Land-Use Microsimulation model for livelihood diversification after the 2010 Merapi volcano eruptions.

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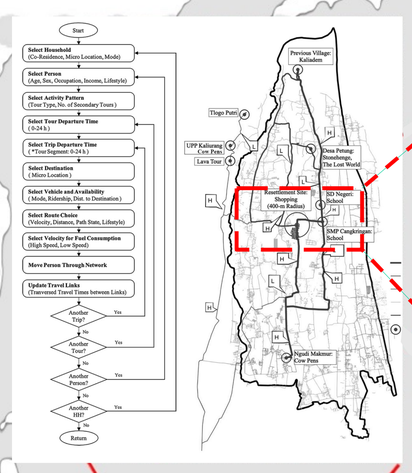
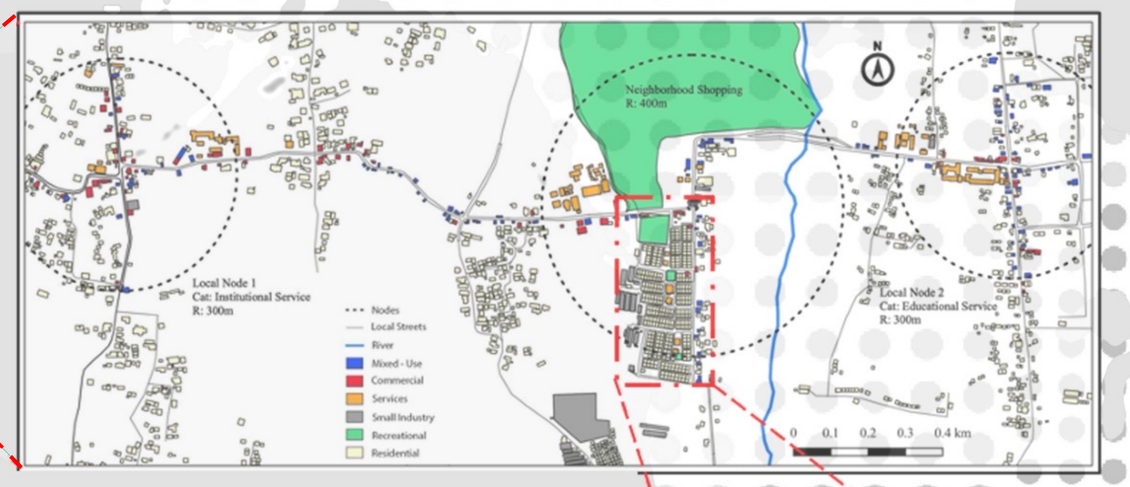
https://doi.org/10.1016/j.trd.2022.103189

After the 2010 Merapi volcano eruptions, many villages were relocated to semi-urban settlements separated from their earlier livelihoods and with few options for diversification. Post-disaster resettlement is dependent on people's access to livelihoods as a means for short- and long-term recovery. This study evaluates post-disaster mobility, aiming to clarify whether a land-use network with distributed livelihood options can complement rural labor in a recovery scenario. In 2019, a field survey was conducted in the largest resettlement site of the Sleman Regency in Yogyakarta, Indonesia, to evaluate the state of recovery; socio-demographic and land use data was subsequently processed to forecast urban development up to the year 2030. Travel routines were simulated for 2019 and 2030 comparatively to quantify travel efficiency and ease of access to employment options with the Operational Land Use and Transport Microsimulation (OLUTM) model. 1,944 new tradable and non-tradable jobs were added to the area. Consequently, residential demand was met with a 44% deficit caused by spillover effects. The study also saw that 63% of the 84% livelihood diversifications were made by farmers and that farming was kept as the primary job while home-businesses became a secondary employment. Travel utilities were reduced by 30% while travel in the settlement saw 49% fewer kilometers driven. As a result, CO_2 emissions decreased by 28% and a balance in mobility modes was achieved for the whole settlement. The OLUTM model demonstrates that people utilized 21%–26% of their monthly income before the intervention and 11%–18.4% after with a modest bus service. This study concludes that recovery planning with economies of scale generates livelihood opportunities for farmers in rural areas.

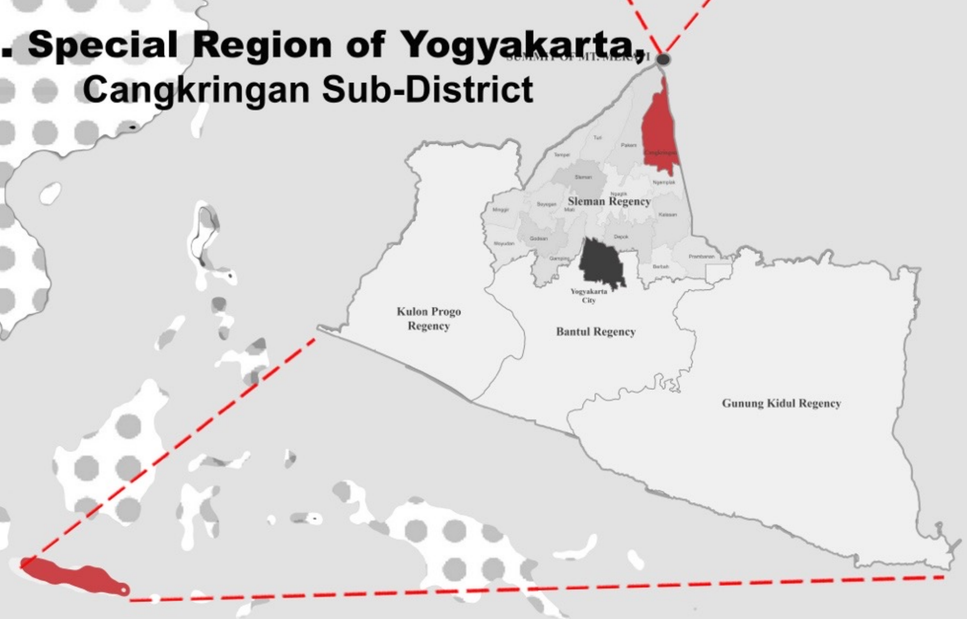
3. Simulation A
Travel Schedules in 2019 with a New Settlement





4. Simulation B
New Settlement & A Peri-Urban Development Process (2030)

2. Special Region of Yogyakarta,
Cangkringan Sub-District

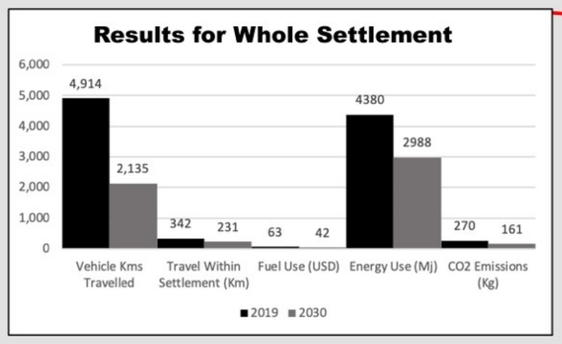


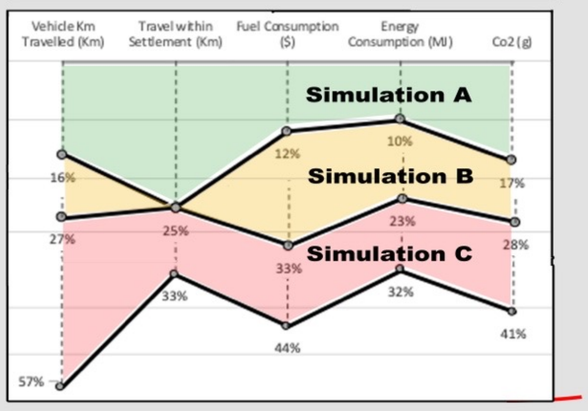
1. Java Island, Indonesia

Findings

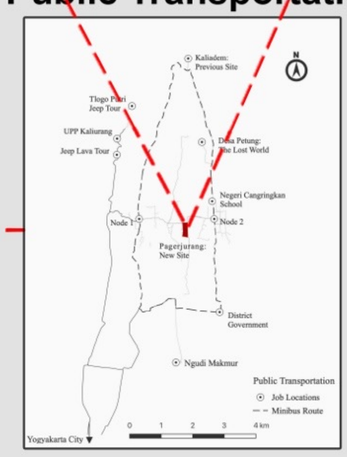
66% of all non-work tours occur within walking range, with all subjects walking to or from destinations increasing micro-business demand.

5. Simulation C
New Settlement
Peri-Urban Development (2030)
Public Transportation





7. Travel Efficiency Tests



6. Transportation Route
(Key Destinations in the Cangkringan Sub-District)

8. Urban Form Results

- 37,442m2 of new construction
- Total transit volume 3.2 times larger by 2030
- 1,944 new full-time jobs in nodal development
- Neighborhood shopping increases by 57%

Next Steps: Consolidate a Urban Development Process for Instant Resettlement after Natural Disasters in Peri-Urban Areas

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