

## **CONCLUSIONS AND FUTURE RESEARCH**

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### **8.1 CONCLUSIONS**

The research work performed and presented in the thesis discusses about the determination of improved thermal sharpening methods that can be useful to obtain thermal satellite images at fine spatial resolution in urban areas of different climatic zones. The LST behaviour of different land covers were studied for day as well as night time. The relation of day and night LST with different indices were also explored to develop relation which can better explain the LST variation. Further, quantitative analysis of SUHI effect was studied in the Varanasi region with urbanization and contribution of each land covers towards SUHI effect was also analysed. SUHII was determined for the monitoring of SUHI growth with increased urbanization for different seasons. The conclusions drawn from the research work conducted are presented as follows:

- The two robust regression methods i.e. Least median square regression (LMSR) and Bi-square regressions reduces the effect of outliers which improves the downscaling of LST as compared to that of Distrad model. The LST image obtained at fine spatial resolution can be useful for various urban applications.
- The spectral indices i.e. NDBI, UI and BI showed better disaggregation of LST results in comparison with the other indices for different urban areas.

- The selective use of combination of both vegetation and built-up or soil indices proves to be more convenient for thermal-sharpening in different urban areas than using single indices.
- UHI effect was found more prominent during night time in comparison to day time in semi-arid cities.
- The combination of first order of NDBI and second order of NDVI resulted into better correlation with day LST as compared to the correlation determined using individual variables in heterogeneous urban areas.
- The combination of first order of NDVI and ISF surfaces showed better correlation with night LST than that of individual variables in heterogeneous urban areas.
- The index UHIRI proposed in the study is useful for explaining the effect of urbanisation on LST in urban areas with greater heterogeneity in land cover types.
- Land cover contribution index (LCCI) analyses the quantitative contribution of each land cover towards SUHI effect.
- SUHII was found to vary for different seasons and the rate of increase in SUHII was found greater in winter revealing that decrease in vegetation in a city with increased urbanization shows greater impact on increasing SUHII.

## **8.2 FUTURE RESEARCH**

The following research work can be conducted in future to analyse the temperature variation in the heterogeneous urban areas:

- Disaggregation of coarse spatial resolution satellite LST data can be performed by determining the relation of LST with emissivity in different urban areas.
- Estimation of urban energy heat flux and anthropogenic heat discharge can be determined using thermal satellite data and meteorological data.
- Determine the sensitivity of Surface urban heat island intensity on different urban characteristics like urban density, industrial areas, residential areas, parks etc.
- Comparative Study on variation in Surface urban heat island intensity for day and night time in different seasons.