

Empowering Resilience:

Community-Driven Technological Innovations For Climate Adaptation Among People With Disabilities in Coastal Urban Makassar

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Executive Summary

Makassar, a densely populated coastal city in South Sulawesi, faces dual climate-related challenges: recurrent hydrometeorological hazards, including flooding, extreme heat, drought, and fire, alongside one of the highest disability prevalence rates in Indonesia. According to the 2018 Provincial Basic Health Research (RISKESDAS), more than 50 percent of Makassar's urban population reported experiencing some form of disability. This intersection of high climate exposure and a disproportionately large population of people with disabilities (PwDs) creates a unique vulnerability profile, making inclusive climate adaptation not only urgent but essential.

This study employed a Participatory Action Research (PAR) approach, involving 30 participants from eight disability organizations in Makassar, supplemented by interviews with key stakeholders, including government agencies (BNPB, BPBD, Bappelitbangda), the National Commission on Disability (KND), civil society organizations, and technology consultants. The research aimed to identify specific vulnerabilities, co-design community-based technological innovations, and provide policy recommendations for inclusive strategies on climate resilience.

The central output of this project is *Siaga Difabel*, a prototype of a community-driven disaster preparedness and response system tailored for PwDs. Designed as a modular platform, it provides:

- *Netra* mode (audio alerts and navigation support for blind/low vision),
- *Tuli* mode (visual cues, sign language videos, and captioned alerts for deaf/hard of hearing),
- *Daksa* mode (mobility support and accessible evacuation routes for persons with physical disabilities).

The system integrates multi-channel early warnings, accessible disaster information, evacuation and navigation support, live situation reporting (including in sign language), and community-based recovery mechanisms.

Key Findings

1. Inclusivity requires specificity. Needs differ across disability types; modular design ensures tailored solutions.
2. Technology needs community. Mobile phones are lifelines for many PwDs, but gaps remain; community networks are critical in bridging access.
3. Policy integration is vital. Without institutional reform, inclusive innovations risk remaining pilot projects.

Policy Recommendations

1. Recognize PwDs and their organizations as co-designers, not mere beneficiaries.
2. Invest in digital literacy and social protection to close the digital divide.
3. Ensure interoperable and accessible disaster data systems across agencies.
4. Strengthen capacity building for officials, volunteers, and service providers on inclusive evacuation and accessible communication.
5. Institutionalize disability-responsive units within local disaster management agencies
6. Ensure sustainable financing through public budgets and climate funds.

Contribution

By merging disability justice, community-based adaptation, and digital innovation, this study provides both theoretical insights and practical solutions. It demonstrates that resilience for PwDs cannot be reduced to technical capacity alone. True resilience means ensuring that persons with disabilities can evacuate safely, access disaster information, and recover with dignity.