**Team: Quarto**

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**Problem:** Analysis of built-up area expansion in Nainital district of Uttarakhand in the time period of 2005-2018

**Materials and Methodology:**

***Dataset used:***

* Thematic data: LULC 250k (2005-2006) –WMS service from Bhuvan portal
* Satellite data: AWiFS - Downloaded from Bhuvan Portal.

***Methodology followed:***

There were few challenges while using the WMS service

1. WMS map of LULC 250k is available at the state level, not at the district level.
2. After clipping the district, the main problem was that the output file was without any attribute table. So the question was how to delineate different classes. To overcome this problem, the following methodology has been adopted.

The major change has been noted in the built up area, so to extract built up area from the clipped file . Few Indices have been used in the study. All the steps have been performed in QGIS software.

1. Clip WMS layer of LULC 250k (2018 and 2005-06) for Nainital district.
2. Calculation of Normalized Difference Water Index(NDWI) using AWiFS data using Raster calculator of QGIS to delineate water bodies from built-up area at few places.
3. Creation of a 100mX 100m grid around whole Nainital district.
4. Masking all the polygon of a grid falling under the threshold value of NDWI index image showing water bodies.
5. Calculation of Normalized Difference Built-up Index(NDBI) to delineate urban areas from other land cover classes.
6. Overlay of the same grid (after 3 step) over the NDBI image .
7. Mask all other polygons of the grid except those falling over built-up area.
8. Finally left with grid having polygons lying over built-up area.
9. Clip built-up area from layer obtained at step 1.
10. Repeat steps from 7 to 10 for 2005-2006 layer also.

**Application of the Map**

The analysis of the spatial and temporal characteristics of the built-up area is conducive to the rational formulation of urban land use strategy, scientific planning, and rational distribution of modern urban development. Time-series satellite remote sensing data with different spatial and spectral resolutions have been found very promising to meet these requirements and have been used in several built-up area mapping and urban studies. Parts of the Nainital district cover one Tiger reserve (Corbett Tiger Reserve) and Nandhaur Wildlife Sanctuary in the eastern and the western side respectively. Urban area expansion map is important in monitoring the urban area growth along the wildlife corridors connecting these two protected areas or biodiversity hotspots.