidak hanya relevan untuk Kota Palu, tetapi juga dapat dijadikan model komprehensif bagi wilayah pesisir lain yang menghadapi ancaman tsunami.

**Kata Kunci:** pemodelan inundasi tsunami, kerentanan, kapasitas, strategi mitigasi, komunitas tangguh bencana

## ABSTRACT

Palu City is highly vulnerable to tsunamis due to the narrow configuration of Palu Bay, the activity of the Palu-Koro Fault, and the high population density along its coast. The 2018 tsunami revealed weaknesses in the early warning system and low community preparedness, which exacerbated the disaster's impact. This study aims to integrate tsunami inundation modeling with vulnerability and capacity assessment to formulate adaptive and zone-based mitigation strategies for the coastal areas of Palu. A mixed-methods approach with an explanatory sequential design was employed. Tsunami inundation was modeled using MIKE 21 software under three earthquake magnitude scenarios (7.5 Mw, 8.0 Mw, and 8.5 Mw). Vulnerability and capacity were assessed through surveys with 202 respondents and in-depth interviews, covering physical, socio-economic, and institutional aspects. The results of the modeling and assessments were integrated using TOWS analysis to develop both structural and non-structural mitigation strategies. The findings show that the worst-case scenario (8.5 Mw) could generate inundation up to 16 meters high and extend more than 700 meters inland in several southern coastal areas and the Palu River estuary. Four sub-districts namely Besusu Barat, Mamboro, Watusampu, and Nunu were identified as priority zones, as they combine high vulnerability with low capacity. The mitigation strategies include constructing tsunami-resistant shelters, strengthening evacuation routes and early warning systems, conducting emergency response training, enhancing disaster education, and improving institutional coordination and community empowerment. In conclusion, integrating physical modeling of tsunami hazards with social assessments of vulnerability and capacity produces more contextual and evidence-based mitigation strategies. This integrated approach not only provides actionable recommendations for Palu City but also offers a comprehensive model for tsunami risk reduction planning in other coastal regions.

**Keywords:** tsunami inundation modeling, vulnerability, capacity, mitigation strategies, disaster-resilient communities