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Short communication regarding following key questions:

1. What are the key urban remote sensing/urban modeling and forecasting issues that you represent?
2. What are the key challenges, missing opportunities, and exciting developments in your theme and region?
3. Why are we not seeing more studies on smaller urban areas?
4. What platform/data/access limitations do you currently/frequently encounter?
5. How do these limitations affect our ability to monitor, model and forecast urban areas?
6. What do you see as missing in terms of case studies and methods?

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1. Urban remote sensing/urban modeling and forecasting issues:
   The main issue is to promote a quantitative analysis of various urban indicators. Remote sensing provides the empirical data for urban studies while GIS provides a environment for handling of remote sensing derived thematic layers and other ancillary spatial and non spatial data sets

   The main issue is how to integrate various quantitative techniques in a GIS environment for different urban applications namely:

   a. interaction between poverty and land surface physical characteristics (LULC)
   b. Urban modeling: entropy approach; cellular automata,
   c. urban out growth/sprawl
   d. urban heat island : ASTER, TM and MODIS.
   e. urban model for sustainability (natural resources, water and land)

2. key challenges, missing opportunities, and exciting developments
   While remote sensing provides the necessary temporal data sets for land cover/ land use , the absence of consistent and complete socio- economic dataset to complement the remote sensing data is highly conspicuous.

   Only a limited number of studies using advance techniques like Artificial intelligence, cellular automata have been carried out for Indian urban centre.

   There is an urgent need to involve professional from urban, remote sensing and mathematical fields in order to develop a integrated approach for addressing various urban issues.

   a. Spatial : non existence of geodatabase at required scale
   b. Socio-economic: non existence of geocoded datasets
   c. Less studies using combined remote sensing and socio economic datasets.
   d. To fill this gap and integrated approach to be adopted.

3. smaller urban areas studies

In Indian conditions the big urban centres (i.e., metro and class I) are undergoing a rapid growth due to better infrastructure and employment opportunities. While the medium / small towns are more or less stagnant due to lack of proper facilities and infrastructure. This trend is clearly visible in the 2001 census of India

Hence, most of studies have been carried out for large urban centres where various growth related issues are more prominent and visible.

Secondly there is lack of adequate socoi- economic data and other spatial datasets for the medium / small towns which further hampers any study to be conducted for these areas.

This polarized and concentrated growth has resulted in regional imbalances. In order to address the problem the government proposes to develop, medium and small towns as counter magnets through various schemes, namely IDMST scheme, NCR region etc.

a. Since focus was on big urban agglomerations b'cos of strong NEG, externalities and globalization.
b. Schemes for small and medium towns were there but after 90's trend shifted to class-1 urban areas. But decentralization process and ULB governance requirements realized importance.

4 . platform/data/access limitations (question 4 and 5 can be combined into one)

The main limitation faced is the availability of temporal datasets and socio –economic data for various urban centers.

The datasets if available are not consistent with each other. Hence, carrying of temporal studies for pattern analysis is a crucial issue. Generation of datasets by the researchers for their study, especially at the regional level is very time consuming and laborious process, which therefore consumes a major part and resource of the project.

a. Data is no more a limitation, but its non existence in geodatabase form.
b. This limitation affects ability, since everything starts from scratch and research institutions depends for data on central agencies.

6. case studies and methods

Most of the case studies spend a major part of their time and resources in generation of data sets (i.e., spatial and non spatial) . Thus, the researchers are not able to concentrate much on the quantitative analyses of the data sets generated.

Hence. there is an urgent need to develop a data warehouse at the national and regional level for addressing this issue. Secondly, new methods of quantitative analyses (i.e., Cellular automata, Artifical neural networks, Fuzzy logic etc.) must be made an integrated part of future case studies.

Thirdly, there is a strong urgency for concentrating on the rural and medium and small towns, as they can serve as counter magnets to address the problem of concentrated and biased urban growth.