

# Land Use-Land Cover Change in Baddi Industrial Town, Himachal Pradesh

**Vipan Kumar \* & Dr. Krishna Mohan\*\***

\* Project Fellow, Center of Advanced Study (UGC) Department of Geography,  
Panjab University, Chandigarh

\*\* Professor and Coordinator, Center of Advanced Study (UGC) Department of Geography,

Received: February 25, 2019

Accepted: March 31, 2019

**ABSTRACT:** : **Aims:** The study aims to assess land use and land cover change from 1992-2017 in Baddi Industrial Town, Himachal Pradesh.

**Study Design:** The present study is based on satellite data acquired from different sources of different periods of time.

**Place and Duration of Study:** Satellite images of the study area for the years 1992, 2012 and 2017 were used for the study

**Methodology:** Satellite images of the study area for were used to analyse the land use patterns and changes over time. Landsat 5TM 1992, Landsat 7ETM 2012 and Landsat 8OLI/TIRS 2017 were obtained from the earthexplorer.usgs.gov. Toposheet was taken from Survey of India, Chandigarh and it was converted to the digital mode using scanning. The topographic map is geo referenced with longitude and latitudes using the ArcGIS software and spatial analyst tools and demarcated the boundary of the study area. The

**Results:** There has been a decrease of 3.2 per cent in forest land between 1992 and 2012. During this period agricultural land decreased by 4.3 per cent and area under wasteland also went down by 1.02 per cent only built up land has shown a positive increase of 8.54 per cent. There has been a decrease of 0.13 per cent in forest land between 2012 and 2017 agricultural land decreased 10 per cent and area under wasteland also went down 2.32 per cent. During 2012 to 2017 only built up land increased 12.45 per cent.

**Conclusion:** Baddi, a nondescript and dusty settlement has been transformed into an industrial town and Asia's largest pharmaceutical hub in a span of just 25 years. The process of transformation that began in early 1990 got a fillip in 1999 when it was declared as one of the industrial development areas of Himachal Pradesh. Ever since change is very rapid that it recorded more than 2000 industrial units in 2011. The built-up land increased because of the construction of the new structures. These both have advantages as well as disadvantages

**Key Words:** Land use, Land cover, Change Detection, GIS, Landsat, Remote Sensing.

## Introduction

The land is the basic natural resource. It is perhaps regarded as a resource base rather than a resource itself (Mather, 1986). It is infinite and fixed in place and most of the needs of humanity for food, clothing, shelter and energy come from the land (Davis, 1976). Only 29 per cent of the earth's total area is under land while the rest 71 per cent is under water. Thus the percentage of fertile and productive lands, which are habitable and provide basic needs of human beings, is comparatively very small. Therefore, every inch of these lands has great importance for us.

There are few landscapes on the Earth's surface that have not been significantly altered or are not being altered by humans in some manner. The modification of landscapes by anthropogenic activities has had a profound effect on the natural environment. These anthropogenic influences on shifting patterns of land use are a primary component of many current environmental concerns being faced by humans today. As a result, land use and land cover change are gaining recognition as a key driver of environmental change (Riebsame, et al. 1994). Change in land use and land cover are pervasive, increasing rapidly, and can have adverse impacts at local, regional and global scales.

The land use-land cover pattern of a region is an outcome of natural and socio-economic factors and their utilization by humans in time and space (Bhagawat, 2011). The land is becoming a scarce resource due to immense agricultural and demographic pressure (Sundarakumar et al., 2012). Hence, information on land use/land cover and possibilities for their optimal use are most essential for the selection, planning and implementation of land use schemes to meet the increasing demands for basic human needs as well as welfare (Miheretu et al., 2017). This information assists in monitoring the dynamics of land use resulting out

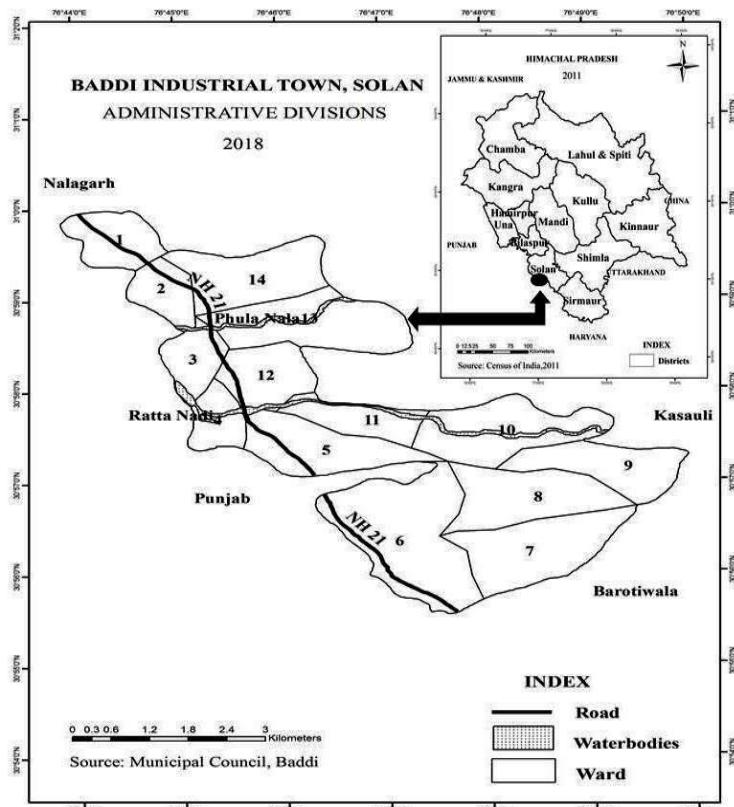
of changing demands of the increasing population.

Land use refers to human activities and various uses which are carried on land (Clawson & Steward, 1965). Land cover refers to natural vegetation, water bodies, rock/soil, artificial coverage and other resulting due to land transformation (Lillesand, et al. 2004). This term originally refers to the kind and state of vegetation (such as forest or grass cover), but it has broadened in subsequent usage to include human structures (such as buildings or pavements and other aspects of soil type, biodiversity, surface, groundwater). Land use affects land cover and changes in land cover affect land use. In other words, both are interdependent (Patra et al., 2018). Changes in land use and land cover do not imply a degradation of land. It denotes a shift in land use patterns driven by various socio-economic processes.

### Baddi Industrial Town

Baddi is an industrial town and *Nagar Panchayat* in Solan district of Himachal Pradesh. The study area situated between 30°82'20"N to 31°11'20"N latitude and 76°63'21"E to 76°99'21"E longitude. is covered by Survey of India topographical map No. 53A/12, 53B/09, 53A/16, and 53B/13 at 1:50,000 scales (Fig. 1). The total geographical area of Baddi tehsil is 232 sq. km and the study area Baddi industrial town covers the geographical area of 29 sq. km. The industrial town Baddi is located in Solan District of Himachal Pradesh around 35 km. from the District Headquarter Solan. Baddi is around 40 km from the capital of Punjab and Haryana, the city beautiful Chandigarh. *Ratta Nadi* and *Phula Nala* are important seasonal streams in the study area, which are tributaries of *Sirs River*. These are seasonal streams and remain dry during non-rainy season. Mean maximum and minimum temperature ranges between 34°C and 4°C. Average annual rainfall in the study area is about 1450 mm with an average of 64 rainy days.

Baddi Industrial Town (BIT) is one of the fastest growing towns in Himachal Pradesh. In the recent past, Baddi has become a manufacturing hub for Indian and Multinational Companies. In order to provide facilities to the manufacturers and to boost the business, the Government of India has also decided to link Baddi with the rail network. Currently, there are around 1000 medical and pharma companies operating in Baddi. Apart from this, there are over 200 packaging/printing units. There are hundreds of other factories of various sizes. The fortunes of Baddi began to change with the visit of the then Prime Minister, Mr Atal Bihari Vajpayee, to Uttarakhand and Himachal Pradesh on March 29 and 31, 2002, where he announced tax and central excise concessions to attract investments to special category states.



\*Numbers denote ward number

Figure 1: Location Map of Study Area

## Objective

- To know the land use-land cover at the time of demarcation of Baddi Industrial Town 1992.
- To trace the land use-land cover change during 1992-2012 of Baddi Industrial Town.
- To know the land use-land cover change in 2012- 2017 of Baddi Industrial Town.

## Methodology

The present study is based on both primary as well as secondary sources.

- The primary data sources include field visit, interview schedules, observation, and informal meetings with an official. A series of consultation meetings at the office of Baddi BarotiwalaNalagarh Development Authority (BBNDA), Municipal Council Baddi, Department of Town and Country Planning regarding structural plans, land acquisition mechanism and land management strategies, and developmental activities in the study area.
- The secondary sources are: Land Records, Municipal Council Baddi, Department of Industries Baddi, Remotely sensed data (LANDSAT 5/TM, LANDSAT 7/ETM+, LANDSAT 8/OLI/TIRS) and Census Data.

The satellite data were acquired from different sources of different periods of time. Satellite images of the study area for the years 1992, 2012 and 2017 were used to analyses the land use patterns and changes over time. Landsat 5TM 1992, Landsat 7ETM 2012 and Landsat 8OLI/TIRS 2017 were obtained from the earthexplorer.usgs.gov. Toposheet was taken from Survey of India, Chandigarh and it was converted to the digital mode using scanning. The topographic map is georeferenced with longitude and latitudes using the ArcGIS software and spatial analyst tools and demarcated the boundary of the study area. The detailed methodology adopted is given in Figure 2.

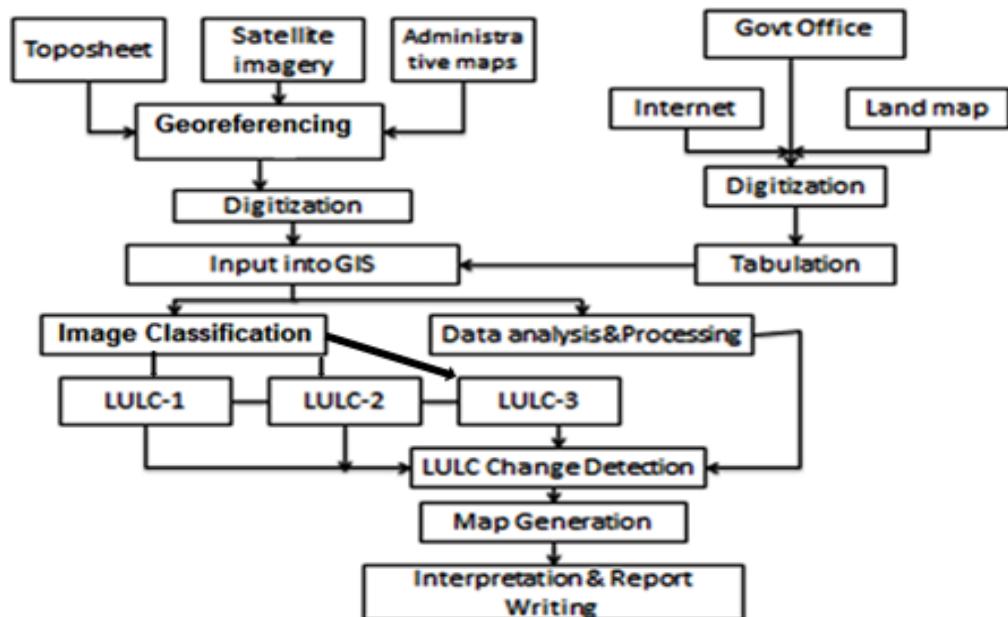


Figure 2: Flow chart of a methodology for land use-land cover change.

## Policies for Industrial Development in Baddi

In the early 1990s, Baddi, (Solan district, Himachal Pradesh) was a nondescript and dusty town. The land was barren. There was hardly any industry and locals had to look for jobs in the neighboring Punjab and Haryana states. The first unit was set up in 1991 (Vardhman Textiles Ltd) and since then it has emerged as Asia's largest pharmaceutical hub and one of the biggest industrial centers in north India. Baddi is not just about pharmaceutical manufacturing, it also boasts of packaging, textiles, food processing and engineering units.

The growth of the industrial sector in any economy mainly depends upon its effective and systematic industrial policies. In this direction, the Industrial Department, Himachal Pradesh formulated industrial policies periodically. It announced various industrial policies: Industrial Policy 1996; Industrial Policy

Guideline 1999; Industrial Policy 2004; and Industrial Policy 2013. Key objectives of these policies are:

- (i) Raise industrial development in those areas in which have a maximum comparative advantage,
- (ii) Encourage private players for promoting infrastructure,
- (iii) Give more emphasis for balanced development. The policies pursued by the state have resulted in promoting investment in general, diversification of industries and generation of employment opportunities.

The state of Himachal Pradesh prepared an incentive rule for industrial areas and industrial Estates in 1999. There were two broad categories of areas (i) Industrial Backward areas (ii) Industrially Developing areas. The industrially backward area was identified in 10 out of 12 districts except for Sirmour and Solan. Sirmour and Solan were identified for industrially developing areas. In Solan, four industrial areas Baddi, Barotiwala, Nalagarh, *Parwanoo* and two Industrial Estates *Chambaghata* and *Dharampur* were identified. The State Government has already developed 42 Industrial Areas and 17 Industrial Estates with all basic amenities like roads, power, sewerage, water and communication.

The state has the capability now to sustain long term growth of industrial development. There is a need for structural change in the economy, with the diversification of the primary agricultural sector and the contribution of the industrial sector growing substantially to take a comparatively significant place in the state's overall economy. The Income Tax Holiday and the Central Transport Subsidy Scheme, the two major central incentives have helped the growth of industries in the state.

In 2003 Central Government announced a special package of incentives to Himachal Pradesh in the form of Concessions in Tax Rate and Central Excise Duty. *DeenDayalHathkarghaProtsahanYojana*, *Prime Minister RojgarYojana* and Central Transport Subsidy helped the growth of industries in the state. The Industrial Policy 2004 of Himachal Pradesh provided a large number of incentives and concession to the industries like concession in tax and central excise duties. The key incentives which were provided to the industries through the Industrial Policy 2004 were an exemption in electricity duty, special discount in power for 100 per cent export-oriented units, transport subsidies to industries for furnished goods and raw materials. It is not just the surplus power availability in the region that helped its development, but also cheaper land rates. The government of Himachal Pradesh has given more emphasis on Baddi to reap the advantages location with respect to Punjab, Haryana and union territory of Chandigarh. It is connected with the transportation facilities like road, railway and airways. Baddi due to its location and geo-climatic conditions has certain positive assets for certain industries such as pharmaceuticals, plastic, engineering, electrical and electronics, food and beverages. These are based on considerations like available human resource, natural resources, locally available raw materials, flora and fauna and became the industrial hub of the state. The Himachal Pradesh Government has also implemented a prestigious project of Export Promotion Industrial Park at Baddi. This project has been sponsored by the Government of India. The systematic and periodical polices by the state have a positive impact on the growth of the industrial sector in Baddi.

### **Industries in Baddi**

Industrial areas are being presently developed and maintained by the Department of Industries itself and through agencies like Himachal Pradesh State Industrial Development Corporation and Himachal Urban Development Agency (HIMUDA). Off late, Industrial Areas located in the border areas adjoining Punjab, Haryana, Chandigarh, attracted a large number of projects. This is especially so in case of Industrial Area of Baddi in Solan District. Baddi town in Solan District has come up as an attractive destination for the large and small scale of the industry. The State today has a significant presence of the total textile and pharma industry manufacturing capacity of the country and has established itself as a proven destination for textile, Pharma, Food Processing, Engineering, Paper, White Goods Manufacturing and Packaging industry (Table 1). The State Government has already developed 29 industrial areas and 9 industrial estates with all basic amenities like roads, power, sewerage, water and communication etc. The State has also implemented a prestigious project of Export Promotion Industrial Park at Baddi with an investment of Rs. 20 crores. This project has been sponsored by the Government of India, Ministry of Commerce and Industry.

**Table 1**  
**Baddi Industrial Town**  
**Industrial Units, 2014**

Sr. No.	Category of units	No of units	Investment (in crores)	Workers belonging to Himachal Pradesh	Workers from states other than Himachal Pradesh	Total Workers	Workers belonging Himachal Pradesh on per cent to total workers
1	Pharmaceuticals	282	2331.47	10796	4123	14919	72.36
2	Packaging	197	872.38	2103	915	3018	69.68
3	Plastic	192	923.23	2418	930	3348	72.22
4	Electrical goods	161	85.08	3648	1243	4891	74.59
5	Auto ancillary Miscengineering	179	775.2	3627	1282	4909	73.88
6	Soap and Cosmetics	106	910.16	3009	1063	4072	73.89
7	Electronics	83	366.55	1964	882	2846	69.01
8	Textiles	97	1377.06	7876	3357	11233	70.11
9	Food processing	139	721.09	2413	937	3350	72.03
10	Footwear	36	131.06	2367	1040	3407	69.47
11	Steel	24	286.12	447	174	621	71.98
12	Chemical	32	73.98	810	366	1176	68.88
13	Cement	4	594.99	1237	594	1831	67.56
14	Automobiles	12	194.69	1580	692	2272	69.54
15	Others	577	1751.36	5705	2311	8016	71.17
	<b>Total</b>	<b>2121</b>	<b>13394.4</b>	<b>50000</b>	<b>19909</b>	<b>69909</b>	<b>71.52</b>

Source: Department of Industries, Govt. of Himachal Pradesh

The Table shows the number of industrial units in Baddi. The total number of industries in Baddi is 2121. Total investment in Baddi by industries is 13394.4crores and employment generated by industries is 69909. The total employment for Himachal is 50000 and 19909 for Non-Himachal in Baddi. Major beneficiaries in the job are from Himachal Pradesh that constitutes 71.5 per cent of total employment. (Table1) The short of employment from Himachal Pradesh in industries producing electric goods was a higher 75 per cent. In all other industries, 2/3 of total employers were from Himachal Pradesh. Pharmaceuticals companies were found to be the biggest investor as well as the largest employment generator followed by textile industries.

#### **Land Use – Land Cover at the time of Demarcation of Baddi Industrial Town 1992**

The study area Baddi is highly populated industrial town. The population in the Baddi is unevenly concentrated at the different parts at different hours. The northern part of the town is highly populated. Total population at the time of demarcation of Baddi industrial town was 21429 (1991). The total area of Baddi Industrial town was 2971.8 hectares in 1992. Agricultural land covered 45.44 per cent. Forest land covered 24.66 per cent of the total area while built-up area covered 23.77 per cent followed by wasteland 6.13 per cent. Majority of the forest area was in northern part while the majority of the built-up area was in the south-east. Wastelands comprise land along seasonal streams. Baddi was a rural village in 1992 and the agriculture was the main livelihood option found in the town.

#### **Land Use – Land Cover 2017**

Baddi is a Municipal Council + Outgrowth city situated in Baddi tehsil of Solan district. The Baddi town is divided into 14 wards for which elections are held every 5 years. As per the Population Census 2011, there are total 20365 families residing in the Baddi town. Baddi Municipal Council + Outgrowth have total administration over 20365 houses to which it supplies basic amenities like water and sewerage. It is also authorized to build roads within Municipal Council + Outgrowth limits and impose taxes on properties coming under its jurisdiction.

The total area of Baddi Industrial town is 2971.8 hectares in 2017. Majority of the area is covered by built-up land. Forest land covered 21.31 per cent of the total area while agriculture land covered 31.14 per cent. Least area is covered by wastelands. There is an increase in the built-up land continuously but forest land, agriculture land and wasteland decrease same time. The built-up land increased because of the construction of the new industries, banks, malls and hotels.

## **Result and Discussion**

Land use-Land cover is a dynamic process. It keeps on changing with time and space. Land use-land cover change (LULCC), also known as land change is a general term for the human modification of earth terrestrial surface. Land use affects land cover and changes in land cover affect land use. A change in either, however, is not necessarily the product of the other. Changes in land cover by land use do not necessarily imply a degradation of the land. However many shifting land use patterns driven by a variety of social causes result in land cover changes.

Cumulative changes have been the most common type of human-induced environmental change since antiquity. Cumulative changes are geographically limited but if repeated sufficiently become global in magnitude. Change in the landscape, cropland, grasslands, wetlands, or human settlements are an example of cumulative changes. (Turner, & Butzer, 1992)

Change detection is the process of identifying differences in the state of an object or phenomenon by observing it at a different time. Change detection is an important process in monitoring and managing natural resources and urban development because it provides a quantitative analysis of the spatial distribution of the population of interest. In some instances, land use land cover change may result in environmental, social and economic impacts of greater damage than benefit to the area. Therefore data on land use change is of great importance to planners in monitoring the consequences of land use change in the area. Such data are of value to resources management and agencies that plan and assess land use patterns and in modeling and predicting future changes. To better understand the impact of land use change on terrestrial ecosystems the factors affecting land use must be more fully examined. After the study, great changes in the land use were found in the Baddi industrial town.

**Table 2**  
**Baddi Industrial Town**  
**Land use-Land cover 1992 - 2017 (in hectare)**

Land Use Category	Land Area 1992	Land Area 2012	Land Area 2017	Change in Land Area 1992 - 2012	Change in Land Area 2012- 2017
Agriculture Land	1350.27	1222.74	925.47	-127.53	-297.27
Built-up Land	706.59	959.94	1330.11	253.35	370.17
Forest Land	733.05	637.38	633.42	-95.67	-3.96
WasteLand	181.89	151.74	82.8	-30.15	-68.94
Total	2971.8	2971.8	2971.8		

Source: Data generated using LANDSAT 5 TM, LANDSAT 7 ETM+, and LANDSAT 8 OLI/TIRS

Table 2 shows a change in the area of land use-land cover 1992 to 2017. There is an increase in the built-up land continuously but forest land, agriculture land and wasteland decrease. The decline in forest cover slowed down during the 2012-2017 period. The major casuistry was to agricultural land during 2012-2017 that was eaten up by built-up land. While the transformation of wasteland to built-up land is healthy, loss of agricultural land wise many concern.

**Table 3**  
**Baddi Industrial Town**  
**Land use-Land cover 1992 - 2017**

Land Use Category	Per cent to total land, 1992	Per cent to total land, 2012	Per cent to total land, 2017	Land use-Land cover Change (in per cent point) 1992 - 2012	Land use-Land cover Change (in per cent point) 2012 - 2017
Agriculture Land	45.44	41.14	31.14	-4.3	-10.0
Built-up Land	23.77	32.31	44.76	8.54	12.45
Forest Land	24.66	21.44	21.31	-3.22	-0.13
Waste Land	6.13	5.11	2.79	-1.02	-2.32
Total	100.00	100.00	100.00		

Source: Data generated using LANDSAT 5 TM, LANDSAT 7 ETM+, and LANDSAT 8 OLI/TIRS

Table 3 shows a change in the percentage of land use-land cover from 1992 to 2017. There is an increase in the built-up land continuously but forest land, agriculture land and wasteland decrease.

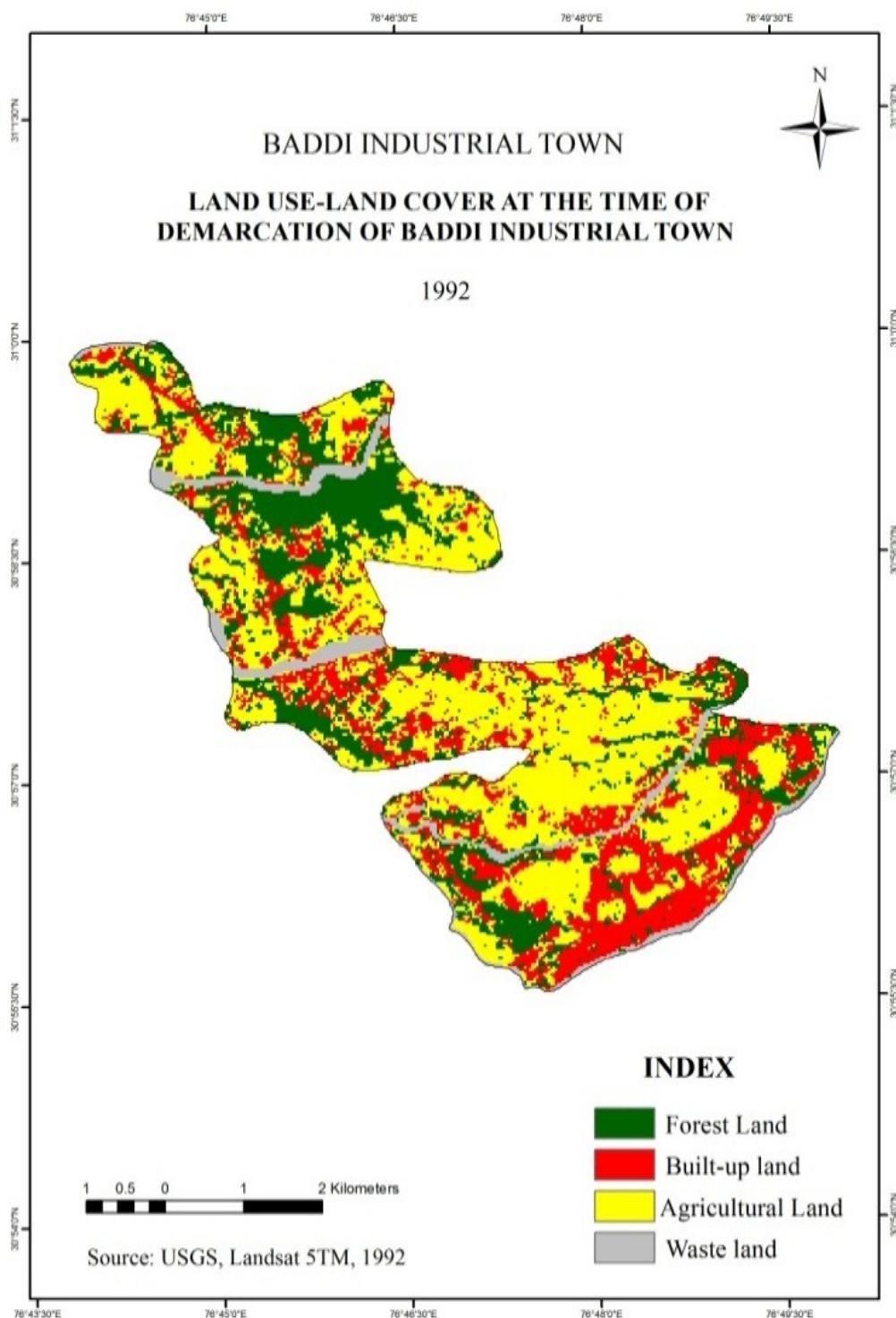


Figure 3: Land use- land cover Baddi Industrial Town 1992

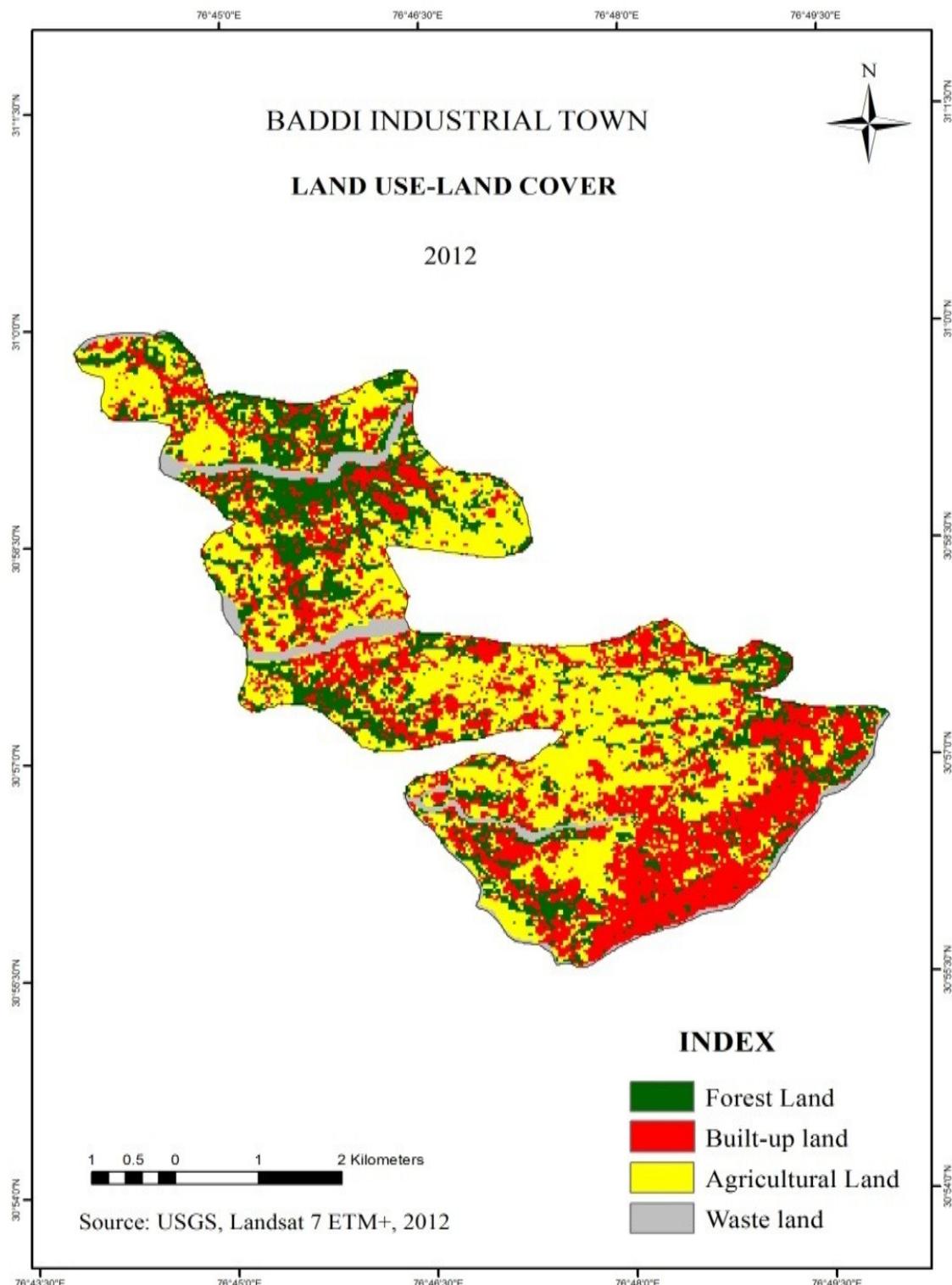


Figure 4:Land use- land cover Baddi Industrial Town 2012

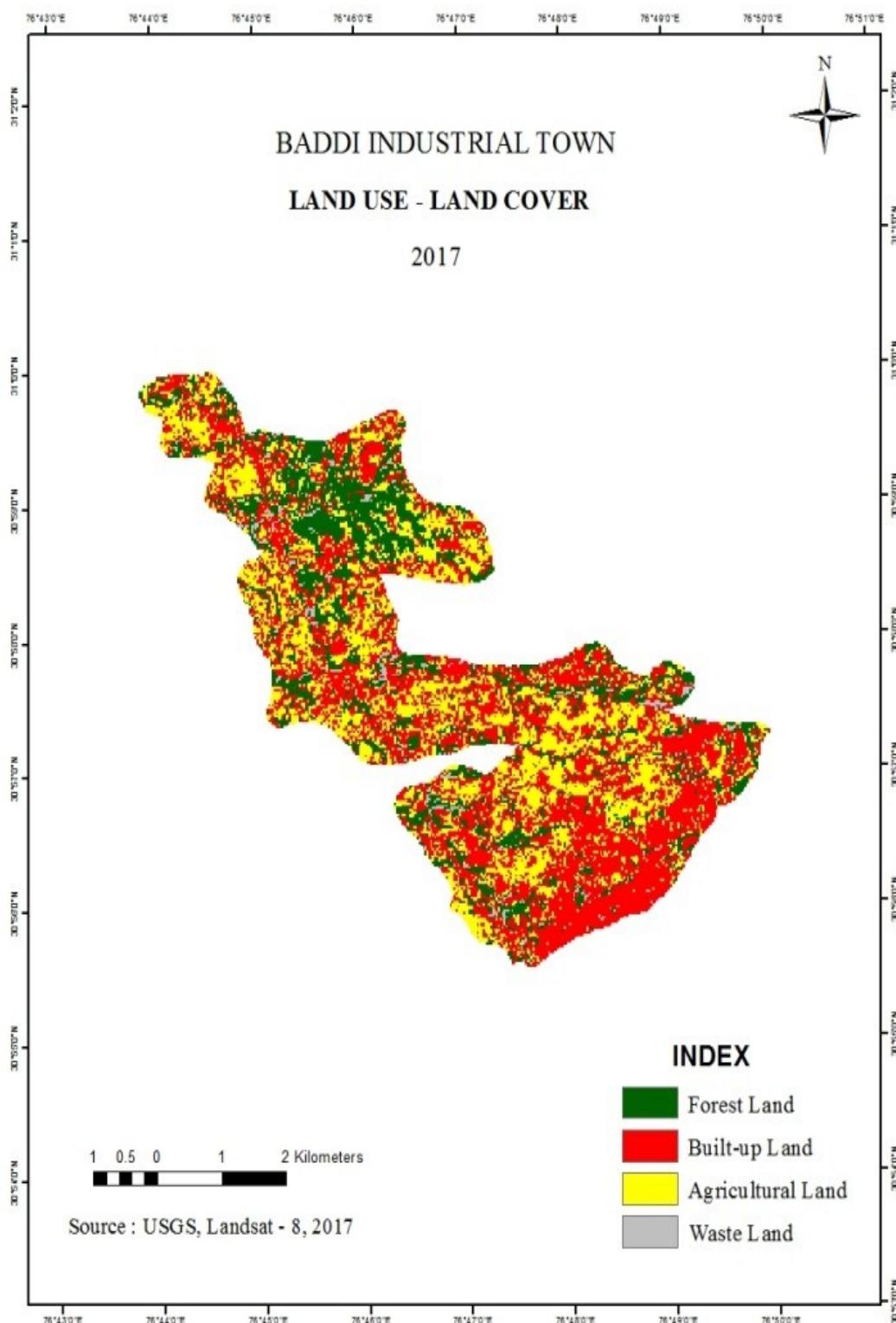


Figure 5:Land use- land cover Baddi Industrial Town 2017

There has been a decrease of 3.2 per cent in forest land between 1992 and 2012 During this period agricultural land decreased by 4.3 per cent and area under wasteland also went down by 1.02 per cent only built up land has shown a positive increase of 8.54 per cent (Fig. 3 & 4). There has been a decrease of 0.13 per cent in forest land between 2012 and 2017 agricultural land decreased 10 per cent and area under

wasteland also wet down 2.32 per cent. During 2012 to 2017 only built up land increased 12.45 per cent (Fig. 4 & 5). Built upland has increased especially in the northern part which was previously under forests. There has also been an increase of built-up land in the central part which was previously used for agriculture. This can be attributed to the rapid increase in the number of industries that are being set up at Baddi. Industrialization at Baddi began in 1992 and soon attracted several new industries. This has led to an increase in the built-up land and a consequent decrease in all other land use categories.

### **Conclusion**

The first unit in Baddi was Vardhman Textiles Ltd. set up in 1991. Unichem Laboratories Ltd. first pharmaceutical factory set up in 1993 since then it has emerged as Asia's largest pharmaceutical hub and one of the biggest industrial centers in north India. Baddi is not just about pharmaceutical manufacturing it also boasts of packaging, textiles, food processing and engineering units. The government of Himachal Pradesh has several subsidies and incentives for the setting up of industries at Baddi. The systematic and periodic policies by the state have a positive impact on the growth of the industrial sector in Baddi. Cheaper land rates, various types of incentives along with power availability were most important pull factors for private investors in Baddi.

The maximum area was covered by agricultural land in 1992. In 1992, forest land covered the second largest area followed by built-up land while in 2012 this scenario reversed with built-up land covering the second largest area followed by forests land. Majority of the forest land was in the northern part while the majority of the built-up land is in the south-east. Between 1992 and 2012 there was a decrease in area under forest land, agriculture land and wasteland. Only the area under built-up land showed a positive increase. In 2017 maximum area was covered by built-up land and agricultural land covered the second largest area followed by forest land. Least area was covered by wastelands. Wastelands comprise of the seasonal streams found in the town. The reason behind was the rapid increase in the number of industries that were being set up at Baddi.

The built-up land increased because of the construction of the new industries, banks, malls and hotels. The advantage of this is that the people of the area will get all the basic things there and they don't have to travel for other places, the other benefits of the people living there will get the more employment opportunities and which will lead to their economic growth. The disadvantages of this are the open space has been decreased and there will be more pollution by these industries and malls as they produce very waste products which are harmful to the environment and for the people's health also.

### **References**

1. Anderson, J. R. et al. (1976). A land use and land cover classification system for use with remote sensor data. USGS Publication.
2. Census of India, (2011). Retrieved from <http://censusindia.gov.in>
3. Clawson, M. & Stewart, C. L. (1965). Land use information: A critical survey of US statistics including possibilities for greater uniformity. Baltimore, MD, The Johns Hopkins Press, P 402.
4. Davis, K. P. (1976). Land - use. New York: McGraw Hill, Book Company.
5. Development Plan (2025) for Baddi-Barotiwala-Nalagarh (2006). Retrieved from <http://bbndahp.nic.in>
6. Gautam, N. C. & Narayan, L. R. A. (1982). Suggested land use/land cover classification for India using remote sensing techniques. Mathura: Pink Publications.
7. Himachal Pradesh Administration official web site Retrieved from <http://himachal.gov.in>
8. Lillesand, T. M. et al. (2004). Remote sensing and image interpretation (5th Ed.). New York: John Wiley & Sons, Inc.
9. Mather, A.S. (1986). Land use. London: Longman Group Limited.
10. National Remote Sensing Centre (NRSC). Retrieved from <http://www.nrsc.gov.in>
11. Pandy, A. C., & Nathawat, M. S. (2006). Land use land cover mapping through digital image processing of satellite data.
12. Riebsame, W. E. et al. (1994). Modeling land-use and cover as part of global environmental change. Netherland: Kluwer Academic Publishers.
13. Singh, A. (1989). Digital change detection techniques using remotely sensed data. International journal of remote sensing.
14. State of the environment report on Himachal Pradesh (2011). Department of Environment, Science & Technology, Government of Himachal Pradesh. Retrieved from <https://desthp.nic.in>
15. Survey of India (SOI). Retrieved from [www.surveyofindia.gov.in](http://www.surveyofindia.gov.in)
16. The Himachal Pradesh state industrial development corporation limited. Retrieved from [www.hpsidc.nic.in](http://www.hpsidc.nic.in)
17. Tomlinson, R.F. (2005). Thinking about GIS: Geographic information system planning for managers, ESRI.
18. Turner, B. L. & Butzer, K. W. (1992). The Columbian encounter and land-use change. Environment, 34(8), 16-44.

DOI: 10.1080/00139157.1992.9931469

19. Rimal, Bhagawat. (2011). Application of remote sensing and gis, land use/land cover change in Kathmandu Metropolitan City, Nepal. Journal of Theoretical and Applied Information Technology. 23. 80-86.
20. Sundarakumar, K., Harika, M., Begum, S. A., Yamini, S., & Balakrishna, K. (2012). Land use and land cover change detection and urban sprawl analysis of Vijayawada city using multitemporal landsat data. International Journal of Engineering Science and Technology, 4(01), 170-178.
21. Miheretu, Birhan&Abegaz, Assefa.(2017). Land use/land cover changes and their environmental implications in the Gelana sub-watershed of Northern highlands of Ethiopia. Environmental Systems Research. 6. 10.1186/s40068-017-0084-7.
22. Patra, S., Sahoo, S., Mishra, P., Mahapatra, S.C. 2018. Impacts of urbanization on land use /cover changes and its probable implications on local climate and groundwater level. Journal of Urban Management, Volume 7, Issue 2, 70-84.