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GLOBAL GEOSPATIAL
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GEOSPATIAL ANALYSIS OF SANITATION INFRASTRUCTURE IN URBAN SLUMS: INFORMING POLICY AND PLANNING DECISIONS FOR SUSTAINABLE URBAN DEVELOPMENT IN KISSEMAN

(ENGINEERING IN SOCIETY)

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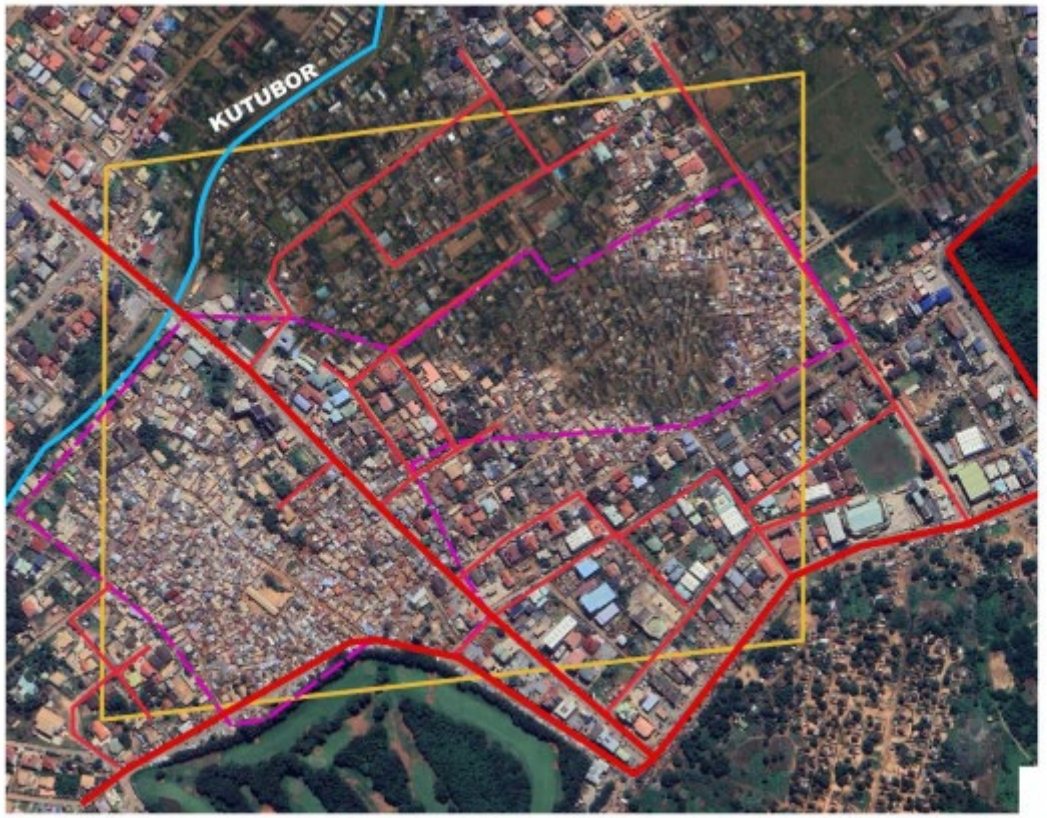
WHY ENGINEERING IN SOCIETY?

- CENG 291: Engineering in Society
- Course inspires community impact
- Focus: solving problems using engineering
- Project site: Kisseman (urban slum in Accra)
- Key issue: poor sanitation systems
- Approach: geomatic analysis of sanitation infrastructure

STUDY AREA

- Suburb in Greater Accra
- Mostly makeshift housing
- Near well built areas
- Basic services available
- Mixed informal economy
- Estimated population: ~1,500

MAP OF KISSEMAN



LITERATURE REVIEW

- Prof. Kwasi Obiri-Danso *et al* (2012): Urban growth in Ghana as many other countries is characterized by unplanned settlements – where municipal authorities have been unable to provide adequate sanitation and water supply alongside development.
- Frank S. Arku *et al* (2013): 2.5 billion people have no access to improved sanitation facilities, and almost 26% of the world's population (over 400 million) lack the simplest latrines

THE PROBLEM

Fig 1. Public Toilet

Fig 2. Pit Latrine

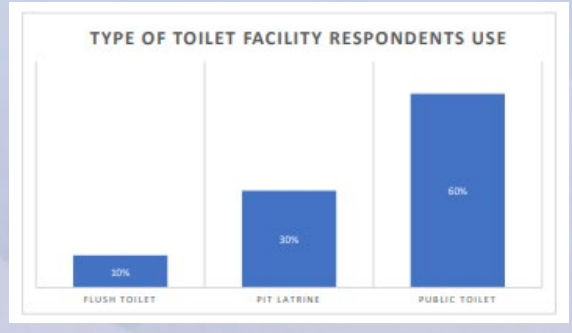
Fig 3. Cloged Drainage System

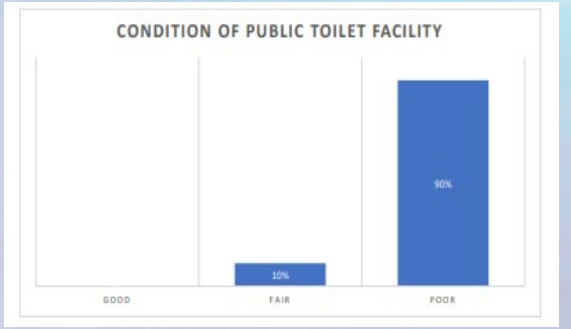
Fig 4. open dumpsite

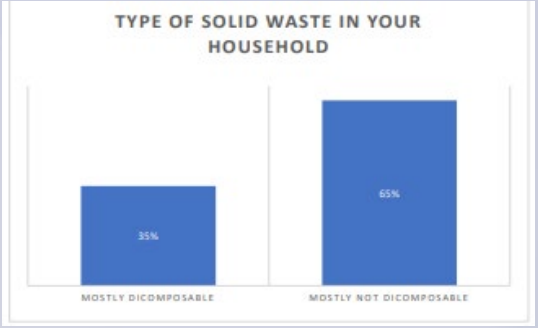
Fig 5 & 6. grey water in open spaces

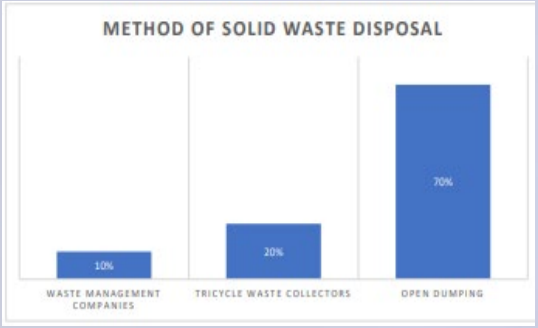
Fig 7. bathing shed

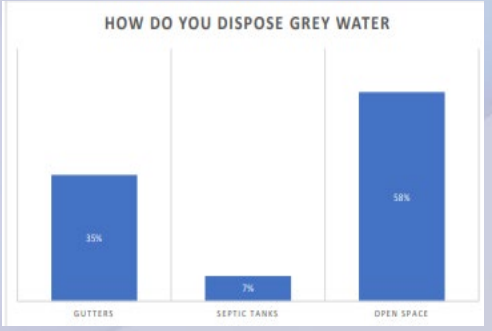
Results and Discussions

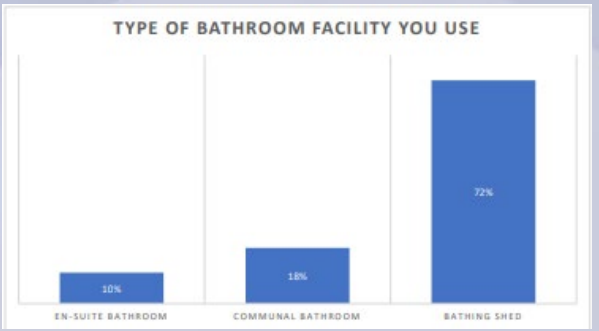




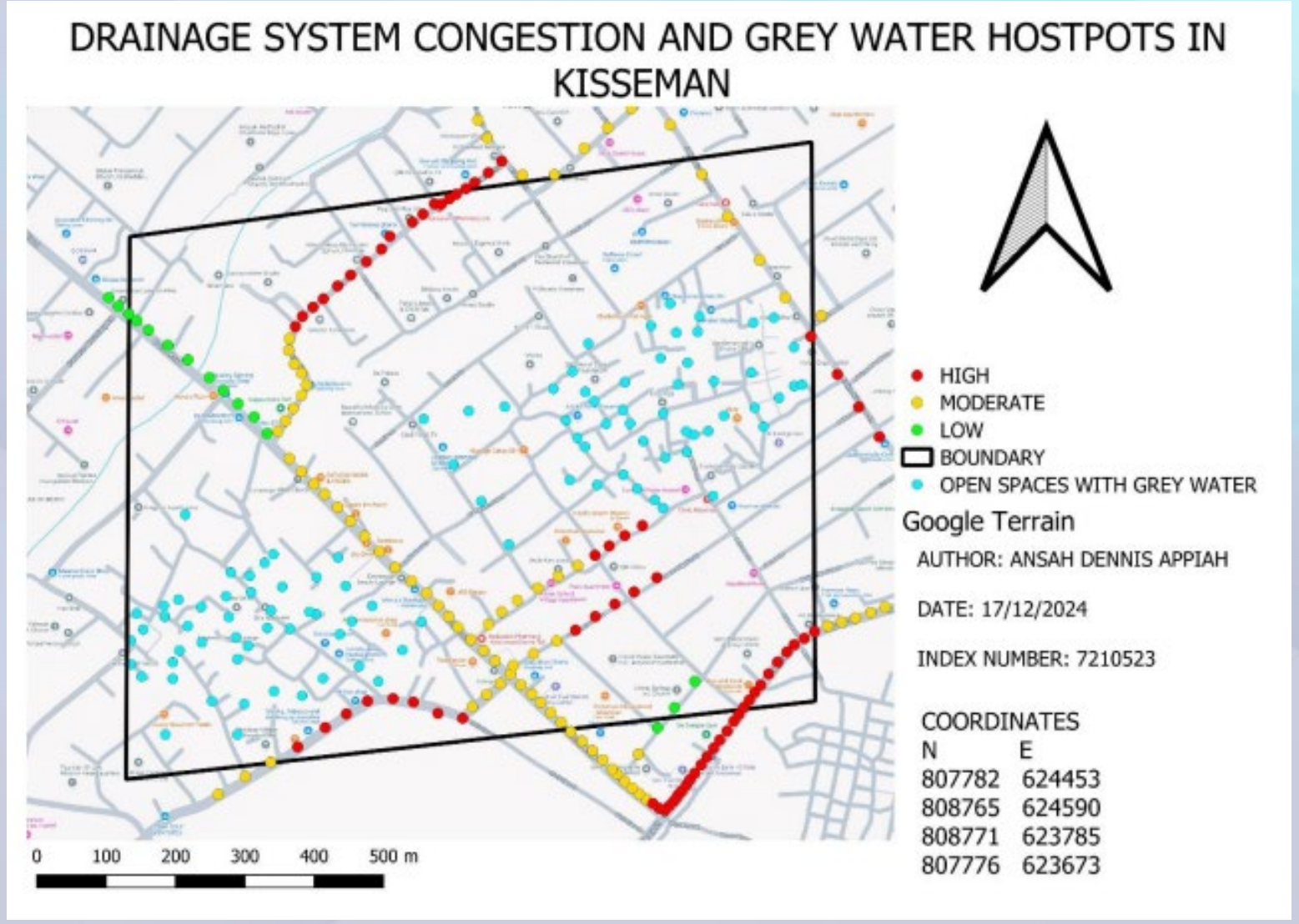




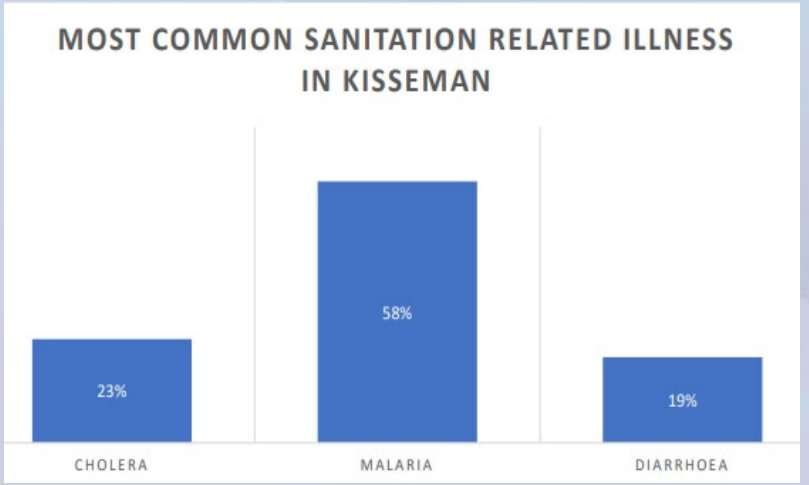


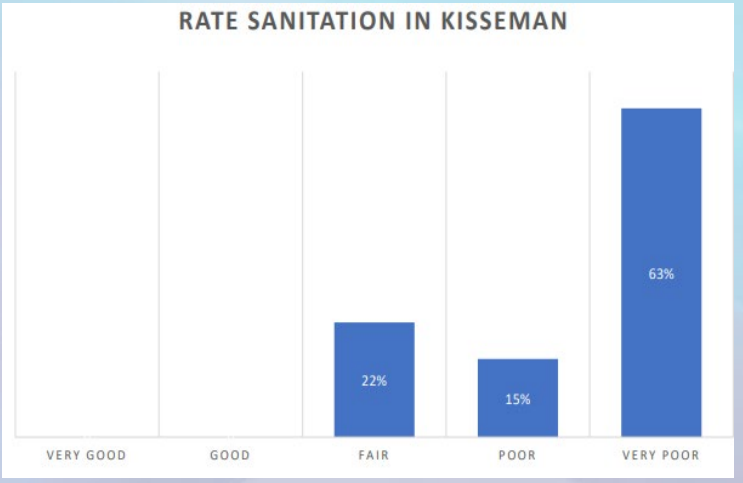


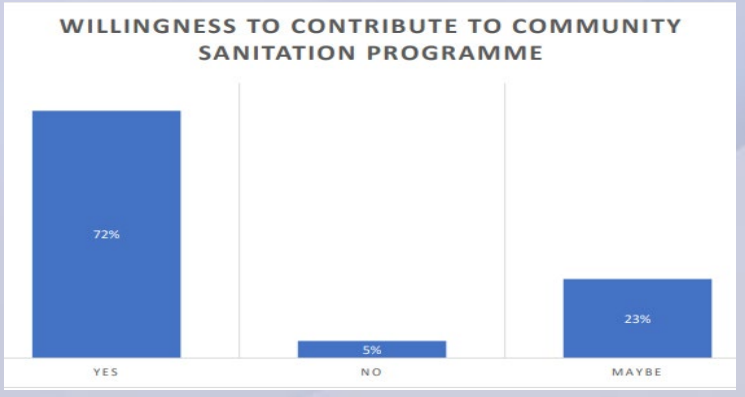
- ❑ Mapping shows severe gutter congestion in Kisseman
- ❑ Most drains filled with silt and plastics
- ❑ Clogged drains increase flooding risk
- ❑ Stagnant water creates mosquito breeding sites → more malaria
- ❑ Greywater exposed in many areas of the slum
- ❑ Red points: highly choked drains
- ❑ Yellow: partially choked
- ❑ Green: no blockage
- ❑ Light blue: exposed greywater points



AWARENESS OF THE ENVIRONMENT







- ❑ **Use spatial analysis to optimize layout**
- ❑ **Improve placement of buildings, roads, and sanitation systems**
- ❑ **Include spaces for housing, markets, factories, schools, and health facilities**
- ❑ **Add sports centers, security posts, and religious facilities**
- ❑ **Provide sites for wastewater treatment, plastic recycling, energy production, and rain harvesting**
- ❑ **Long-term sanitation benefits through plastic recycling**

CONCLUSION

- ❑ **Study identified major sanitation challenges in Kisseman**
- ❑ **60% lack proper toilets; public toilet in poor condition**
- ❑ **Inadequate drainage → flooding & health risks**
- ❑ **Makeshift bathing sheds → greywater in open spaces**
- ❑ **Poor waste disposal; illegal dumping common**
- ❑ **Malaria threat due to exposed greywater & choked drains**

RECOMMENDATIONS

- ❑ Improve town planning with proper layouts
- ❑ Build efficient modern drainage
- ❑ Provide clean public toilets
- ❑ Start door-to-door waste collection + public bins
- ❑ Educate community on proper waste disposal
- ❑ Promote recycling and sustainable habits
- ❑ Partner with local groups and companies
- ❑ Monitor sanitation progress regularly
- ❑ Enforce environmental bylaws

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THANK YOU

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