

Assessment of physical infrastructure of a hill town: A case study of Gangtok, India

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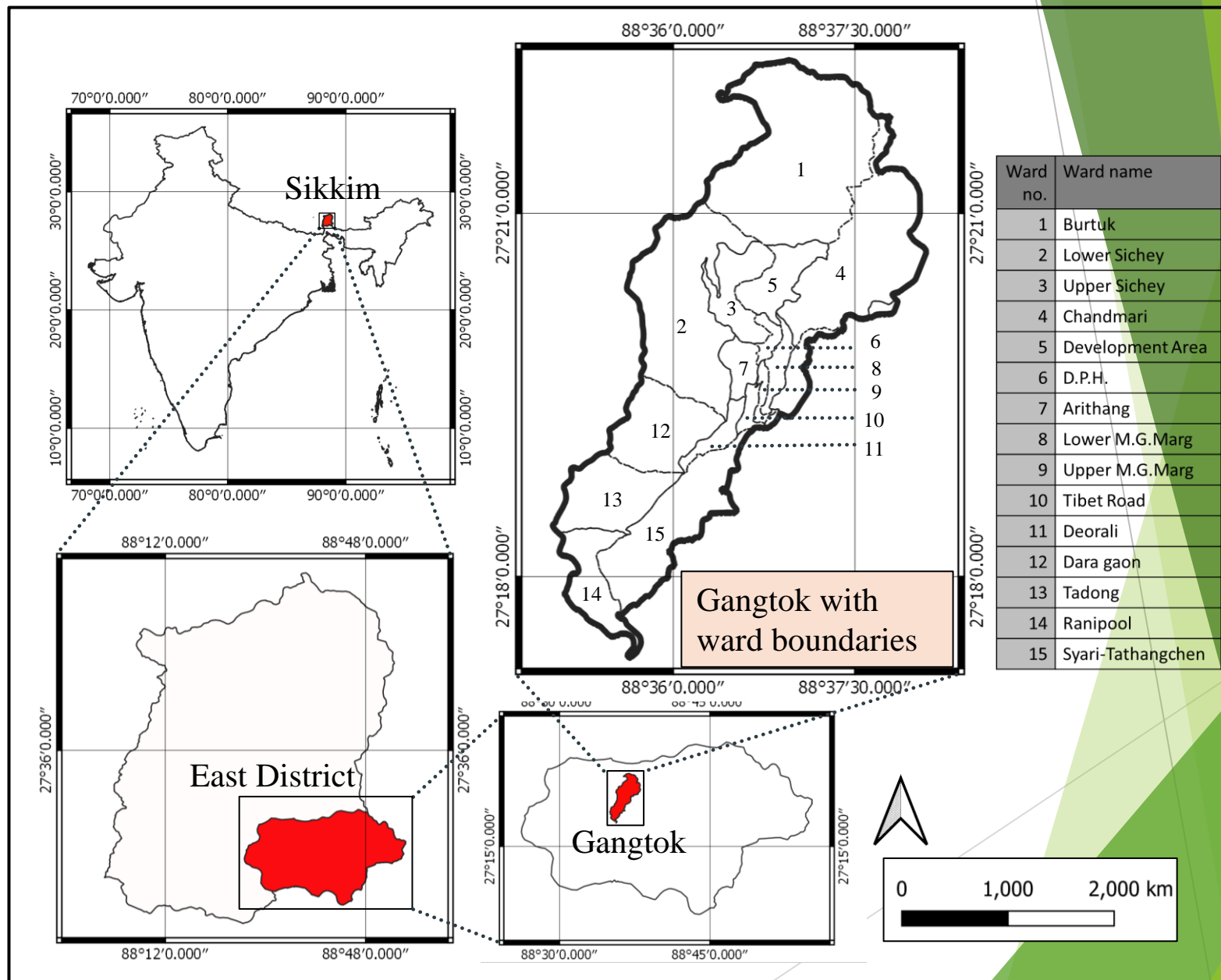
India

- Introduction
- Methodology
 1. Study area
 2. Data collection
 3. Data analysis
- Results & discussion
- Conclusion

- Infrastructure is the basic physical and organizational structures and facilities (e.g. buildings, roads, power supplies) needed for the operation of a society or enterprise.
- Physical infrastructure helps improving the economic activity while social infrastructure helps building human capital.
- As one of the 12 pillars of global competitive index and recognized as goal 9 of Sustainable Development Goals (SDG 2030) by United Nations, infrastructure plays an important role in improving quality of life, economic growth and development.
- Infrastructure development index(IDI) is one of the universal way of ranking the existing services condition:
 1. To monitor and evaluate the status and progress of infrastructure development across the region.
 2. To assist in resource allocation within the framework by focussing on the areas of urgent need.
 3. To contribute to policy dialogue among various federal and non-federal organizations.

- In this study, availability of infrastructural facilities (Physical and social) of Gangtok, India is analysed based on the primary survey (2019) data collected at ward level through composite infrastructure development index (IDI).
- Various factors obtained on the basis of user response are compacted and compared to the existing SLB(service level benchmark) set by MoUD and were simply ranked according to extent of reaching the recommended level.
- The factors specified are chosen further by a simple multivariate analysis(PCA) to extract the most relevant and impactful ones to construct the index.
- The result shows an intra-ward non-uniformity, when ranked and mapped accordingly in QGIS to compare with the subsequent level of service.

STUDY AREA LOCATION MAP

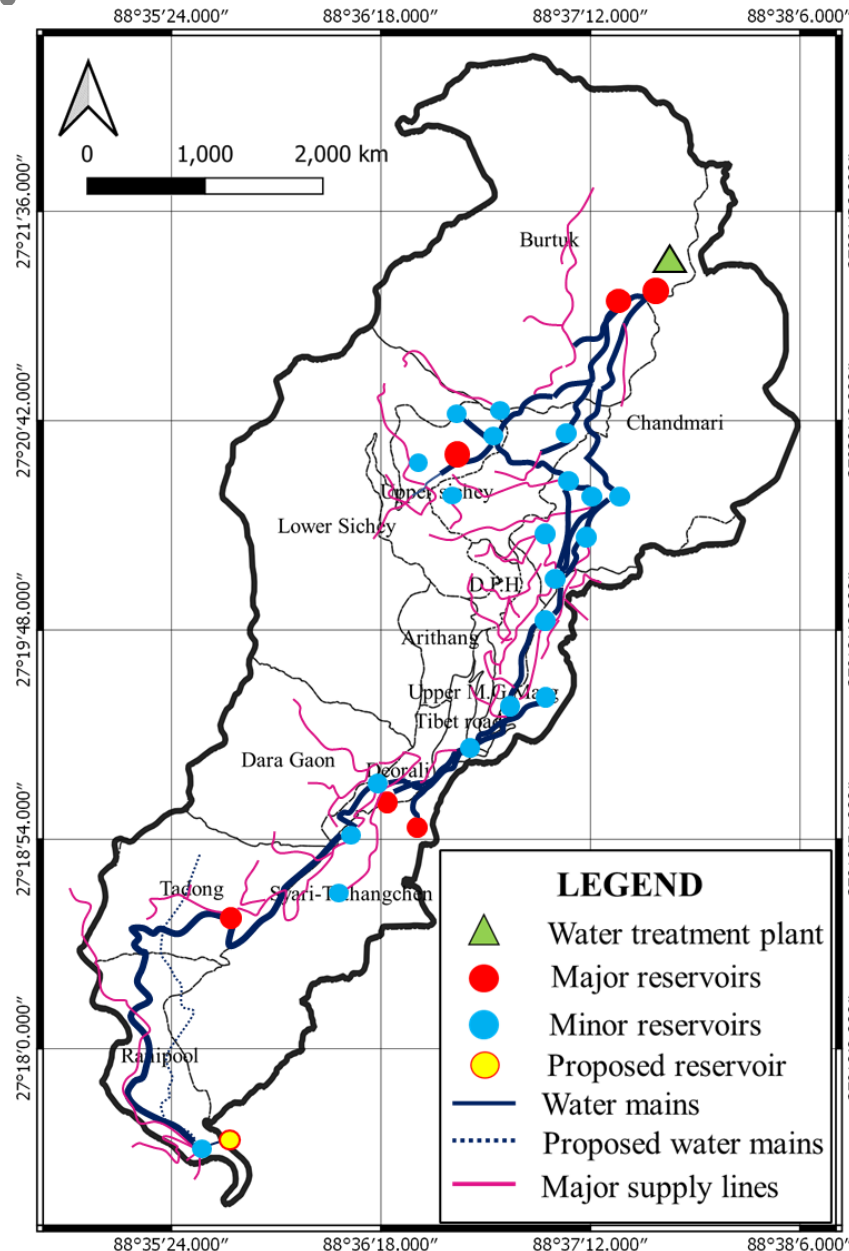


2. DATA COLLECTION

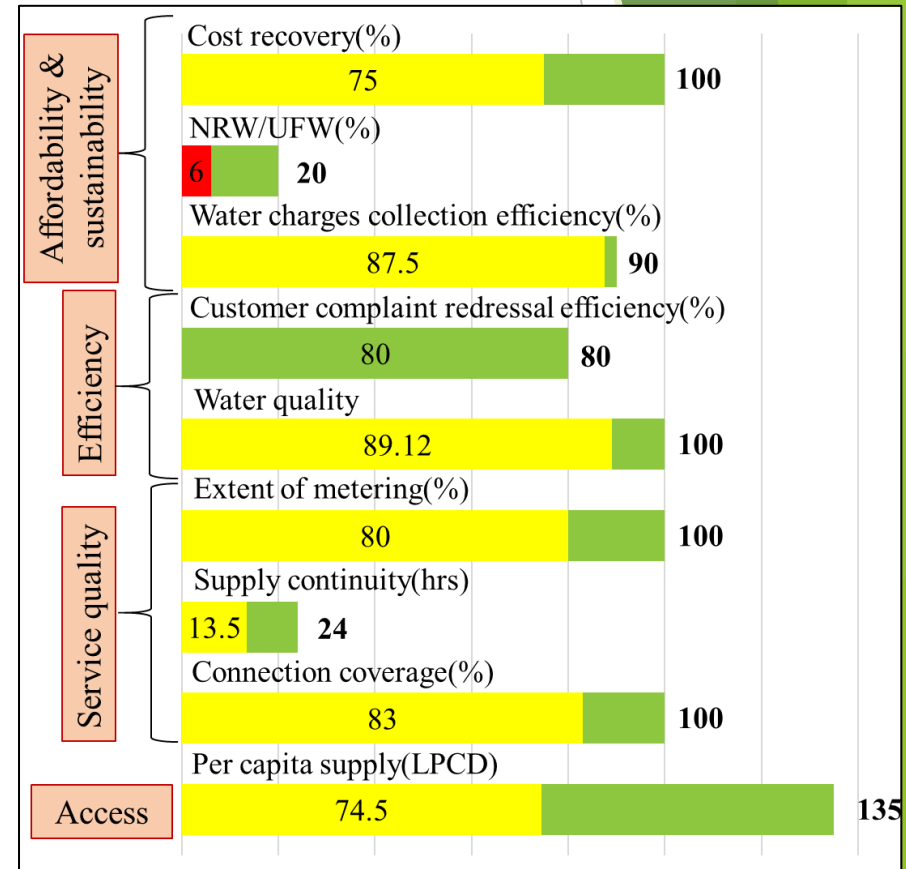
- Secondary data required for the study is collected from Census of India (2011), CDP Gangtok, Benchmark & Guidelines, Infrastructure Plans, Existing Govt. policies and notifications for schemes.
- Primary survey was conducted in 2019 to collect the information about existing scenario through self-designed questionnaire based HH survey and interviews with govt. officials.
- Sample size for the ward based surveys were limited to 60 because of difficult terrain and limited time period available.
- Collected datasets are verified for reliability test(Cronbach's $\alpha = 0.76$) and are used in further calculation to obtain the values for specified parameters mentioned in service level benchmark guidelines.

WATER SUPPLY

3. DATA ANALYSIS

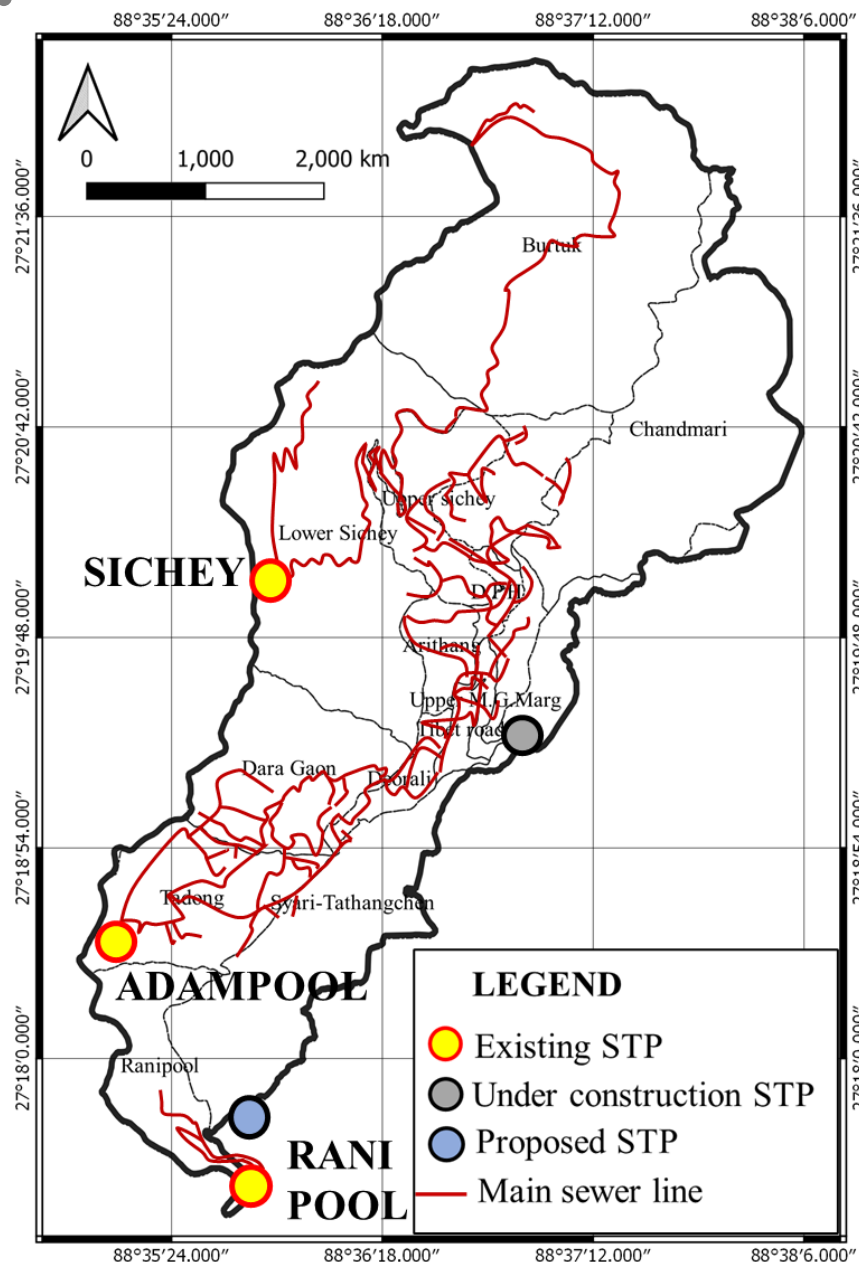


- Main 7 zones distributes to 21 subzones under gravitational pressure.
- Average supply time 2 hrs. at morning and evening.

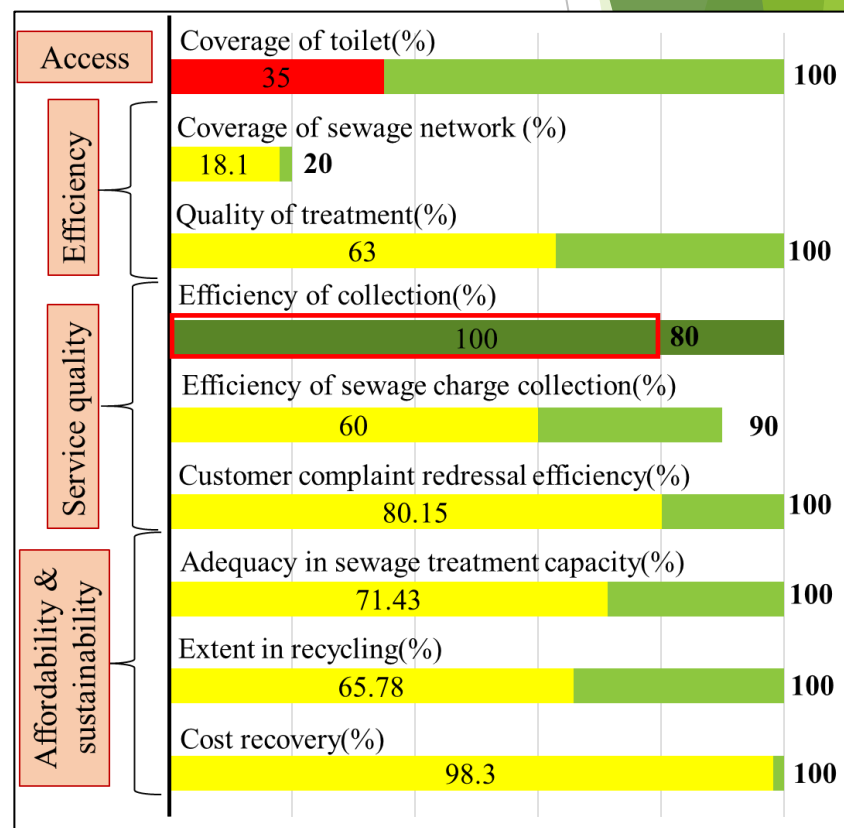


SEWAGE & SANITATION

3. DATA ANALYSIS

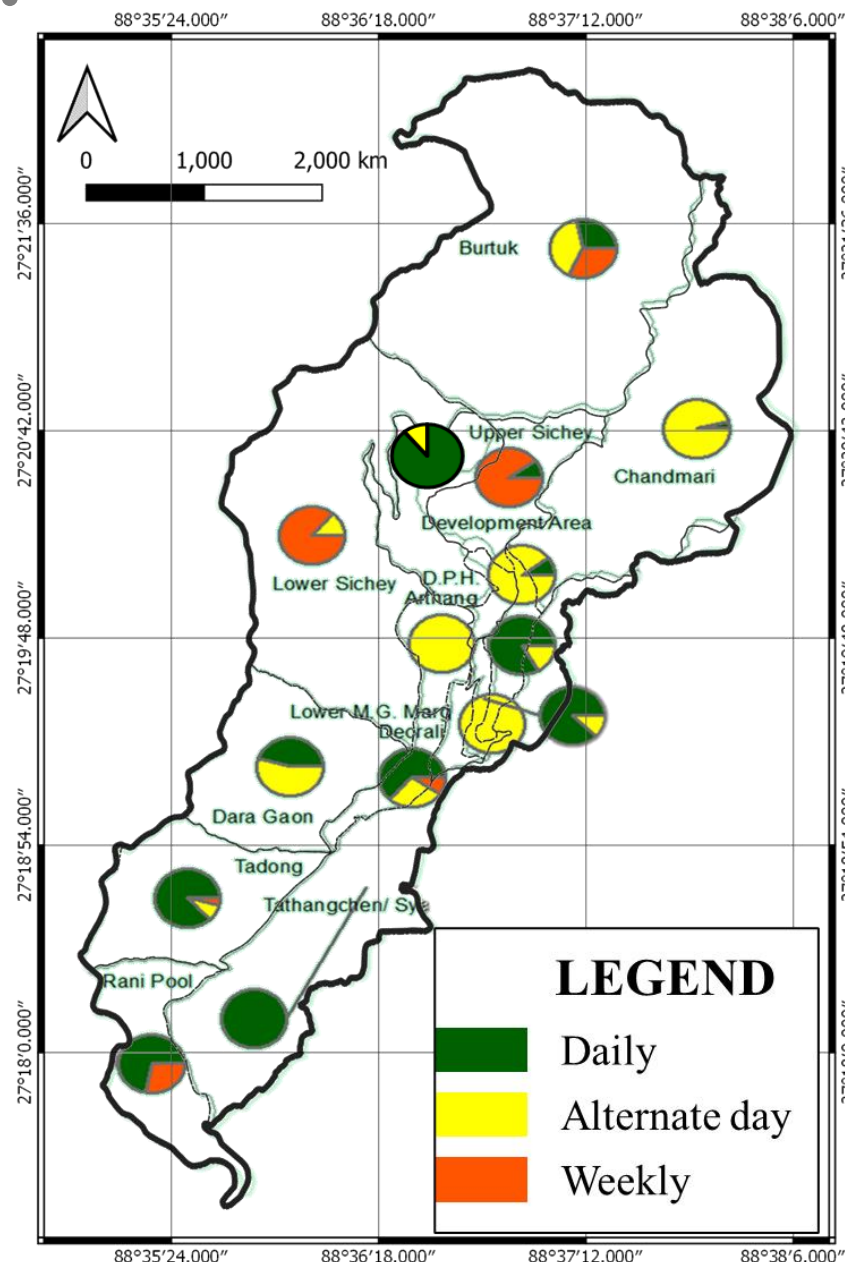


- 4 zones, each has one STP, zone 3 is most underdeveloped.
- TPs situated low-lying area requires pumping making the distribution cost higher.

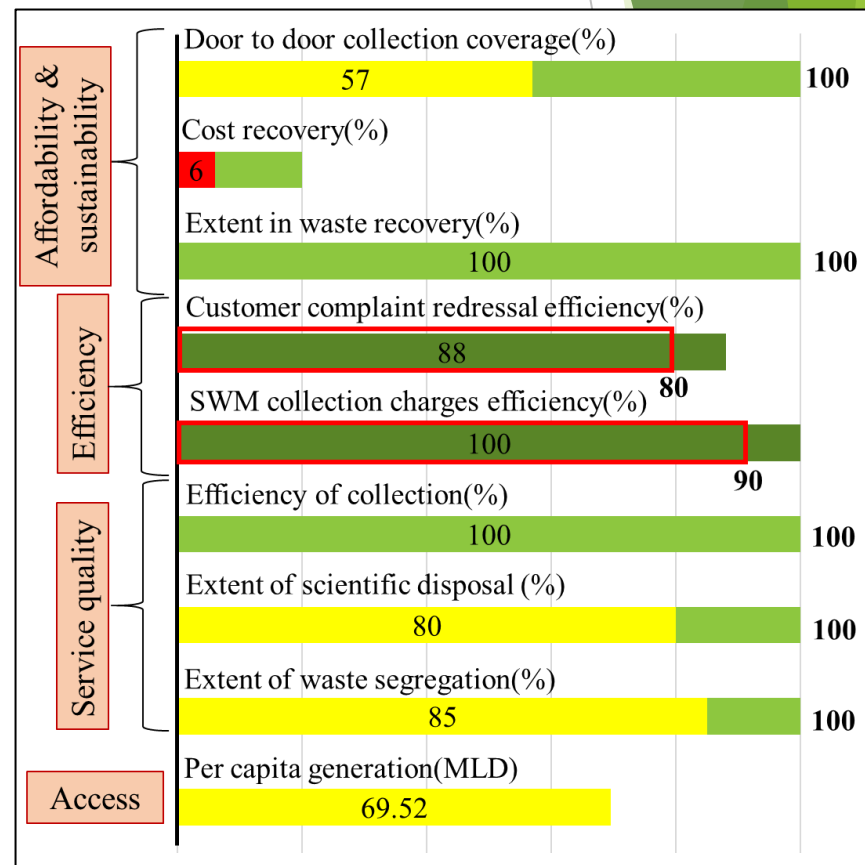


SOLID WASTE MANAGEMENT

3. DATA ANALYSIS

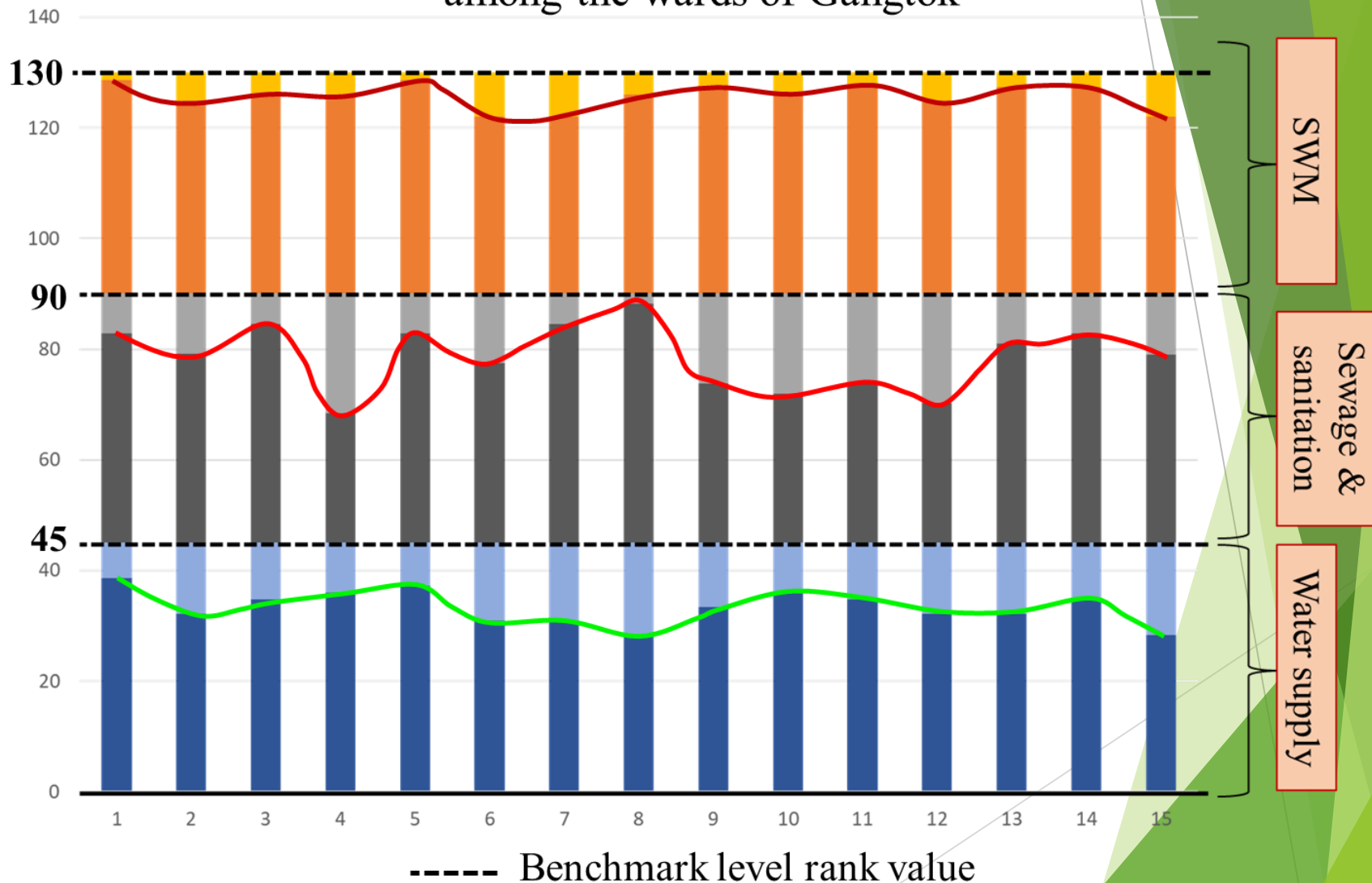


- Average generation 50tonn/day.
- 100% waste collection and sent to landfill 16km away from GMC.
- Waste energy generation by recycling paper and plastic waste.

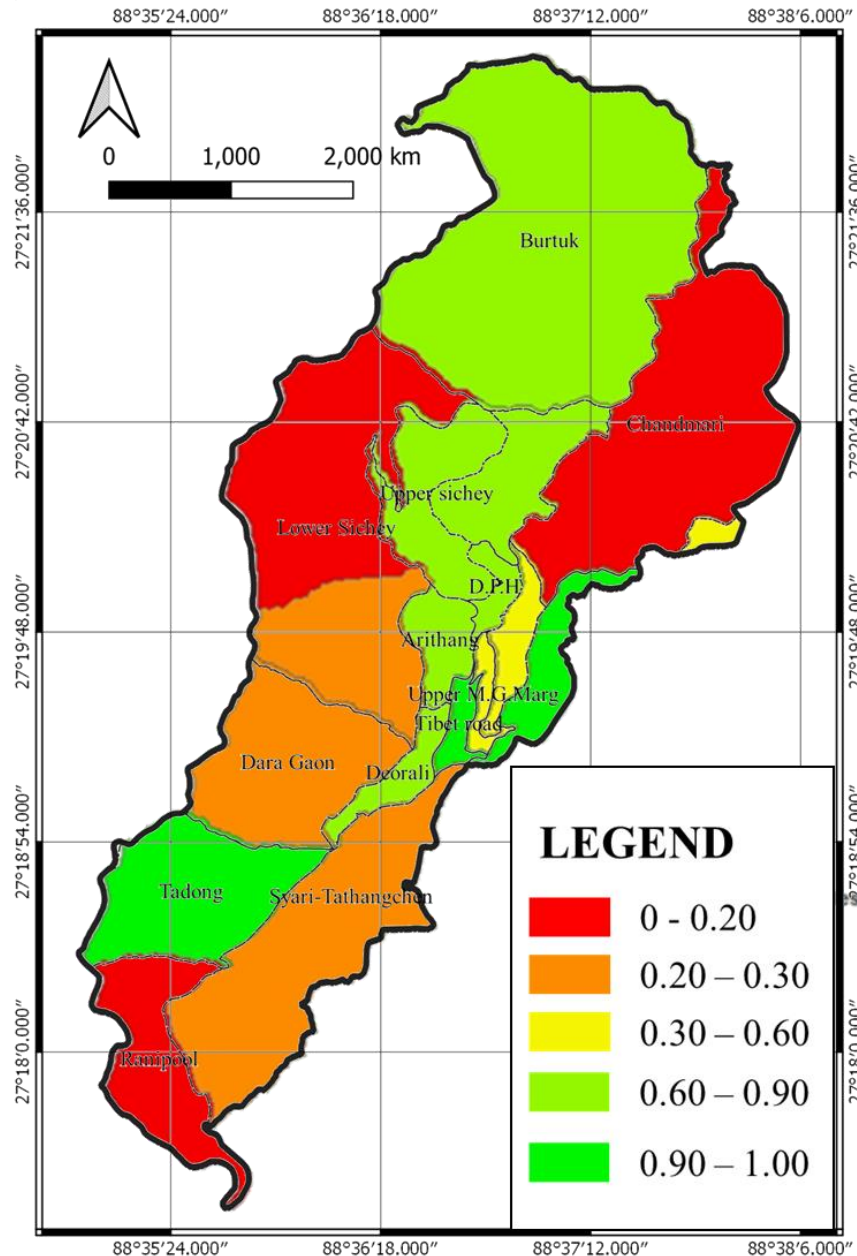


RELATIVE RANKING OF WARDS

Comparative ranking of service infrastructure
among the wards of Gangtok



PIDI(Physical Infrastructure Development Index)



- Wards having index value less than .20 is to be developed in terms of every infrastructural aspect.
- Wards having index value in between .20 to .30 is to be developed in terms of water supply and SWM aspect.
- Wards having value above than that have problems in any one of the aspects.
- Chandmari, Ranipool and Sichey should be given first priority for development.

- PIDI value calculated for all the municipal wards in Gangtok area shows relative extent of all aspects of service infrastructure development (Water supply, Sewage & sanitation and Solid waste management) and points out the ill-serviced wards.
- Wards along the central spine(Burtuk, Development area, Arithang, Deorali)and newly developed ones(Tadong) have the higher PIDI showing quite satisfactory service levels.
- Issues like absence of proper drainage, increased unauthorized connections lessening the head pressure and weekly SWM collections existing in wards like Chandmari, Ranipool and lower sichy put them at the lowest PIDI and most critically serviced wards.
- Shortage of water in winter and storage issues in southern wards (i.e. Daragaon and Syari-Tathangchen) results these wards to be placed in situations needed to be looked after.

- The relative ranking of service level of the wards are further quantified using the infrastructure development index value. This also shows the future areas of focus while extending the service lines along with the exact type of services they need.
- The study area being in hilly region(average terrain height 1650 m from MSL).Provision of service infrastructure being one of the difficulties, this study primarily helps to optimize the time and cost by prioritizing the affected wards.
- The result and its aftereffect can have a significant relationship with employment and poverty, thus it can be considered as an important factor in determining the economic growth of the study area.

THANK YOU