Analyzing Urban Public Toilet Distribution Using GIS-Based Planning Techniques

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Problem Statement

Local governments face challenges in justifying the number of public sanitation facilities needed in cities/towns.

Existing norms for minimum seat numbers and utilization are insufficient for addressing the ad hoc nature of urban areas.

Lack of methods to identify suitable locations based on localized infrastructure and user types leads to many public toilets becoming defunct.

Methodology

1 Data Collection

Geo-tagging of CTPT
- *KOBO Application*

Mapping high activity areas
- *Google Earth*
- *QGIS – Vector Geometry Creation*

Digitising major roads
- *Google Earth*
- *QGIS – Vector Geometry Creation*

2 Analysis

Creation of walkability buffer (500 m) around CTPT
- *QGIS – CRS Projection Tool (GCS TO PCS)*
- *QGIS – Buffer Tool*

Merged all the buffer zones to arrive at Required Service Area for Public and Community Toilets
- *QGIS – Merge tool*

Calculating the Demand area for CTs and PTs – Seat utilisation
- *QGIS – Difference tool*

Locating the points for new PTs and CTs
- *QGIS – Points Generator Tool*

Validation of proposed toilet locations by Citizen
- *Physical Survey*

3 Recommendations

Construction of a new toilet in an area where no toilet currently exists
- *Citizen Validation*

Construction of a new toilet in an area already having an existing toilet/s, but are insufficient to meet the existing user demand
- *Citizen Validation*

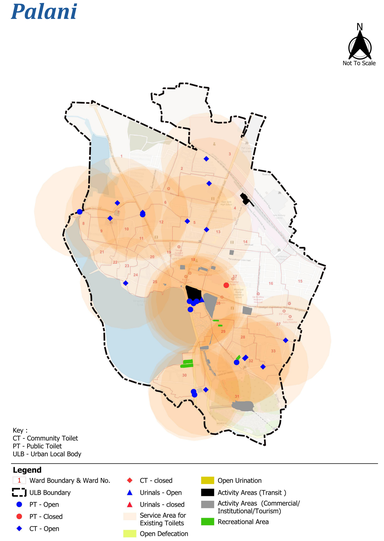
Extension of existing toilets to increase number of seats and therefore meet the demand
- *Citizen Validation*

Repair/refurbishment of closed and/or dilapidated toilets to fully functional toilets
- *Citizen Validation*

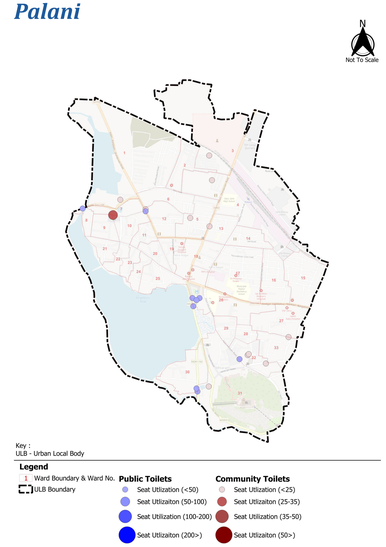
Spatial Analysis

Sample in select project town

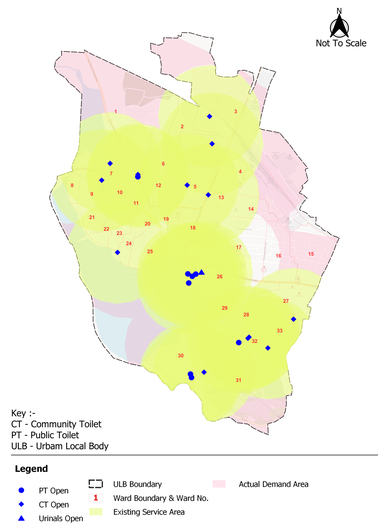
High Activity Areas - Palani



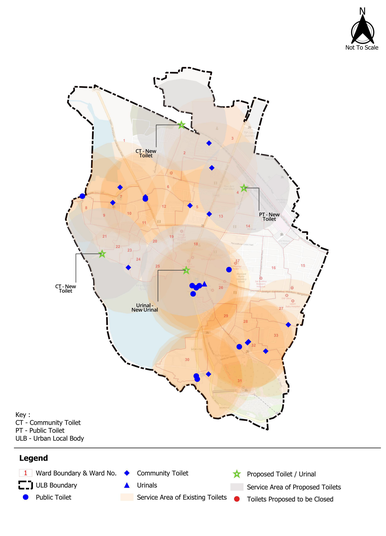
Seat Utilization Map - Palani



Existing Service Area Vis-a-Vis Demand Area - Palani



Proposed Locations Map - Palani



Limitations of the approach

Limited Automation:

Despite extensive software utilization, the approach cannot be fully automated due to the need for manual input and validation by Urban Local Bodies and community members.

Manual Data Collection:

The data collection phase necessitates human intervention for accurate input, which may introduce variability and limit efficiency.

Advantages of the approach

Scientific Approach to Addressing Accessibility and Availability of Public and Community Toilets

Cost-Effective Solution:

Utilizes open-source geospatial tools for efficient analysis and identification of toilet locations, minimizing financial barriers to implementation.

Validated by Stakeholders:

Approach considered citizen feedback as an important step, ensuring a comprehensive and accurate representation of public toilet needs.

Theoretical, Implementable, and Scalable

Theoretical:
Aligns with established spatial norms and standards for public sanitation, ensuring academic rigor and credibility.

Implementable:
The results can be directly applied to the design and construction of new toilets, facilitating timely and effective solutions in urban areas.

Scalable:
This approach can be adapted for various geographic scales, from local neighborhoods to city-wide initiatives, making it versatile for diverse urban contexts.