

# A Case Study Of Integrated Land Use Planning For Sustainable Infrastructure

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**Abstract:** The development of infrastructure in a country is an important aspect in shaping the future of an country. The infrastructure development is considered to be a blueprint in overall development of a country. Basic development of roads, bridges, hospitals, schools etc. make life easy to live and the progress of developing nation is recognized with providing basic facilities to its residents. India is considered to among top developing nations of world. India is seventh in the list of countries in terms of geographical area and second in the list in terms of population. India's geographical area ranges from mighty mountains of Himalayas to tropical areas in the south. Due to random use of land in an unplanned manner in country for infrastructure development caused rapid transformation of cities, districts and villages, which has at large scale affected sustainability of country. Although some cities are sustainable and well planned. Sustainable development means wise use of natural resources for socio economic development taking into consideration the needs of future generation. This study had been done on Srinagar city of state Jammu and Kashmir of India on subject of unplanned land use and its effects on sustainability of city. This study provides the policies to tackle the situation of city.

**Index Terms:** sustainability, infrastructure development, planning, land use, construction, population, geography

## 1. INTRODUCTION

The management of land and its use has long been the subject theme of city planners throughout the globe. As cities area unit is growing in dimension and size, the sources of built up land area unit is decreasing hastily. This thought of land as a scare reserve has prompted the concept of sustainable property to planners across the world and to introduce the concept in their discipline in an endeavor to higher have room for the requirements future population and current population as well. The notion of "development" can be associated to the science of rural planning and urban planning within the perspective of this research in the logic that planning and development is concerned with all the activities that are occurring on land both current and future as well. "Sustainability" and "Planning" both have a chronological dimension. sustainability refers to what we tend to do currently, and the way this manipulates the longer term, coming up with is associate activity where ever we tend to truly arrange for the longer term. Since urban coming up with a carry out that happens among each town, will we are able to thus establish that planning can undoubtedly influence the property of a town or city. There are completely two different dimensions to designing or planning, firstly that deals with day by day activities and another that appears into the long run into future. In the majority of countries, land use designing may be a operate of same level of state liable for the delivery of services like water, sanitation, electricity etc. authorities successively place a worth toward land and collect rates and taxes in arrange to fund the supply of service. In several instances, however, the activities of land use designing don't seem to be integrated.

This ends up in inefficient cities and cities that at a pace developing in an exceedingly financially unsustainable manner. Land may be a restricted resource and nevertheless an imperative resource for meeting the social, economic and environmental demands and targets. The mounting development allied by the rising population and so the associated industrial enterprise and urbanization land resource is raising pressure on it.

## 1.2 INFRASTRUCTURE DEVELOPMENT IN INDIA

Infrastructure sector may be a most significant driver for the Indian economy. Infrastructure sector is principally to blame for boosting Republic of India's overall development and enjoys terribly intense focus initiating policies from Government that guarantee creation of time-bound world category infrastructure in India. Infrastructure sector includes urban infrastructure development, roads, bridges, dams, highways and plenty of different. India hierarchic forty fourth out of 167 countries in 2018, in World Bank's supply Performance Index (LPI). Due disorganized and unplanned use of natural resources, it gets more and more littered competition of reciprocally exclusive uses and with the conflicting land uses, besides motion grave considerations and harmful impacts. The considerations will even turn out to be additionally serious in associate rising country India or like any other Asian country, India at the moment has over on 2.6% of the area of the world's geography at which are living 17% of world's population.

## 1.3 JAMMU AND KASHMIR

The Jammu and Kashmir geographical region state is largest Mountain State of India and also the Northern most state, Situated between thirty two.17 degrees and thirty six.58 degrees north latitude and thirty seven.26 degrees and eighty.30 degrees east meridian. According to geologists, Kashmir Zone falls in Seismic Zone 5, "extremely vulnerable" to "strong earthquakes". The state of Jammu and Kashmir is an agrarian economy predominantly with about 80% of its population linked to agriculture and associated sectors. Land being one of the basic natural resources has always been the subject matter of debate regarding its effective use. One of the most important problems being dealt with by the state is the conversion of land mainly land from agriculture to non-agricultural purposes

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due to urbanization and other activities. As per Agriculture figures, 2 hundred thousand canals of agriculture land of world wide web planted or cultivated space of 3 and a 0.5 hundred thousand square measure has been reborn for industrial and alternative functions in Kashmir over the years. As per the economic survey, 2011, J&K state has been listed as a food deficit state, therefore, agriculture land conversion especially that of paddy fields is a serious issue.

#### 1.4 OBJECTIVES

1. To determine the causes of change of Land cover of city and its effects on sustainability.
2. To determine the strategic approach and comprehensive planning method for sustainable infrastructure development.
3. To determine the challenges for integrated land use planning for sustainable infrastructure development.

## 2 LITERATURE REVIEW

Iftikhar A Hakim et al. (2018) The planning and coming up with of Srinagar must take under consideration the complication of the region of geographic area its existing settlement pattern, fragile ecology, affordable transportation, vulnerability to floods so the economic development and potential future growth of town while not compromising on its fragile ecology is ensured. The controlled land suitability investigation involving consecutive wipeout of the prime agricultural lands, high slopes, vulnerable areas, ecologically fragile areas, flood absorption basins, water bodies, wetlands, and forests leaves terribly restricted land obtainable for the aim of development. Zahoor ,A.Nengroo ,M.Sultan ,BhatNissar, A.Kuchay (2017) publicized that town of Srinagar has in actual truth been the prey of populated area classified by low concentration of population and unequal division of a spread of urban facilities. The examination is 1st such effort to calculate the sprawl of Srinagar town and can operate as book of facts for town of Srinagar for future analysis in ecologically fragile range of mountains on populated area. Arshad, Amin, Shahab, Fazal (2015) Urbanization follow has drastically altered the land use of town of Srinagar and its abutting areas throughout the study section of thirty two years. Settled space has drastically amplified by 158% overwhelming the wealthy agri. land (3459 hectares) within the extreme space, wherever residential industrial expansion area unit going down. likewise for the farming development twelve.86% of agricultural land is consumed. The Srinagar town has considerably extended toward western components, southern components and northern components, principally because of the accessibility of land in these regions. The learning additionally reveals that the ecologically delicate land cover/uses options i.e., water bodies, forest space and wet space, even have diminished in their total section by -71.8%, -55% and -11.6% correspondingly for industrial development, residential and agricultural of the town. The rising population directs to the cut in per capita accessibility of land that's ensuing into deficiency of land and lift in rate transformation of land method. Khalid, Omar, Murtaza (2015) land cover Land use in area of study has under gone noteworthy changes over the last 39 years; above all, the areas agriculture and areas of forest have been declining while as horticulture and built-up land have been rising. The alteration of land cover land use in the city of Srinagar is most likely driven by the increase of reckless

deforestation, unplanned urbanization, and population, changes in amount of quality and quantity of water resources, social developments and economic developments. likewise, tourist destination and heritage sites are under regular danger of destruction and environmental degradation due to unexpected management of these possessions. Bhat et al. (2013) examined the pattern of agricultural land use in district Pulwama of natural depression of geographic area. The results disclosed that the full forest space of the district Pulwama diminished from 732 hectares in year 1990-91 to 661 hectares in year 2000-01 and 412 hectares in year 2010 – 2011.likewise, space not accessible for farming (barren and land that's uncultivable and land that has been place to non-agricultural uses) diminished from year 1990-91 (14015 hectares) to year2000-01 (12037 hectares) and in year 2010-11 (8387 hectares). Shah et al. (2013) examined cropping model and land use dynamics being practised in Budgam district which is situated in central division in the geographical region of valley of Kashmir and is generally dominated by agricultural livelihood. The examination was based primarily of secondary source. A multi-temporal examination was administered in order to investigate the way of change as well as the extent of change. The study showed that an raise of about concerning 628 hectares has been found in tehsil Chadoora in non-agricultural land which may primarily be because of the markets, construction of homes, roads, complexes etc. because of raise in population. Innocent et al. (2013), land, since existence and since organic process activities use it, it is positively effectively the foremost important traditional resources. Land use is that the phrase for any form of consumption to that human has situate the land .It is additionally the term for assessment within the land with relevance a range of standard characteristics. Land use is mostly a product connected with interactions regarding physical desires of the one hand and a society's cultural background of state further because the natural potential of that land on the opposite. Jin, Yang (2013) numerous changes in land use/cover, like as long-period changes, are as a consequence of human actions and natural causes more and more plays a crucial role within changing this land use and land cover across the world. The need for quantifying, observation and characterizing of those modifications that to be detected remotely and geospatial information conjointly as a very important constituent of the important land modification discipline are loosely distinguished by environmental and world change studies. Amita Bhid et al. (2012) in his study, 'Sustainability in India's Urban Area', explain how urbanization is becoming a substantial occurrence. Urban development mean new challenges, new realities and new opportunities. He made a point out that The 1992 Rio conference give a definition to sustainability as 'the capability of present generation to build up and meet up its needs while not compromising and taking into thought the potential of future generations to grow'. Even now, Republic of India could be a preponderantly a rural country. Besides, the urban character of Republic of India is extremely different with associate increasing sprawl and an oversized majority of smaller townships area unit targeted within the region of its main cities as witnessed by the figures of census 2011. M.C. Ruiz et al. (2012) The construction, planning and designing of an industrialized area is lengthy process and quite a complicated due to the scale of the action itself. The desire for a fresh theory on sustainable industrialized areas entails stand-in

upon all of the segments of their life sequences. This editorial proposes a multi criteria assessment model and analyzes prominent site factors meant at promising the feasibility of industrialized areas with their surrounding areas. The spatial spirit built-in to the problem leads to construction of a Spatial Decision Support System (SDSS) based on a platform of Geographic Information System (GIS), the integration and the design of other well-matched tools. The method is applied to a district located in (Northern Spain) of 646.2 km<sup>2</sup>. The outcome is talked about with digital maps which distinguish the zones according to their appropriateness for industrialized area position using criteria of sustainability. Rahman et al. (2009) the cities of India are growing quickly, causing a broad diversity of ecological pressure. In this article a systematic approach by using satellite statistics and GIS methods in concurrence with socio-economic information is used to evaluate environmental problems in urban city of Delhi. Delhi's present population is growing rapidly with 13.8 million and is expected by 2021 to reach 22.4 million. The problems addressed in this study include as: changes in land cover/land use, changes in temperatures of surface for 2001 and 2005; industrial pollution (i.e. waste water, air and noise), solid waste generation, its management and collection. The outcomes revealed that Delhi is on the rise very rapidly mainly in the south-west, west and through eastern sides. The paper revealed that a highly dense populated residential area 122% increase in Delhi was recorded throughout last decade. Because of the result of urban expansion the reduction of (17%) was recorded in the fringe areas in fertile agricultural land. The load of pollution has amplified in terms of solid waste generation, air, noise, water and disposal, etc. The data from Thermal Infrared (TIR) satellite of Delhi clearly demonstrates that there was an increase of 1-2°C in temperature of surface in just 4 years and that is a issue of concern for all. Zuber et al. (2006) the actual land cover/land use model of an area is an result of socio economical factors, natural factors and their own consumption by human over the period of time. Accordingly, information regarding land cover/land use is serious for the planning, selection and for the implementation of land utilization and can be utilized to meet the growing demands for wellbeing as well as important human needs. This study also assists in keep an eye on the dynamics of land utilization resulting from varying demands of increasing population. Mahan et al. (2000) in his study 'Valuing urban city Wetlands: A Property Price Approach' revealed that to calculate approximately the results of changes in land utilization connected with housing development on the implied ecology services and water eminence at level of watershed. They found that converting forests to built-up land utilization constantly increase the directory of deterioration in water eminence. Water eminence can have a straight amenity result on properties that are adjoining or very near to the water body. International Association for Impact Assessment (1999) outcomes of any projected or development plan. UNEP describes ecological Impact evaluation as a means used to recognize the economic, social and environmental effects of a project plan prior to making conclusion. It gives a rational way to sustainable growth. The (IAIA) International Association for the Impact Assessment describes an ecological impact evaluation as "the process of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of development proposals prior to major decisions being taken and commitments made.

### 3 METHODOLOGICAL APPROACH

As stated in chapter one, the principle of this investigation was to examine the strategies for land utilization planning for sustainable infrastructure using Srinagar city as a case study. The diverse character of the statistics requisite and various sources from which the data had to be gathered made the mixed means approach fitting with this procedural approach, study tools linked with both qualitative and quantitative approaches were united to assemble the data. These were field observations, questionnaires, interviews, and analysis through documentary. The option of the diverse process approach was well-versed by a number of ground reasons. The choice to combine qualitative and quantitative methods in this research study can furthermore be justified on the basis with the aim that made it possible to investigate the research questions from various and different viewpoint which would guide to more broader and wider understanding of the concerns connected with land use for sustainable infrastructure in Srinagar city. Moreover, combining various methods of statistical collection and scrutiny provided me with the chance to gain in-depth data and information from the various groups of participants including public institutions involved with this subject, private institutions in one way or other and different communities. Without this mixed profound methodological approach, dependence on any lone approach to data and information gathering might lead to loss of precious data and information.

#### 3.1 METHODS OF DATA COLLECTION

Srinagar city was selected for this study. Srinagar which is the first urban agglomeration in Kashmir formed the area for this study. I was motivated to focus on Srinagar because it represented a large city in the Kashmiri context and so provided an opportunity to investigate the problem of land use because of urbanization and industrialization. In order to get a representative sample for the research study, different sampling ways were used to select the important departments' and the respondents for the research study. Purposive technique of sampling was used to select different departments and institutions like:

- Agricultural department
- Horticultural department
- Municipal department
- Roads and buildings department
- Census department
- Statistical and planning department
- Forest department
- Department of Water bodies etc.

This was based on its extensive range of employees from various background and also broadness of its service stipulation for a long phase of time for the nation. The Quota sampling method was used to assign quota to each of the institutions from which the respondents were selected.

The respondents were selected through purposive sampling based on the culture of the organization, work performance on their experience.

Moreover, features of the information were actually noticeable and might be collected through direct inspection or field examination. There was also a variety of published data and information available like

- Newspapers

- Articles
- Books
- Magazines
- journals

and other different publications that might give useful data and statistics for the study.

From above insights I became certain of the worth of combining diverse methods and techniques from both quantitative and qualitative approaches in my effort to collect the information required for this analysis. The research, hence, employed field observation, questionnaires, interviews, and documentary study analysis, depicting upon the potential strength of these various ways and methods to upgrade the worth or legitimacy of the data and information

## 4 ANALYSIS AND INTERPRETATION

### 4.1 City profile (Study Area)

Srinagar town is that the largest metropolis within the whole range region and not solely in Jammu and Kashmir geographical area. Town has been alarmingly growing at abundant quicker pace so indicating in it goodly changes. City lies at  $34^{\circ} 0' - 34^{\circ} 14' N$  latitude &  $74^{\circ} 43' - 74^{\circ} 52' E$  meridian. It's lies at 5200 feet elevated than mean sea water level. The situational map of the area of study space has been shown in fig.4.1 (see page 21 for fig.4.1). Town encompasses a distinctive geology setup with sharp hills within the North East and East low lying paddy fields of paddy that fall within the flood bare of river Jhelum within the West and south, the karewas of district Budgam within towards the North and the extreme South area unit set with the up lands with reasonable slopes. The city dal lake is settled within the city heart of Srinagar town. Town of Srinagar receives the majority of its rainfall right the way through the winter and has a Mediterranean sort of weather. According to a latest census, Srinagar city has a population of 1.1 million. Srinagar has been listed the tenth worst contaminated town within the world in step with World Health Organisation's (WHO's) international urban pollution information. Kashmiris, especially those living in Srinagar, are annoyed about this development. The process of urbanization has modified extensively the land utilization of Srinagar town and the area in its surrounding. Unrestrained, speedy and Un planned urbanization causes jumbled growth. The models of urban growth are varying natural scenes and dynamics of these natural landscapes. In a most important drive for development the of urban infrastructure in state of Jammu and Kashmir, the twin capitals of state Jammu and srinagar have been in the list of "smart cities" to be developed. As among the 30 cities from different states that made it to the figures of smart cities mission, Jammu got the 21<sup>st</sup> position and Srinagar got the 10th position. "The Government of India cleared the proposal of developing Srinagar and Jammu as smart cities" The Mission of smart cities meant at getting better the basic urban infrastructure in smart cities. It was initiated in June 2015. The mission will provide a boost to basic infrastructure development in the capital city of srinagar. "It would address all core components of city development like basic facilities, disaster management, sanitation and urban mobility". The function of smart keys will perk up the services and the infrastructure in the city. "Area-based development will be undertaken in downtown areas under the program".

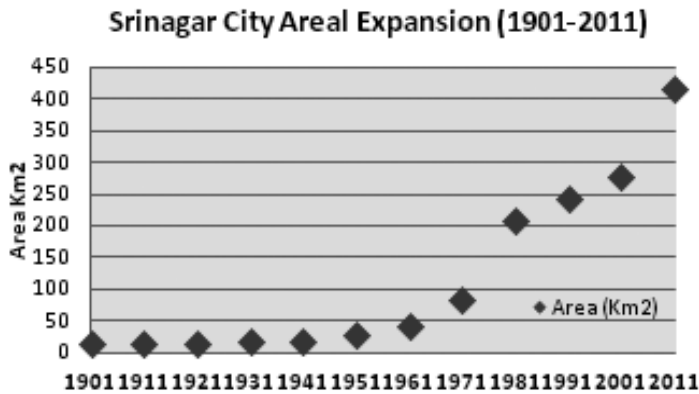
### 4.2 Population Growth

Soaring growth of population is a general dilemma of the the majority of urban hubs throughout the budding world that is in developing stage. on the subject of population of city the figures are comparatively reliable since 1901 A.D. Therefore for analysis of growth trends it may be taken as a base and decadal variations of the city in population. The Table 4.1 represents the prototype of growth of population and proportion of deviation throughout various decades. From checking the Table 4.1, it is apparent that inhabitants of city throughout last century (1901 to 2011) have been increasing amazingly. It amplified from 122,618 individuals in 1901 A.D. to 122,5837 individuals in 2011 A.D. signifying almost tentimes raise amounting to 900 % increase amid a net augment of 110,3219 individuals. The model of decadal increase nevertheless, had not been identical. In the intial time from 1901 to 1961 A.D, the development of city has been sluggish amid to the slow growth paces, which has decreased from 22.46 % in 1931 A.D. to 15.71 % in 1961 A.D. This decrease in the growth rate might be ascribed to the disorder of politics and also division of 1947 A.D in the subcontinent. The division led to a significant movement of individuals. After 1961 A.D. new period of population expansion commenced. The inhabitants of the srinagar city amplified from 285,257 people in 1961 A.D. to 606,002 people in 1981 A.D. with a total increase of 320,745 individuals with shocking growth pace of 34.31 and 40.13 % correspondingly. The major reasons accountable for this alarming population increase through this phase have been in immigration raise in origin paces and downfall in demise paces. In addition to this, the combination of 62 rural communities of villages in urban limit in 1971 A.D. and the opening of city cluster model which brought various number of rural regions beneath the control of city of Srinagar are in fact the other reasons causing the speedy growth of the Srinagar city people. consequently from the period of 1981 to 2011 A.D. the residents amplified to 971,357 people in 2001, with a total increase of 365,355 individuals in these two decades with a net decadal increase pace of 30.14 % and 122, 5837 individuals in 2011 with a total addition of 254,480 individuals for the period of the previous ten years. The vibrant fashion in the inhabitant intensification of city gives hasten pace of increase in Srinagar city's growth of population in upcoming which is made known from the reality that the city has achieved in the year 2008 the urban metropolitan tag or status. This expected speedy alter in the demographic aspect of Srinagar city is stiffened to trend an bang on the socio financial arrangement of Srinagar city and it can draw attention to the problems of, land speculations, slums, urban disfigurement and housing insufficiency.

### 4.3 Areal Expansion

For the duration of (1901 to 2011) previous century rising populace due to soaring normal growth pace and in movement for enhanced employment means have lined approach for speedy extension of this city. Table I.I demonstrates the prototype of raise in the region of the Srinagar city for the duration of previous one hundred years. It is apparent from this data that a sluggish spreading out of the srinagar city through initial 50 years and an extremely rapid spreading out after 1970's as the sum net area of the srinagar city has amplified from twelve Km<sup>2</sup> in 1911 A.D. to eighty two Km<sup>2</sup> in 1971 A.D., 416 Km<sup>2</sup> in 2011 A.D from 278.1 Km<sup>2</sup> in 2001 A.D.

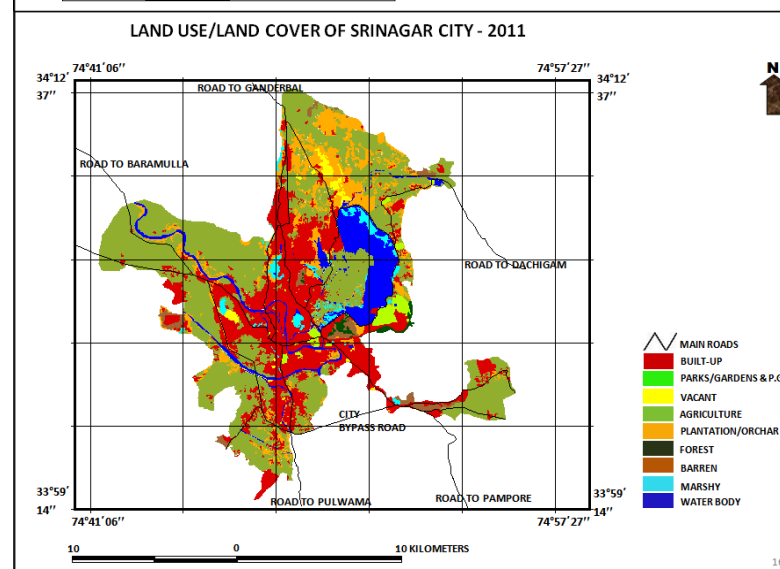
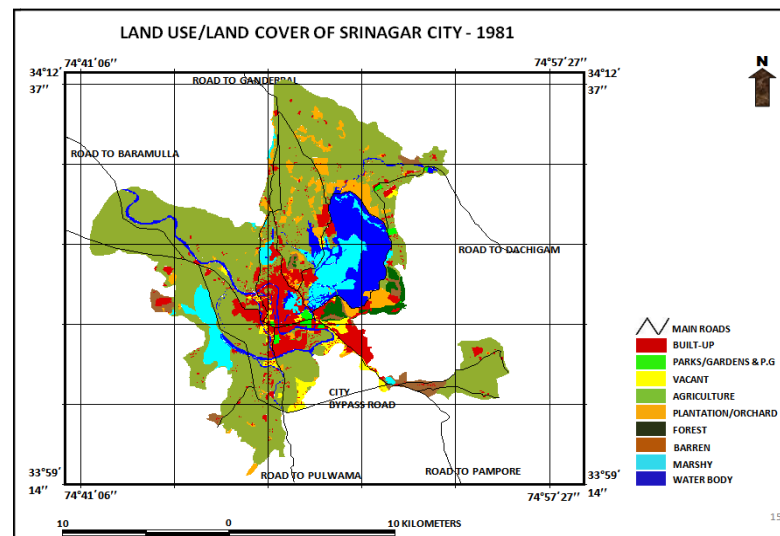
The study of the spatial spreading out of the Srinagar city discloses that exponential enlargement of the srinagar city has been there as replicated in Fig. 3b. The spread out of the srinagar city between 1901 to 2011 is shown in Fig.



**4.4 Land conversion in Srinagar City**

Land is in a constant shape of conversion as a effect of a range of innate and synthetic practices. Land conversion has been declared as one of the vital means of individual inducing ecological conversion. An key feature of change recognition is to establish what is in point of fact i.e., which land utilization set is shifting to the other set. This data shows changes both pleasing and unwanted and sets that are comparatively firm over the period of time. This data also serve as a fundamental instrument in supervision results. Through out the investigation phase city has not only stretched from its original basic range but also there was noteworthy transaction of land amid different land cover/use classes. These kind of changes are since the growth of srinagar city causing amplified requirement of land for housing, commercial, business and several other purposes. This request of land space along with the site magnetism, purposeful magnetism, serviceable expediency and the land worth to meticulous area eventually manipulate the speed and track of city land conversion and transformation. From Maps it shows transformation between 1981 to 2011. It is pragmatic that the increase has occupied position away from Srinagar city core area subsequently the assumption of city expansion as given by Christaller in 1933. Conversion practice is apparent all over in the Srinagar city openly in the direction of the external areas. It illustrates the extension of srinagar city in the direction of its outside edge. Noteworthy land conversion was witnessed between built-up region, empty, water bodies, plantation, orchards, marshy lands, agriculture and. Built-up area greater than before by about 3835 hectares, it is capturing the land primarily from plantation, vacant, marshy area, agriculture, and orchards. Gardens, play grounds, and Parks enlarged by 232 hectares, getting hold of the area from forest area, plantation and orchards. Plantation land had lost about 689 hectares; this sum of loss of land was add for parks, orchards, built-up, and to empty area. At the similar period of time orchard/plantation had gained 1355 hectares from water body ,empty land, agriculture, forest land and marshy land. Empty land that is vacant had lost around 262 hectares to the built-up region for housing and development for business-related activities and also for farming and extension to horticulture region. The prime agriculture land had lost 3459 hectares for housing, business related, parks, plantation, orchards, gardens,

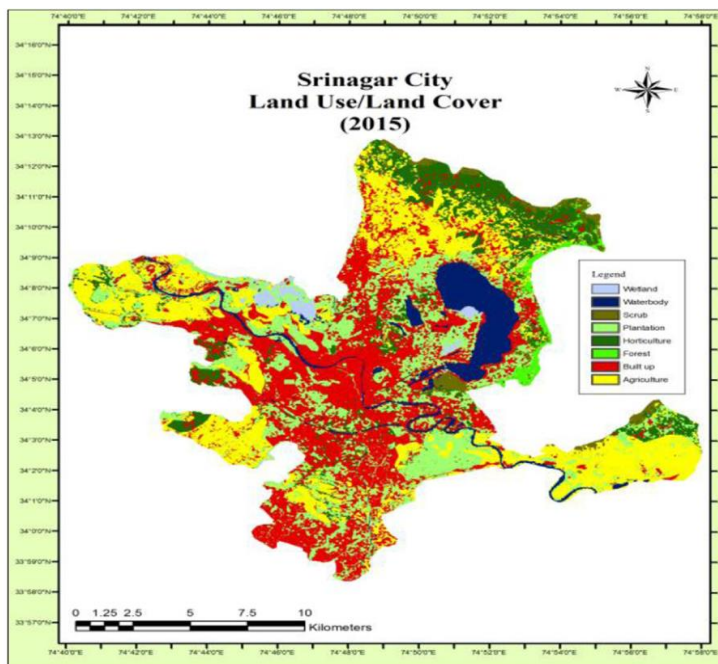
industrial, swampy area and wet bodies lost 1449 hectares area largely to governmental land use, housing, agriculture, plantation and industrial. Uncontrolled development and volatility of politics in the region of Kashmir has also its part in converting the Srinagar city into unorganised one. The majority of the empty land best matched for business related functions had been used unorganised and unplanned. Jobless people especially youth try to set up their own business with no appropriate papers or registrations from the govt. associations and thus it led to self choice of area of location for any setup. Additional progress and construction in the Srinagar city will lead to dangerous land conversion. The Master plan Although for the city and the state as well has been prepared already but the working has not been implemented yet. While Analyzing the character of the transform areas with firmness i.e., under stability or no altered and loss in instability or gain by between 1981 to 2011 by each class as apparent in table 4 below, steadiness or firmness seems to be a same terms as no one class is in fact steady throughout this phase.



**4.5 Land Consumption Ratio, Consumption Rate, and the Future Projections**

Progressive spatial extension of a city is indicated by land consumption rate i.e; by calculation of density (Table 5); it being lofty from 1981 to 2011 and as per the proposed area

consumption, it will increase between 2011 & 2021, since on growing inhabitants (see Table 5 & 6). land absorption coefficient also being assess of usage of new city area land increase by each unit in urban inhabitants was noteworthy from 1981 to 2011. Thus this suggests that for progress the pace at which new land areas are acquired by people is all time high. At the anticipated expansion of city, it will be all time high from 2011 to 2021. Also this may be a fashioning trend from 2011 to 2021 as the city seems to be the spreading out of centre towards the periphery in outskirts. This situation is because of the reality that the capital core centre of the city has become more congested. Strategies and plans has been made by Govt. and to de-congest the internal core city area where in a variety of private offices and government have been moved to the west side of the city. Furthermore, the economically well off individuals from the internal core city areas choose to shift towards the peripheral outskirts on open and wide regions. Table 7 below shows the figures of land cover and land use projection upto period 2021. This kind of action is taken sensibly with the purpose of providing a within reach to condition of capital city that how will it look like by the end of 2021. On contrasting the data with table 2 below there are noteworthy changes in lessons from 2011 to 2021. The proposed data thus reveal that the agri. maintains the maximum amount of share in the net land consumption and is followed by the area of built-up class., parks, gardens, Vacant land, forests, keep hold of the least share. Orchards, water body and plantation maintains noteworthy position amongst all the land consumptions.

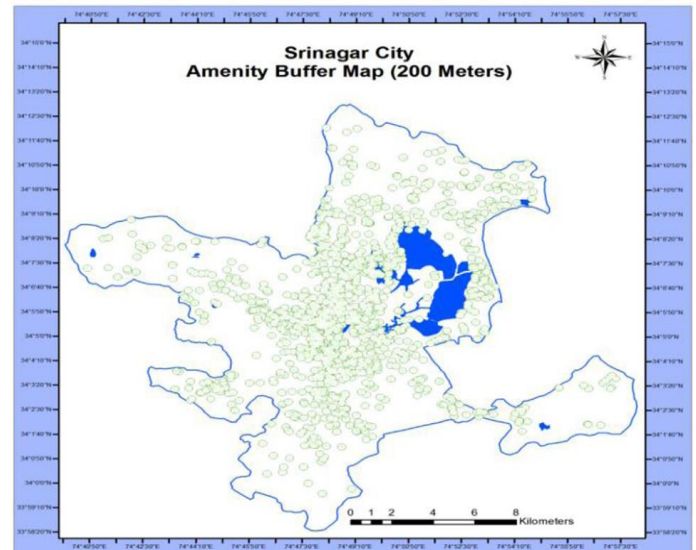


**Figure:** land use/land cover of Srinagar city 2015

#### 4.6 Existing amenity buffer map

Most of amenities are situated in the region of the old core of the city which spans over 200 to 300 m that is why the buffer map of around 200 m has been taken (acc. Master Plan, 2000-2021). Figure 4.6 illustrates that the core of the city have sufficient existing amenities. The map evidently demonstrates that the outwards of city lack this kind of amenity. The north-western wards, south western, northern, of the Srinagar city in

general be deficient in educational amenity. The wards deficient in the amenity are Bud Dal, Zakura, Lokut Dal, Lawaypora, Maloora, umhama, Khonmoh and Khumani Chowk.



**Source:** Compiled from various sources of data Srinagar

#### 4.7 Integrated analysis for urban suitability

The city urban land utilization suitability map has been assembled into 3 classes namely less suitable, moderately suitable, and highly suitable. The urban land suitability map is shown below in Fig.4.7. It displays that as the inner core wards of the city have sufficient urban amenities in contrast to outwards, hence peripheral wards usually show intermediate level of suitability for setting up urban amenities. These peripheral outer wards although have insufficient urban amenities but due to numerous factors like, steep slope, high altitude, inaccessibility etc. these peripheral wards fall in intermediate level of suitability. Because of altitude, favorable slope, accessibility etc. the urban municipal wards that lie between core and peripheral out wards shows high suitability for the stipulation of urban amenities plus lack of urban amenities that already exist. The wards showing soaring suitability are Mehjoonagar, Tealbal, Iddgah, Pandrathen, Jogilangar, Hassanabad, Palpora etc. chased by peripheral outer wards, viz, Dara, Khonmoh, Alesteng, Humhama, Harwan, Zakura, etc. which illustrate intermediate stage of suitability. The inner core wards of the Srinagar city like Lalchowk, Nawab Bazar, Wazirbagh, Mukhdoom Sahib, Zadibal, Kawdara etc. display low suitability because of having sufficient amenities. Also, the utmost region in these old city wards is under built up class, thus having scarcity of area/space for founding of urban amenities. The wards like Bud dal and Lokut dal also demonstrate low suitability as being situated on the shores of famous Dal Lake on which the construction is strictly prohibited. The suitability model of urban amenities in city is shown in Fig.4.7 below, so It is obvious from the fig. that the south-eastern parts, north-western parts and north eastern of the Srinagar city display medium or intermediate level of urban suitability. The inner core wards of the city in a circular manner posses low urban suitability. The high urban suitability is illustrated by the medium wards that lie between peripheral and core wards.

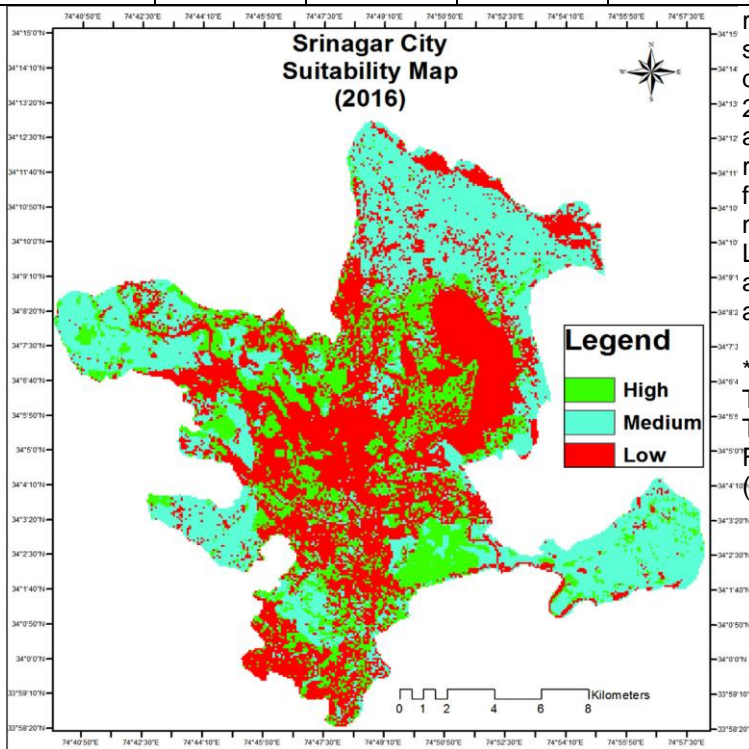
YEAR	LAND CONSUMPTION RATE	YEAR	LAND ABSORPTION COEFFICIENT
1981	0.004	1981/2011	0.006
2011	0.005	2011/2021	0.005*
2021		0.005	

the day” a front-page report published in Greater Kashmir on 28-04-2019 is an eye opener for all. The report reflects a genuine concern regarding loss of cultivable land for non-farm purposes, which has resulted in a decline in farm income and its contribution towards the GSDP. The situation is alarming and needs to be tackled, earlier the better. Crop diversification for profitability and optimum use of the land resource is no doubt scientifically recommended and very useful, however, ruthless and unplanned conversion of farmland for non-farm purposes is a suicide and a great injustice for coming generations. We see a concrete jungle of buildings and commercial complexes coming-up in paddy fields, a 120 m wide and 100 km long four-lane highway running from Qazigund to Tangmarg and a railway track from Banihal to Baramulla with a major portion of all occupying a large chunk of paddy land. Moreover, a large number of farmers are converting their rice fields into orchards or commercial vegetable gardens. This scenario has gained concern and everyone is worried about the loss of paddy area to

Land Use Land Cover Projection for 2021	BUILTUP	PARK	VACANT	AGRICULTURE	PL/OR	FOREST	BARREN	MARSHY	WATER BODIES	
2021	Area in Hectares	8051.34	499.34	157.68	9286	3027.67	77.68	467.35	78.35	1801.6
Area in Percentage	34.33	2.12	0.67	39.60	12.91	0.33	1.99	0.33	7.68	

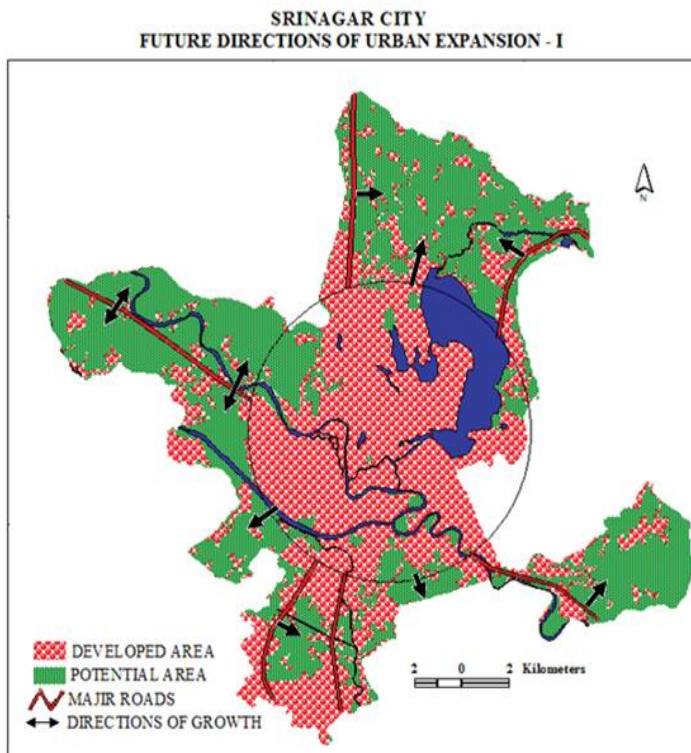
rampant constructions. But surprisingly (or not so surprisingly), the Digest of Statistics 2016-17 J&K State, depicts a regular increase in paddy area from 1955-2017. Only one of the two claims can be a fact. I fully agree with the suggestions given in the above-quoted report especially those to prevent the conversion of farmland for non-farm purposes and to curb the land mafia by framing a healthy and extensive housing policy. Let the authorities wake up from the slumber to save the agricultural land, and hence save the civilization and future generations.

\*Estimated  
 Table 1: Land Consumption Rate and Consumption Ratio  
 Table 2: Land cover/ Land use Projection for 2021  
 Figure: Future directions of urban expansion of Srinagar city (urban sprawl)



**4.8 FUTURE SCENARIO**

The first furrow on land by the plough marked the beginning of human civilization. It is the land resource that replaced man’s savagery with what we now call “settlement”. The abuse of this land resource may probably cause settlers to become savages again. “Agri. land conversion making 60% J&K population poorer by



## 5 FINDINGS

There is no clear mechanism put in place to lessen gap between available land and growing population. The broader gap involving the the population growth and available land has made rise in land utilization pace and coefficient of land absorption which illustrates the expansion of city. Also, the estimation of proposed inhabitants experienced that transformation until 2021 may probably follow the fashion of 1981 to 2011 all circumstances being identical. This possibly will guide to other urbanized overcrowding and spreading out of the Srinagar city on the lush agri. land in its periphery.

### Non economic development of rural areas

The financial progress in the capital has prompted community conversion that leading to modify and interchange of land use classes. The land use of city provides accommodation to private resource centres, various government, and every decision making centre, which lays downs a sequence of relations, and enhance activities of the people of city with the individuals of diverse regions and urban heart of the Kashmir valley. This has prompted the individual movement from rural and backward regions to the srinagar capital, it has drawn attention to the practice of land utilization transformation and changes.

### No policy on effect of urbanisation on climate change

Urbanization may have an effect on the local environment all the way throughout its pressure on the plane irregularity. This may also produce a local climate warmer significantly than the neighboring region by the warmth that is released by heavily settlements of colonized individual by variation in evaporation and its characteristics by altering the extensive outgoing wave radiations. This is recognized as island of urban heat. The effect on local climate may be visible but minute. It may on the other hand have a noteworthy effect on lengthy instrumental high temperature reports since stations influenced by growing

urbanization. On July 15 in year 1973, the maximum temp. in the capital that was ever recorded was 35.5 C and then on July 7 in year 2006, the temperature recorded was at 39.5 C. According to Annon (2006).

### No Identification of urban zones of city

Being the chief city Srinagar capital of the region was conferred by "God with rivers and lakes" used to operate through intense rainy spells like sponges, however due to constant reduction of the Jhelum River and the lakes there is a danger of flood constantly. The technique of Supervised classification of the pictures will be triumphant to learn about the transformation discovery of land cover and land use in the area, this process offers a proper method to recognize urban zone development which led to conversion in the land cover and land use pattern that as a result has immense impacts on the environment of landscape.

### No guiding principle on population growth

Throughout the earlier period century in later half, the scale of increase of population and consequential spreading out and land cover transform in city has progressively more presumed from noteworthy to hostile fractions. The capital city of Srinagar has tenfold times grown in provisions of populace and may twentyfold times more than in requisites of region between year 1901 to year 2011 AD. lack crucial policies and practices of sustainable land management to avoid the endangering of the environment and sustainable development. The size of the population of the city capital is proposed to to go beyond 1.7 million marks and this region of the urban city centre is anticipated to reach about 750 km<sup>2</sup> upto year 2031. The investigation puts to light the blueprint and procedure of fast urbanization in this capital of hilly area and it calls for an urgent notice to planners of country to work out inclusive land utilization plan for the reasonably fair and sustainable urban development in the area. Else the Srinagar capital might twirl into a unmanageable and an uncontrollable metropolitan complex with grave social and ecological consequences.

## 6 CONCLUSION AND RECOMMENDATIONS

The following conclusions and recommendations result from the data analysis: The relative relevance of a city in a region can be understood from the following standard models based on population and the functions performed by the city.

### Primate city model

A primate city division is called as "rank-size distribution" that has one very huge city with many much minor towns and cities, and no intermediate sized urban city centers.

### Zipf model-Rank size rule

The rule of 'Rank-Size' was unconcealed in each underdeveloped and developed countries once the additive incidence of cities with bigger population than 20 thousand individuals was graded alongside with the dimensions of a town on a log-typical scale. In terms of population the division of city sizes in both developed and underdeveloped countries have come recently under close assessment by specialist in under settlement geography and many academic fields. The initiation of general systems theory has proved to be an priceless analytical pattern to the study of city size distribution, it includes in that the concept of entropy and stochastic growth



theory. The two aspects have been very useful of general systems theory in clearing up some of the empirical regularities observed especially the rank size distribution and of city size distribution.

#### **Losch model/christaller model**

Losch's model itself consist of superimposed hexagons in a pattern around a capital or central city. These hexagons show the land around industries in order to determine at which location the population will have the lowest cost.

The residential and commercial pattern within the city can be understood from the following models

#### **Burgees model**

Chicago city was studied for which Burgess presented empirical facts. Concentric Zone Model or CCD model was developed between 1925 - 1929 based on the examination of American cities. Burgess Model is another name for this model (provided after the name of Ernest Burgess).

#### **Homer hyot model**

The Hoyt model also known as the sector model, is a model proposed by land economist Homer Hoyt in 1939 of urban land cover/use. The benefits of the application of this model contain the fact it allows for an outward progression of growth. It is a amendment of the concentric zone model of city development.

#### **Edward Ullman model**

Each nucleus acts like a growth point. The model is suitable for large and expanding cities. Ullman and Harris argued that cities do not grow a single nucleus but several separate nuclei. The theory was formed based on the idea that people have greater movement due to increased car ownership.

#### **Leap frog model**

The construct of leapfrogging most recently is being employed as a theory of development within the perspective of development of sustainable infrastructure for developing countries, which can accelerate development by, less economical, skipping inferior, dearer or a lot of polluting industries and technologies and move on to a lot of superior ones.

#### **Urban sprawl**

The growth of the city in the near by rural areas due to expansion of the population leads to urban sprawl or rural urban fringe. This growth, if not performed by the government in a planned manner, is usually haphazard and leads to several ecological degeneration.

#### **Lewis Mumford theory of town planning**

Mumford argues that urban planning should put emphasis on an organic relationship between their living spaces and the people, While pessimistic in tone, Mumford argues that the structure of present modern cities is somewhat to blame for many social troubles seen in western society. Harshly critical of urban sprawl.

#### **UN Habitat-III**

Habitat III was the primary international organization world summit when the implementation of the agenda of 2030 for Development of property and therefore the sustainable

infrastructure Development Goals. It presented a novel chance to debate the necessary test of however villages towns and cities area unit managed and planned so as to meet up their role as sustainable development drivers and therefore form the execution of temperature change goals and latest world development. In line with the bi-decennial cycle (1976, 1996, and 2016), and the Resolution 66/207, the international organization General Assembly set to convene the surroundings III Conference to energise the world commitment to specialize in the implementation of a replacement Urban Agenda, to property urbanization, and building on the surroundings Agenda of Istanbul in 1996.

#### **SDG-10 ( cities)**

Making sustainable cities means that making business and carrier opportunities, reasonable housing, safe housing and building resilient economies and societies. It engages making inexperienced public areas, rising urban designing and management in democratic, investment publically transport and inclusive ways.

#### **Srinagar master plan 2000-21 & draft master plan-2035 for srinagar metropolitan region**

The state of Jammu & Kashmir which concern the unparalleled acts of encroachment of state land, wetlands, flood basins, forest areas, , lakes, rivers and had mess up the Master Plan of Srinagar city 2000-21, amid other issues. The accountability of devastation of capital city of Srinagar it would be valuable to talk about that is largely because of the carrying out of Faulty or non-implementation of different land use/ cover plans enumerated in the SMP- 2000-21, this has been under check for the past 7 years with no conclusion. After holding wide ranging discussions with experts in international Repute and on national Urban Planning, EPG group i.e; Environmental Policy Group offered its 14 page Critical Analysis reply on the projected Master Plan -2035.

#### **Decentralization**

Decentralization of some advanced order tasks should take place as or else this leads to dilemmas like traffic jams, pollution and traffic congestions and other in the core of the cities.

#### **Unique geography**

The valley of Kashmir can't afford to have huge railways, highways, cement factories, Industrial Estates, shopping malls etc. in view of unique geography and lesser availability of land. We cannot compete with states like Maharashtra, Haryana, Punjab, UP or other vis-a-vis infrastructure and development. Our future generations will curse us if we do not stop this loot, plunder and unholy practices of land utilization.

#### **Sustainability to be a hallmark**

It lays emphasis on the fact that meeting climate change, smart city development, sustainable development, and mitigation goals should go hand in hand. Combating the envelope of pollution shrouding our cities and pollution strains our cities has already made huge stretches of urban spheres unhealthy for residence. This important aspect we can't afford to overlook.

### Urban Planning

When we talk about smart cities, one constituent is there that is at the core of it i.e; Urban Planning in actual fact, A smart town can't be planned while not meticulous and elaborate urban coming up with. Urban planning can be defined as the 'structural scaffolding of a smart city, its optimized layout plan as well as support system the of the city. Synchronization with the technological and infrastructural needs of a feasible smart city structure hence stems the need of modification the fundamentals of urban planning.

### Rapid technology

With rapid technological advancements in the 21<sup>st</sup> century, a lot of old urban planning models have already become obsolete. This ensures that the focus should be on amalgamating latest technology goals and urban planning guidelines while recognizing the importance of sustainability. since a lot has changed over the decades, it should fundamentally reflect in urban planning strategies that focus on the future.

### New orientation of yesteryears approach

Stressing on the need of a calibration between traditional urban planning and technology in a new technology-driven age, "World over, one of the most accepted models in urban development is Smart India. India too is following this route. But the contradiction is that standard town planners ought to be actively engaged unitedly and aggregation. But that is not the case. It is the technologists who have leapfrogged and are at the forefront of most aspects of a smart city".

### Eschewing a uniform pattern

Coherent visualization is needed for that data collection and [sustainable development](#). Visualization is essential. Undoubtedly data is among the various pillars of development of smart city. "Cities ought to gaze within the mirror and determine their challenges, history, complexities and contradictions. There can't be a 'one size fits all model' or 'one silver bullet'. A multiscale, cross-sectoral planning and specially tailored approach is the key is the need of the hour. Different cities have different burdens of the past, different baggage, anxieties of the future and the hesitations of the present and naturally they will pursue diverse trajectorye.

### Coupling policy and technology

It gives us some food for thought when she asks, "That should Smart City only be synonymous be groundbreaking technology and smart be the buzzword of technological capability". Pointing that "Smart should not merely be about digital enablement, but equally about policy mechanisms, governance, and a systematic approach."It goes without saying that smart city development has to be encompassing everything, truly holistic; from policy to enablement to technology to citizen participation and to government action. In the field of policy making, what will empower smart cities more is decentralization in decision making and gradually devolving power.

### New methodology

- A new methodology is needed in urban planning. "A methodology involving people, process, technology and citizen participation, inviting experts to share knowledge, and facilitating enterprises,"

- Possible solution to tackle the issue of pollution. "Export ideas. Focus more on education and knowledge sharing, spreading awareness by encouraging people, organizing free workshops, and innovation and Inspiring startups".
- "Encouraging the germination of new ideas, fast-tracking process, throwing new light on challenges is the way forward, training youth to understand financing solu

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