AI-based Waste Mapping for Addressing Climate-Exacerbated Flood Risk Insights from Dar es Salaam

Dr. Steffen Knoblauch, Climate Change AI Workshop NeurIPS 2024

Why Should We Care About Waste in Dar Es Salaam ?

- Sub-Saharan Africa
  - < 50% of municipal solid waste formally collected
  - ~ 70% openly dumped
- Dar es Salaam, Tanzania
  - Expected rapid urban growth: 5 mil. (2022) -> 10 mil. (2030)
  - ~ 4,600 tons of daily waste
  - < 40% of waste formally collected

Steffen Knoblauch, Levi Szamek, Iddy Chazua, Benedcto Adamu, Innocent Maholi, Alexander Zipf

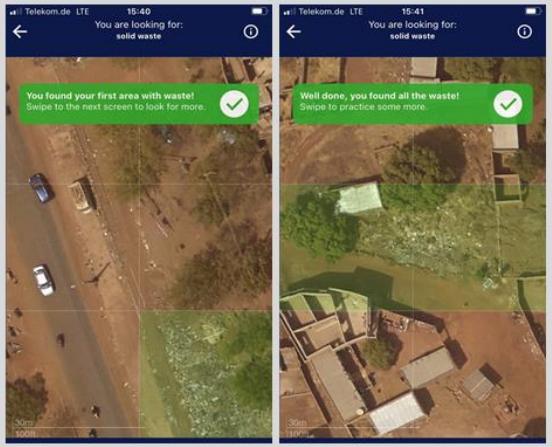
AI-based Waste Mapping Workflow

NEURAL INFORMATION PROCESSING SYSTEMS

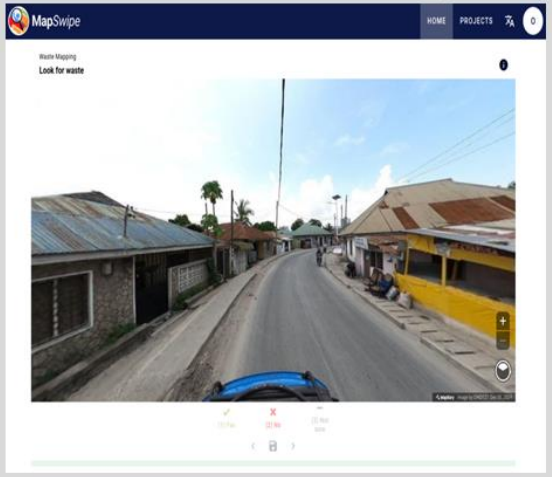
Local Data Acquisition

Aerial & Street Perspective

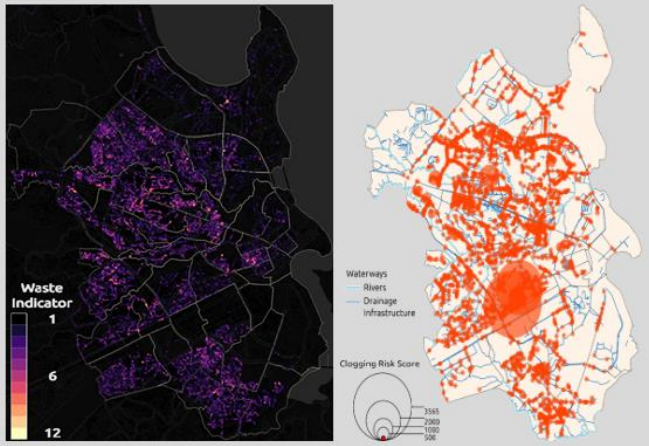
Crowdsourced Labeling



Waste Pile (yes / no)



Remote AI Deployment for Local Guidance



Waste Contamination & Waterway Clogging Risk

Assessment of Waste Types/Weight/Waterway Capacities

Community Engagement to Build Acceptance and Leverage Local Knowledge

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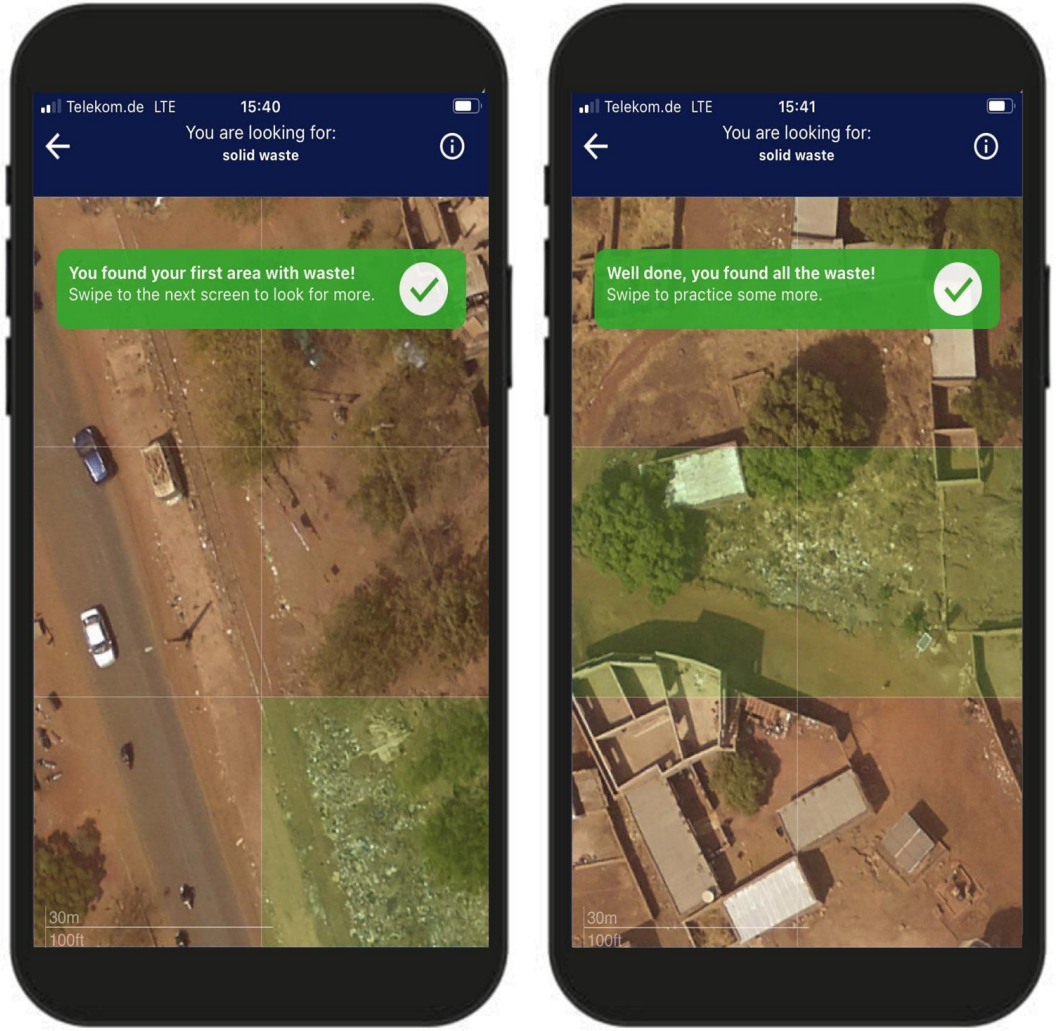
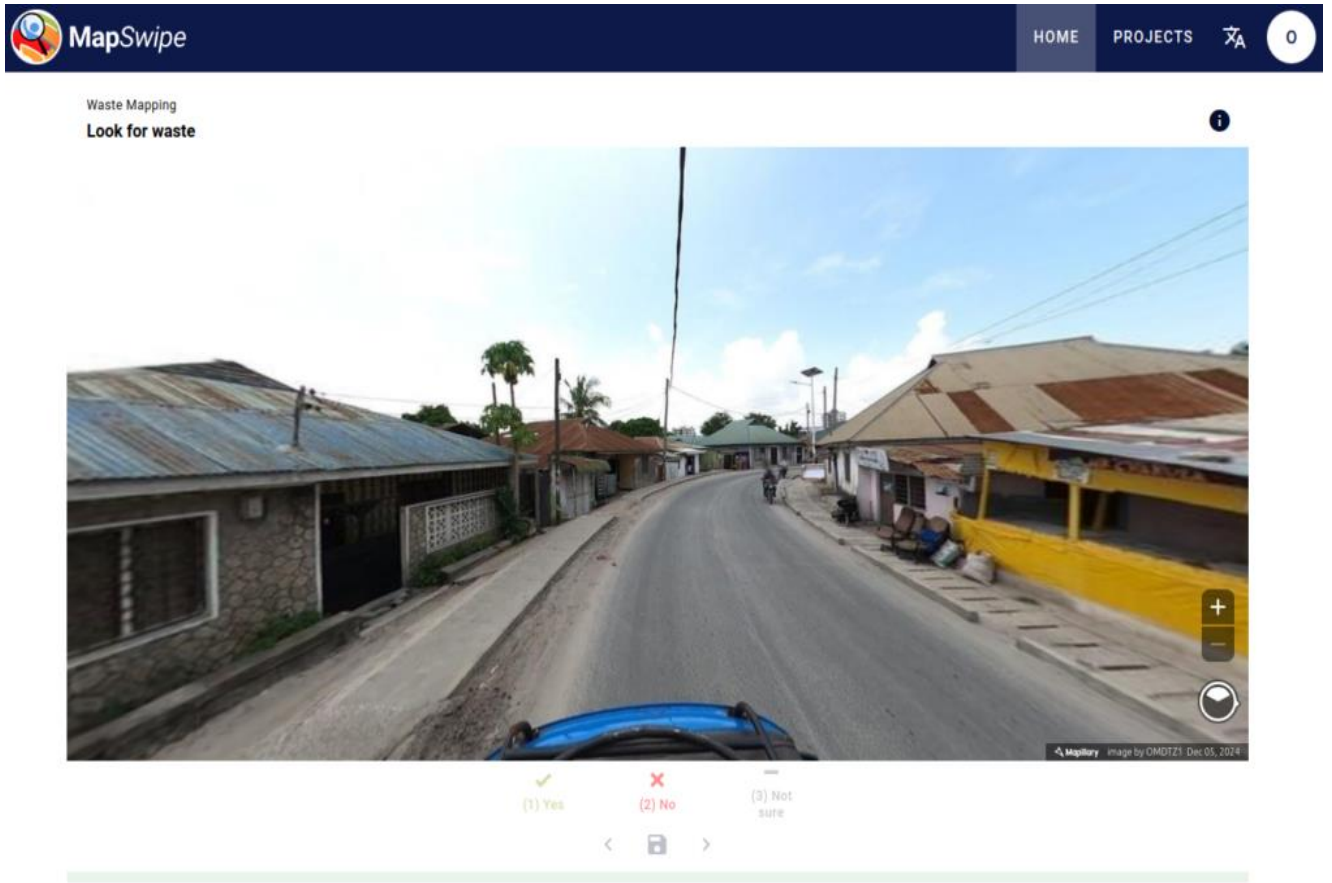
1) Community-driven Data Acquisition

2) Development of MapSwipe

Community Labeling Platform to Capture Local Perspectives





3) AI-based Waste Mapping

Waste Contamination

Waterway Clogging Risk

Community-driven Drainage Clean-up

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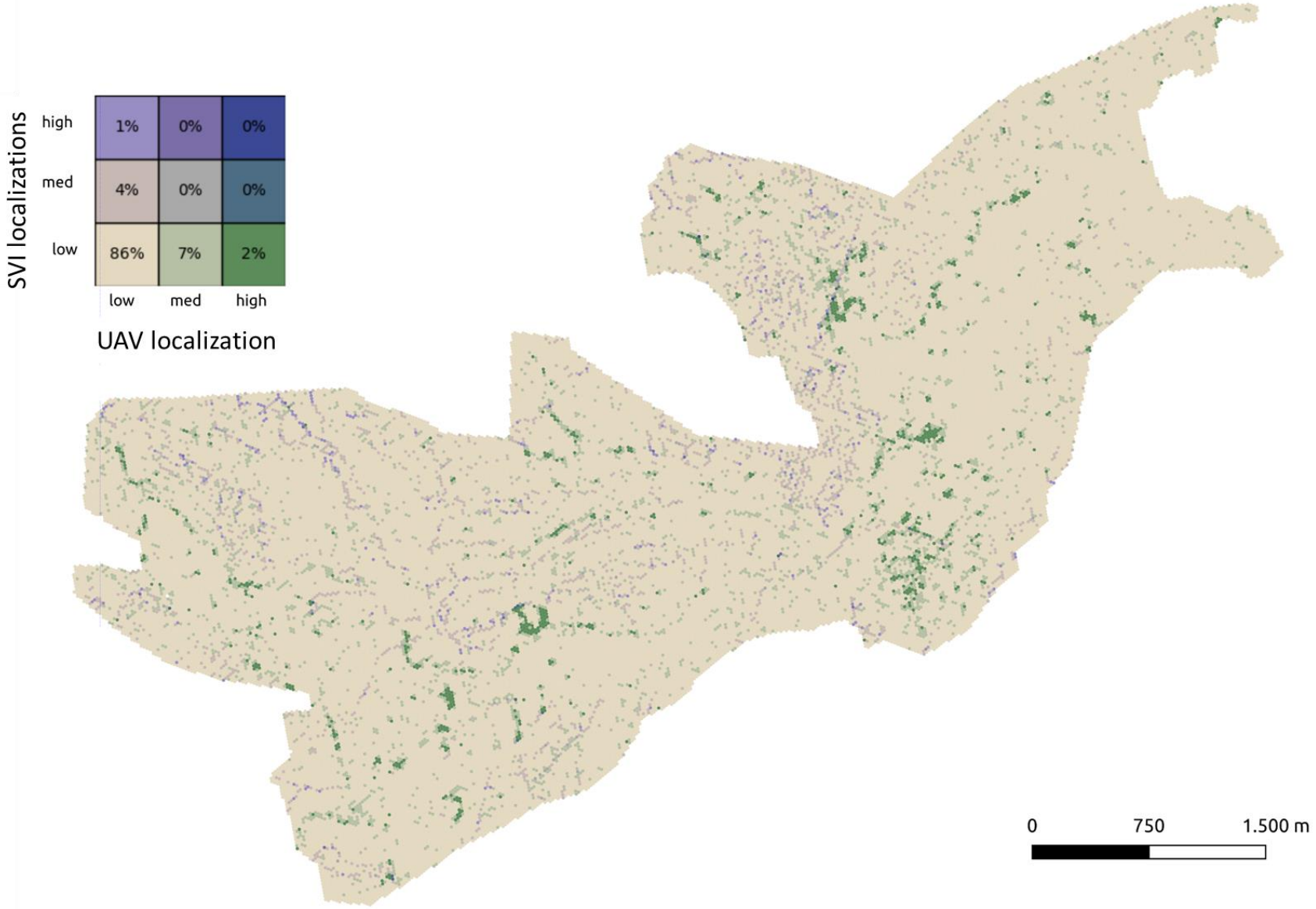
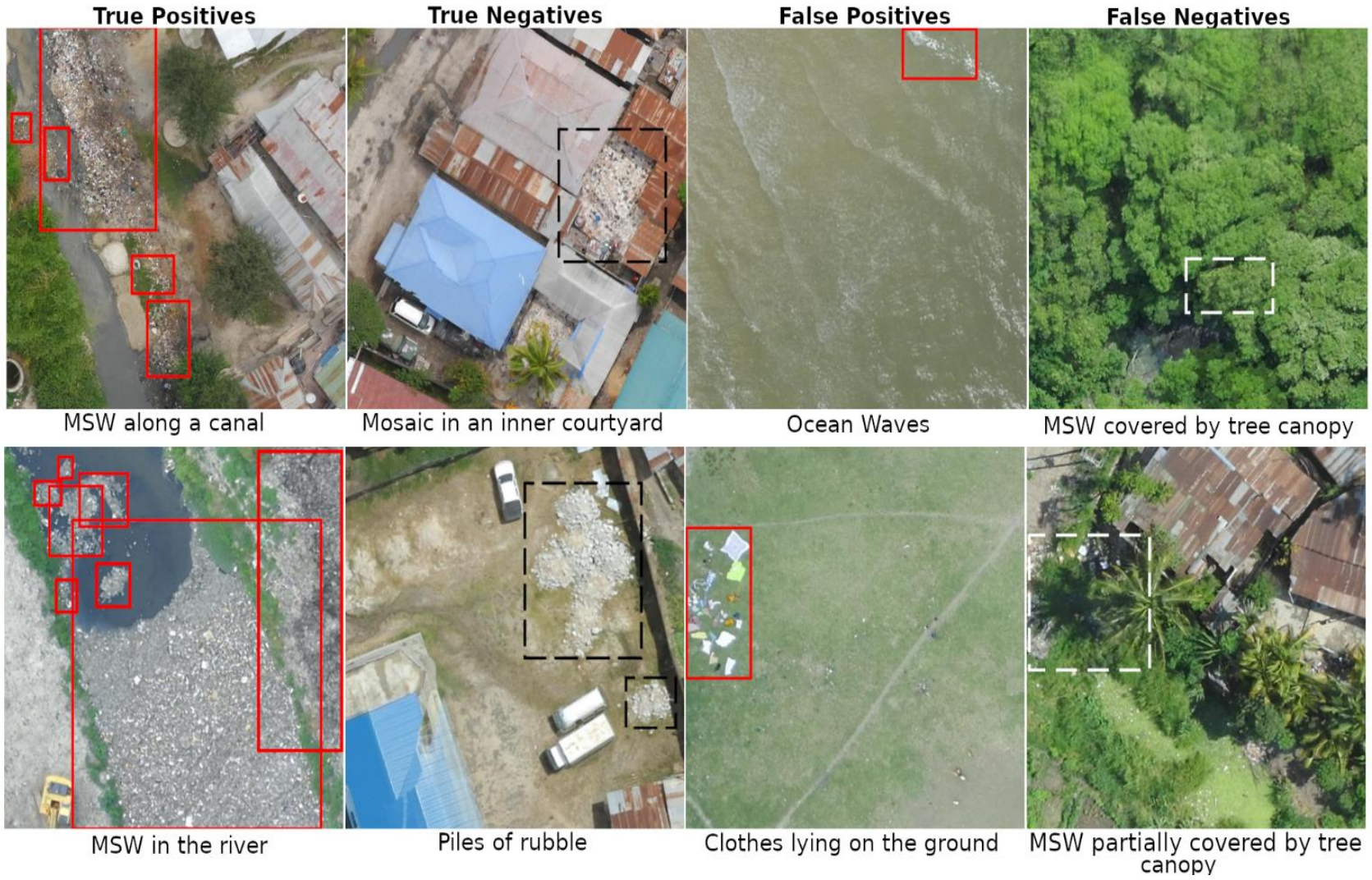
Discussion - Complementary Use of UAV and Street View Imagery



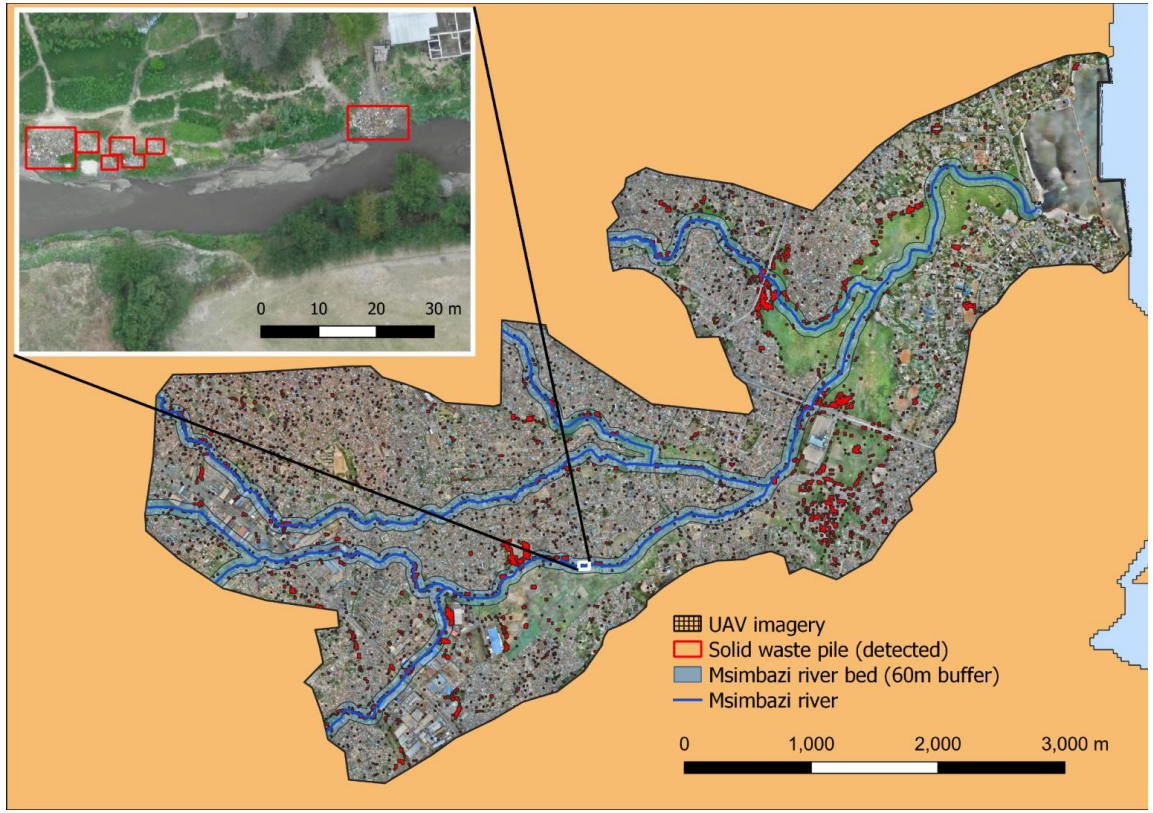
Discussion - Why we chose classification over detection …



Knoblauch et al. (2024) UAV-Assisted Municipal Solid Waste Monitoring for Informed Disposal Decisions - https://doi.org/10.1145/3677525.3678649

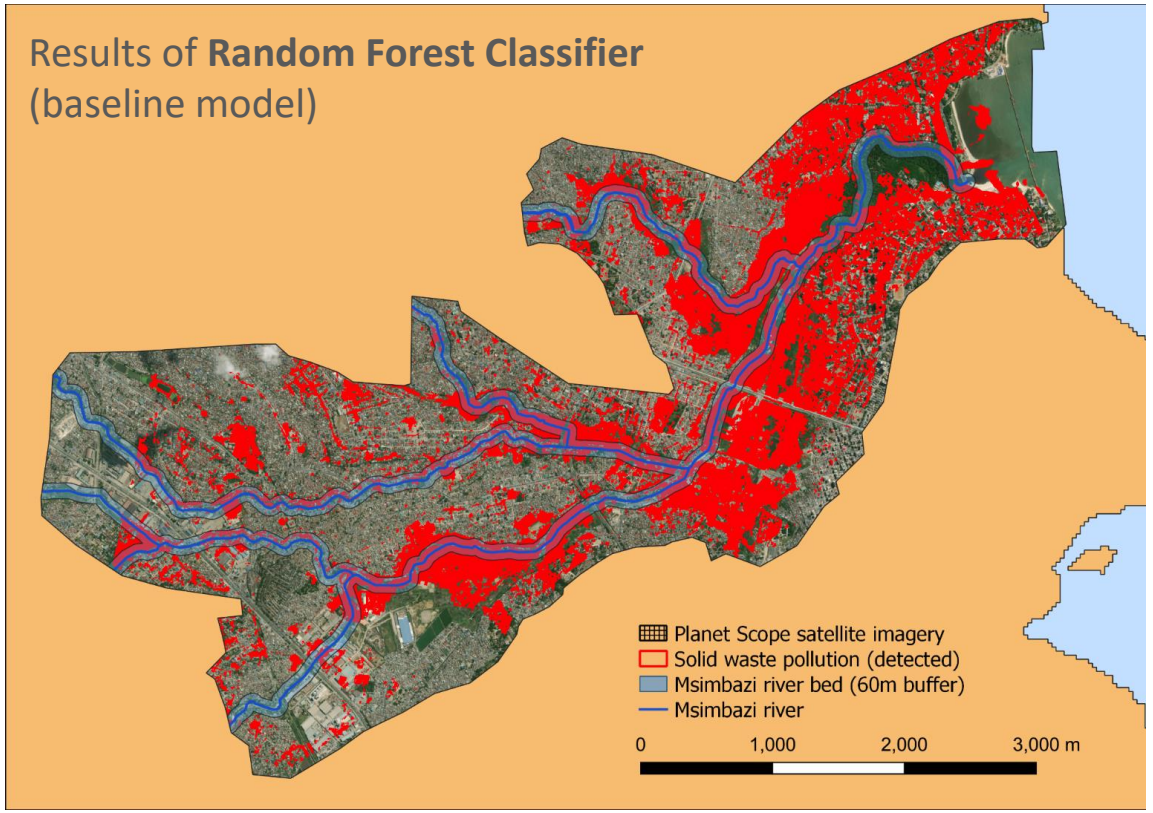
Discussion - Would satellite imagery also work?

UAV imagery



(3 spectral bands (RGB); GSD 0.09m)

Planet scope satellite imagery



(8 spectral bands; GSD 3m)

Knoblauch et al. (2024) UAV-Assisted Municipal Solid Waste Monitoring for Informed Disposal Decisions - https://doi.org/10.1145/3677525.3678649