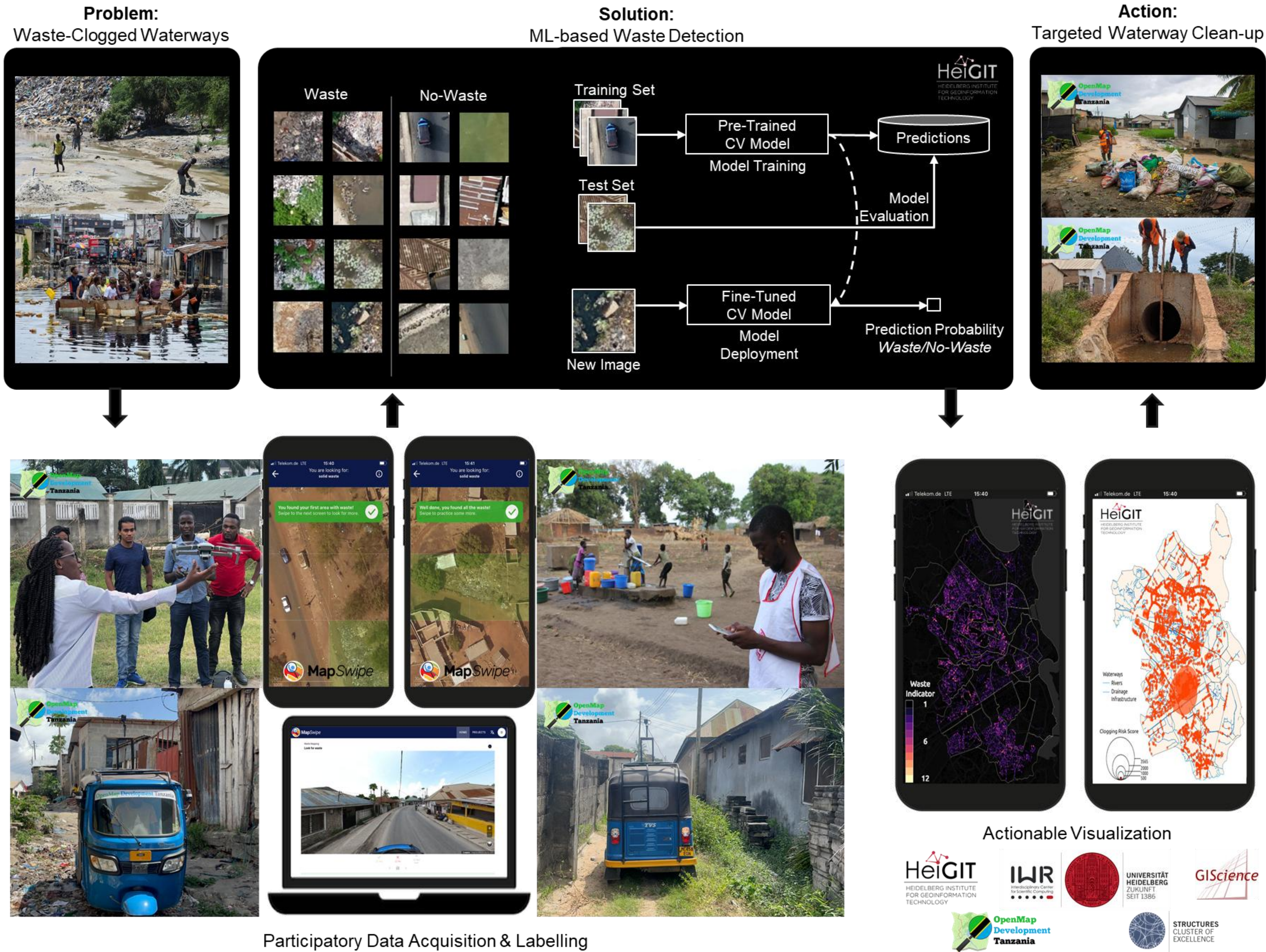


AI-based Waste Mapping for Addressing Climate-Exacerbated Flood Risk

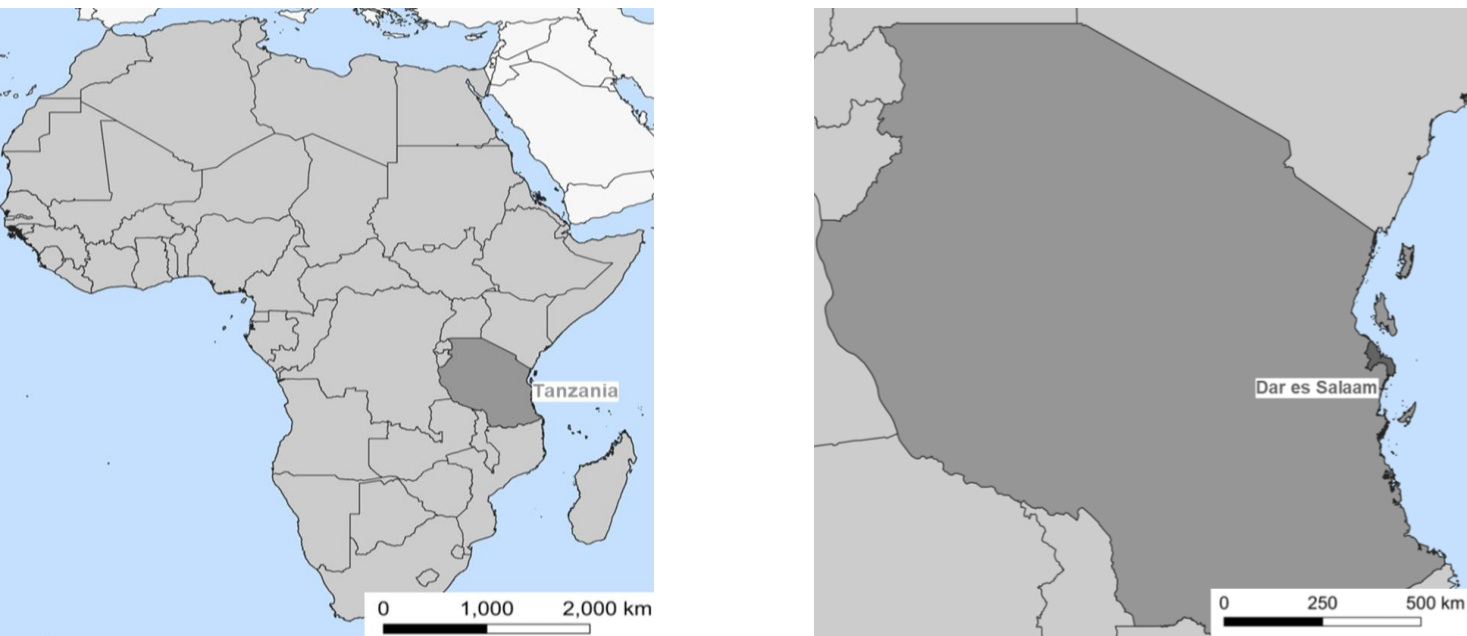
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Description:

Urban flooding is a growing climate change-related hazard in rapidly expanding cities, where inadequate waste management often blocks drainage systems. This study presents an AI-powered waste mapping workflow that empowers local communities to build resilience against flooding.



In Sub-Saharan Africa, less than half of municipal solid waste is formally collected, with up to 70% openly dumped. Dar es Salaam, Tanzania, was selected as a case study to test our workflow, given its rapid urban growth and critical waste management challenges. With a population of 5.38 million in 2022—projected to exceed 10 million by 2030—the city generates approximately 4,600 tons of waste daily, of which less than 40% is formally collected.

We conducted a two-week data collection campaign combined UAV and street-level imagery to capture diverse views of municipal solid waste. Drone flights produced 19.2 km² of high-resolution orthomosaics (~9 cm GSD), while a 360° camera mounted on a tricycles recorded over 494,000 panoramic images along 1,500 km of streets. All data was uploaded to Panoramax and OpenAerialMap for open-access sharing. Subsequent participatory labelling via MapSwipe enabled us to consider local waste reuse practices and to train a scalable waste detection model, which can guide targeted waterway clean-ups.