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# Geo-Spatial Analysis of Urban Sprawl- A Case Study of Nishat Srinagar, J&K

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**Abstract:- The investigation of urbanization has revealed enthusiasm from a large number of specialists. This is a multidisciplinary range of the subject which conjures the enthusiasm from environmentalists to urban organizers & geographers, managers, structural engineers, sociologists, strategy creators and lastly the normal man. This is a result of the huge number of exercises and procedures that occur in the urban environments consistently. Urban environments are the result of the inherent idea of people as social creatures to live respectively. The ordinary overviews become futile for chalking out future administration procedures in light of the fact that when information gets accessible, it never again speaks to the ground reality completely. The protection systems request close to exact and approach ongoing spatial information. The remote sensing strategy has risen as a useful asset to guide and screen the regular assets particularly in out of reach and uneven territories and that too financially, precisely and inside a limited capacity to focus time. The examination territory speaks to the division Nishat region which is monetarily developing quick by changing to settlements and developed land for as far back as scarcely any decades. Analysis of the Landsat pictures of the year 2004, 2007, 2014, 2019 were used to distinguish the scale of changes in both land use as well as land cover in the previous multi decade. The examination uncovers increase of 0.0479km² increment in the settlement over the previous decade and the territory is getting disturbed as far as biological well being.**

***Keywords:-*** *Change detection, Land-use/Land-cover, Geospatial analysis, Urban Sprawl.*

## I. INTRODUCTION

The method of remote sensing gives significant land-use/land-spread information at nearby, provincial and worldwide level from the previous history till as of late. Land cover sythesis and change are significant habits for some logical research and financial appraisals. Data with respect to the land use & land cover is used for screening the settlement change for a specific period & survey scene conditions. Constant checking of the areas of land use & land cover provides us a conspicuous outlook on change components and to show the impacts of the change on the earth and related biological systems [1]. Numerous examinations have been carried out on both local land use as well as land cover mapping, it very well may be utilized as a rule for checking the land the executives by arrangement creators or neighborhood experts so as to maintain a strategic distance from any natural change brought about by inappropriate arranging in land use land cover spread. Typically, the procedure of land spread mapping includes picture arrangement.

The exceptional populace development and movement, an expanded urban populace and urbanization is incidental in creating nations. An ever increasing number of towns and urban areas are sprouting with an adjustment in land use, usually along the expressways as well as quick region of city. This scattered improvement outside of the minimized urban and town focuses along thruways and in rustic wide open is characterized as spread. Urbanization is a type of metropolitan development that is a reaction to regularly stupefying arrangements of monetary, social, and political powers and to the physical geology of a territory. A portion of the reasons for the spread incorporate - populace development, economy, examples of foundation activities like the development of streets and the arrangement of framework utilizing open cash empowering advancement. The immediate ramifications of such urban spread is the adjustment in land use and land cover of the region [3].

The point of this investigation was to investigate the plausibility of checking urban sprawl redundantly utilizing high, moderate & low resolution images so that eventually, an instrument is developed where obligation of any harms that occur after some period can be improved on the present field staff in that period.

## II. METHODOLOGY

- *Study Area*

The investigation region is situated in the zone of Inner Himalaya. The zone shrouded from this examination is around 1.5466 km² lying in the middle of 74.869′ to 74.889′ East longitude and 34.134′ and 34.136′ North scope with a height pf 1590m.

- *Topography*

Nishat garden is the biggest one of the Mughal plants in Kashmir. It is arranged on the banks of the pleasant Dal Lake. The Nishat gardens have the Zabarwan Mountains framing its scenery. Nishat Bagh of Kashmir offers an

impressive perspective on the Dal Lake just as the snow topped Pir Panjal mountain run.

➢ *Climate*

The shifting area features & altitudinal assortment are the two rule factors at risk for the assortment in climate. It is quiet in lower rises yet freezing in the higher up with the everlasting day away from work. Four seasons viz winter, fall, spring, summer are all around addressed. Spring, is cold acompanying light showers, begins in March and ends in May. From June to August summers are experienced & are generally smoking and not entirely dry. September to November are the months of rainfall with awesome and magnificent with to some degree cold and in every way that really matters dry. Winter quite a while of December, January and February are incredibly cold & the region experiences overpowering snow fall. Ice is formed of November onwards.

➢ *Method*

A few stages were pursued for the classification and mapping of the land use. Right off the bat the particular element classes have been distinguished dependent on the visual translation of the satellite symbolism and afterward advanced information investigation was done utilizing ERDAS IMAGINE programming. Land-use maps of 2004, 2007, 2014, and 2019 have been set up by utilizing isocluster solo grouping. The land use & land cover classes incorporate Bare surface, Agriculture land, Forest, Built-up, Settlements .

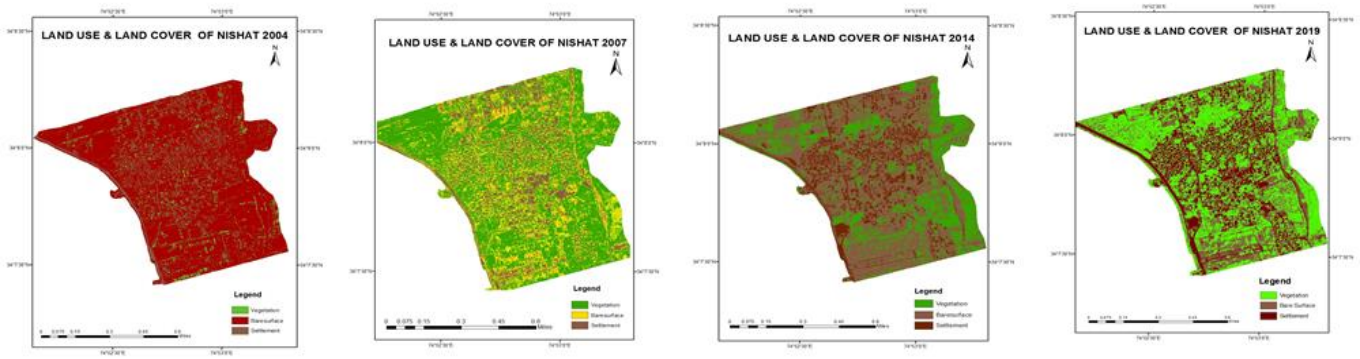


Fig 1-4:- Show the landuse & landcover classification done in Erdas Imagine the stats of which are shown in charts given below.

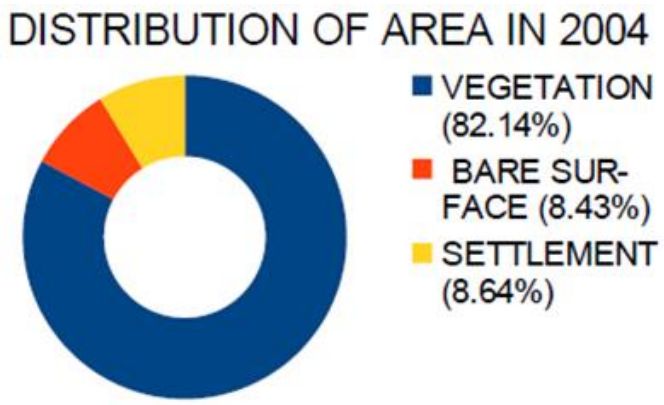


Figure 5 : Area distribution of year 2004

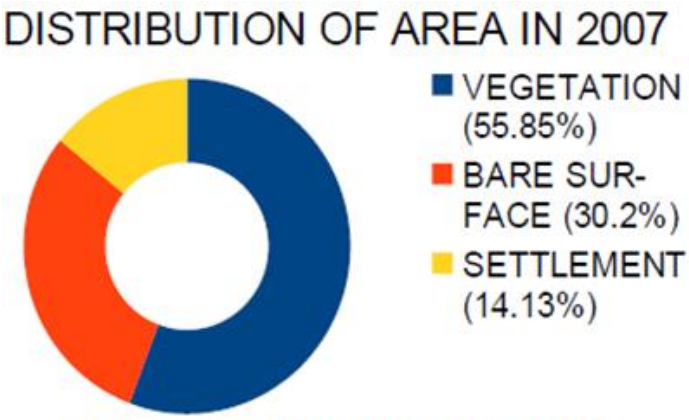


Figure 6 : Area distribution of year 2007

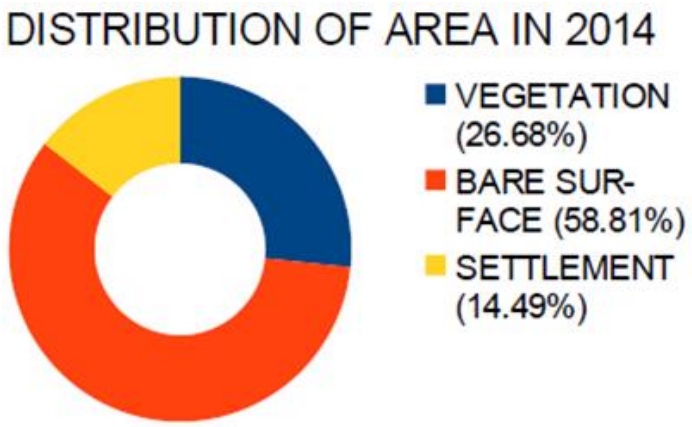


Figure 7 : Area distribution of year 2014

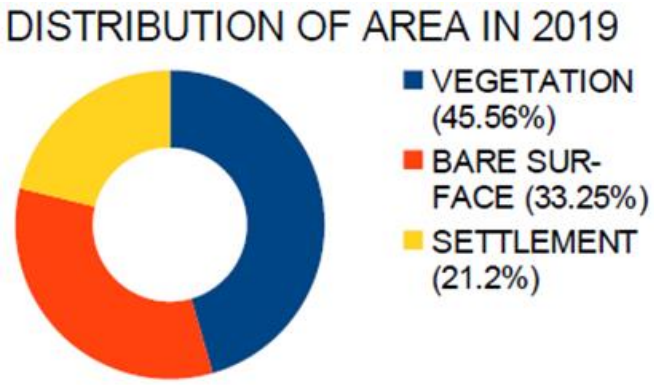


Figure 8 : Area distribution of year 2019

After the Land use & land cover analysis by unsupervised classification for each year the following stats were obtained, In 2004 the total area overed by vegetation cover was 82.14%, area covered by settlement was found out to be 8.64% & bare surface was found out to be 8.43%. Similarly the stats for year 2007 for vegetation, settlement & bare surface are 55.85%, 14.13%, & 30.2%. For year 2014 26.68%, 14.49%, 58.81% & for the year 2019 45.56%, 21.2%, 33.25% for vegetation, settlement & bare surface.

➢ *Settlement Evaluation*

Settlement increase is calculated by using formulae which is used to calculate the annual rate in change of forest cover [2]. Which can be written as

$$r = [\frac{1}{(t2-t1)} \ln \frac{a2}{a1} * 100]$$

r is the percentage rate of forest cover loss (yearly pace of progress), a1& a2 are the areas base & the current year, ln is natural logarithm, t1 & t2 are the time periods of the base year & current year respectively.

| t1 | t2 | Settlement Area1 (Km²) | Settlement Area2 (Km²) | No. of Buildings (T1) | No. of Buildings (T2) | Net gain in Area (Km²) | Net gain in No of buildings |
|---|---|---|---|---|---|---|---|
| 2004 | 2007 | 0.1322 | 0.1503 | 1092 | 1265 | 0.0181 | 173 |
| 2007 | 2014 | 0.1503 | 0.17 | 1265 | 1368 | 0.0197 | 103 |
| 2014 | 2019 | 0.17 | 0.1801 | 1368 | 1452 | 0.0101 | 84 |

Table 1:- Net gain in area & no of buildings

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## III. ANNUAL RATE OF DEFORESTATION

The assessment of loss in the forest cover was carried out in a part of Nishat division, which disclosed the percentage rate of increase in settlement as 13.69% from 2004 to 2007, 13.1% from 2007 to 2014 & 5.94% from 2014 to 2019. Period from 2014 to 2019 showed a least amount of growth.

| t1 | t2 | Settlement Area1 ($Km^2$) | Settlement Area2 ($Km^2$) | Percentage increase(%) |
|---|---|---|---|---|
| 2004 | 2007 | 0.1322 | 0.1503 | 13.69 |
| 2007 | 2014 | 0.1503 | 0.17 | 13.1 |
| 2014 | 2019 | 0.17 | 0.1801 | 5.94 |

Table 2:- Total percentage increase in settlement area

By the Analysis of deforestation annually, it indicates net loss of 4.277% during 2004-2007 which is the peak rate of deforestation. Annual rate of 1.1542% during 2014-2019 which is the lowest net loss.

| t1/t2 | 2007(%) | 2014(%) | 2019(%) |
|---|---|---|---|
| 2004 | 4.277 | 2.5148 | 2.0613 |
| 2007 | | 1.7595 | 1.5073 |
| 2014 | | | 1.1542 |

Table 3:- Annual rate of net deforestration

## IV. CONCLUSIONS

The investigation was completed in the Nishat region of Kashmir. The investigation obviously settled that the worldly information from remote sensing combined with the tool of GIS can be an incredible asset for checking forest cover and increment in settlement change in a specific zone. The huge changes in the land use & land change during the investigation time frame between the period 2004 to 2019 recorded some intriguing perceptions. The settlement territory is expanding constantly from 2004-2007 according to grouped transient images however the change is likewise found in the ongoing time from 2004-2019 where addition is low. The net pace of settlement addition is least in 2014-2019 net rate is 1.1542%.

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