URBAN GREEN SPACE AND QUESTION OF DISTRIBUTIVE JUSTICE: A STUDY OF CITIES OF PUNJAB USING GEO-SPATIAL APPROACH

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In

Geography

BY

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DECLARATION

I declare that the project report entitled " URBAN GREEN SPACE AND QUESTION OF DISTRIBUTIVE JUSTICE: A STUDY OF CITIES OF PUNJAB USING GEO-SPATIAL APPROACH " has been prepared by me under the guidance of Dr. Kiran K. Singh, Assistant Professor, Department of Geography and Geology, School of Environment and Earth Sciences, Central University of Punjab, Bathinda. No part of this dissertation/thesis has formed the basis for the award of any degree or fellowship previously.

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CERTIFICATE

I certify that NAVJOTPREET KAUR has prepared her project report entitled "URBAN GREEN SPACE AND QUESTION OF DISTRIBUTIVE JUSTICE: A STUDY OF CITIES OF PUNJAB USING GEO-SPATIAL APPROACH", for the award of Master of Arts Degree under my guidance. She has carried out her work at the Department of Geography and Geology, School of Environment and Earth Sciences, Central University of Punjab.

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ABSTRACT

Urban Green Space and Question of Distributive Justice: A Study of Cities of Punjab using Geo- Spatial Approach

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Urban green parks play vital role in providing fresh and healthy environment in urban areas. But conspicuous problem remains in unequal distribution of parks. This problem raises various questions. One of them is distributive justice. This study was conducted for four major cities of Punjab: Ludhiana, Bathinda, Amritsar and Chandigarh, to check the location of parks and slums in these cities to look into the problem of distributive justice. In study, the buffer analysis is used to know the serving area of parks and to represent over-served, served and un-served area of parks. GIS (Geographical Information System) is used to derive the serving area of parks. The result shows that major concentration of parks is in exclusive areas in these cities like elite class residential localities. It also highlights that most of the parks are far away from the slum areas. The study also shows that well planned areas have the high facility of parks than others. Overall, these findings help in underscoring the problem of distributive justice in allocating parks in urban areas.

Navjotpreet Kaur — Dr. Kiran K. Singh (Assistant Professor)

(Signature of Student) — (Signature of Supervisor)

Dedicate to my loving Parents

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Navjotpreet Kaur

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Chapter 1. Introduction

1.1. Introduction: Urban green parks are the important part of urban open area. Every cities has its own urban parks. Urban parks are essential for maintenance of urban environment. Parks reduce the stress of city people. The city people uses these parks according to their convinces. But these uses are effected by various aspects like distance between the parks and their residents, parks facilities, income. Without this socio-demographic factors such as class, age, gender, and especially race/ethnicity are also effect the uses of parks. Urban Green spaces are any vegetated land that located in an urban area; it includes: parks, gardens, playgrounds, children's play areas, woods and other natural areas, grassed areas and allotments green corridors like paths. It also include any vacant land that is potential to be transformed in to urban green areas like disused railway lines, rivers and canals.

1.1.1 Defining Urban Green and Open Spaces: By definition, urban green spaces are open spaces in urban areas that are primarily covered by vegetation or greenery. It can be public or private. By this definition, urban green space consider as parks, community gardens, natural reserves, golf courses, and forests. The study concentrate only public urban green spaces because these public green spaces are free of charge and most people are not able to access private green spaces such as golf course or any paid entry parks (So, 2016)

Urban green space is also defined as land that consists predominantly of unsealed, permeable, 'soft' surfaces that is fill with soil, grass, vegetation, shrubs and trees. It is the term used for all such areas that are publicly accessible or publicly managed. It includes parks areas, play areas and other green spaces in urban. It also intended for recreational use, as well as other green spaces with other origins (Nigel Dunnett, May, 2002)

Green spaces like parks areas and sports ground as well as natural lands. It may as wetlands areas or other ecosystems, represent a fundamental element of any urban environment. Urban parks and gardens has effective benefits in cooling cities. It also provide the open land in congested area in city for walking and social congestion.

Recent estimates of WHO shows that 3.3% of global deaths is due to physical inactivity to green areas, poor walk ability and lack of access toward recreational areas. Green areas also are important to improve mental health. Green areas can reduce health inequalities, illness, improve well-being, and improve mental illness (Black, 2017).

Urban green spaces are those urban areas that are natural or semi-natural in nature that is converted into urban spaces by human influences. Urban green space builds a relation between nature and urban space (Bilgili and Gokyer, 2012).

Urban parks are defined as delineated open space areas, mostly dominated by vegetation and water, and generally reserved for public use. Urban parks are mostly larger, but can also have the shape of smaller 'pocket parks'. Urban parks are usually locally defined (by authorities) as 'parks' (Cecil C. Konijnendijk, 2013).

1.2 Benefits of Green parks/spaces for Urban: Urban green spaces maintain the biodiversity by the regulation of urban climate. Urban green spaces helps to the linkage of the urban and rural areas. They provide pure relief, seasonal change and linkage with natural world. Areas of the city with enough greenery are more pleasing and attractive to both residents of urban area. (Mohammad Mehdi Sadeghian, 2013). There are lot of benefits of urban green parks/spaces. It is enhanced the urban environment by conditions that include supportive personal relationships of communities, good health, financial and personal security, rewarding employment, and a healthy and attractive environment. The following benefits of urban green parks were included:

• Human health: Urban green areas has positive impacts on human health both mental health and physical health and wellbeing urban peoples. It is by activities direct or indirect in recreation and leisure areas.

• Social identity: There is important role of urban parks in increase identity of socialites, relations and its cohesion.

• Tourism: Urban green area also promote the tourism in urban areas. .It attracts the visitors which gives the positive effects on urban economy.

• House prices: There are also explained that near the green areas in urban, prices of houses and apartments are increased near the urban greenery.

• Biodiversity: There are role of urban green parks in supporting and promoting biodiversity, and diversity of species in particular urban area.

• Air quality and carbon sequestration: There are positive impacts of urban parks in improving air Quality levels and carbon confiscation.

• Water management: it has also contributions to storm water or run off regulation.

• Cooling: The role of green parks in the cooling of urban areas. (Cecil C. Konijnendijk, 2013).

1.3 Injustice for use of urban green Parks/spaces: There are so many injustice in use of urban green parks that are found in various literature. Many people use parks in different ways. Leisure researchers attaches these differences with socio-demographic factors bases on class, age, gender, and especially race/ethnicity. It is found that Ethno-racial differences have been seen in all types of parks. Recently, drawing on cultural landscape, environmental justice ideas and political ecology paradigms and geographers have begun to integrated research agenda, that examining for parks that , 'how and why specific nature-culture assemblages like parks are produced' who has the ability to access these diverse culture-natures and how park access is differentiated in ethno-racially. There are so many reasons for visiting parks that also seem to vary by race/ethnicity. Many studies explained that Whites may have solitude and best opportunities to exercise, African-Americans are looking for organized that recreation opportunities, Latinos are seeks to be socialize, typically with extended family groups, and also have 'fresh air' of urban greenery, and Asians seeks park visits with family or their organized groups, but also visit parks to escape social responsibilities and to exercise (Wolch, 2009). There are several studies show the importance of public green spaces to urban communities, and it is unevenly distributed within an urban areas. It explained that some suburbs has disproportionately well facility of public green space, whereas others areas have considerably less. Some studies criticize that historical and planning reasons for such disparities of this

distribution have rarely been studied, but the correlates between a number of socio-economic variables and urban green areas have been studied. Such inequities that are revealing and communicating, can prompt better planning ideas and environmental justice. This is important to planning officials may not have the same perspective on the great quantity and quality of public green space, its distribution and as do residents of the same urban area (Matthew McConnachie, 2010)

1.4 Background of the study: There are so many studies that study the urban green parks with various aspects like its mapping, accessibility to urban green parks, and injustice for the uses of urban green parks/spaces by the urban poor. Most scholars have investigated five aspects of parks in geography's: (1) the history and ideology of parks (2) park access and utilization (3) the potential of parks to foster sustainable urban livelihoods (4) the ecosystem services benefits of parks (5) how parks benefit the health and well-being of urban residents (Wolch, 2009)

Geographers have made number of contributions in the study of urban green parks, but here some paper focus on two research ideas around urban park making as a socio-ecological project: (1) the ideology of park development – especially how parks were created as 'culture-natures' and used as technologies of social control and; (2) how multiple axes of difference (eg, race, class, gender) have historically configured park spaces (Wolch, 2009) .

1.5 Statement of problem: In the context of urban green space, the study conducted on the two aspects of urban green space. The existing areas location of under urban green parks in major cities of Punjab. And compare with the location of slum population in these cities. And check accessibility to urban green spaces by the urban poor. The study is done for the purpose to check the location of green parks in the major cities of Punjab with respect to location of slums in these cities.

From the literature survey, the study explained the injustice about the uses of urban green parks by the lower class/urban poor of particular area. The studies like 'Urban Green Space Accessibility and Environmental Justice: A GIS-Based Analysis in the City of Phoenix, Arizona and 'when green is White' explained the uses about urban green parks/spaces into the concept of justice. The study will be conducted for the

purpose to check the serving area of parks in selected study area. In this context, the study will be conducted 'Buffer Analysis' in these cities. The analysis is conducted for calculate the service area of city parks. In this study over served, served and un served area of parks also find out. And also Slums' accessibility to urban green parks according the distance of urban green parks from their residence area.

1.6 Objectives:

1. To explore masterplan for area existing urban green parks of selected cities and relate it with concept of justice.
2. Buffer analysis of urban green parks of selected cities and relate it with distributive justice.
3. To find the served, overserved and unserved area of parks in selected cities.

Chapter 2. Literature Review

2.1 Study of urban green space with respect to Environmental Justice: Byrne, 2011raises the question about the effects of parks use according to design of park, character and socio-spatial characteristics of surrounding areas the socio-spatial characteristics of surrounding areas. The paper explained the reason why people do not use the parks e.g. lack of money, insufficient time, long travel distance, and inadequate park space. It also explained the result of previous research of this field that how the characteristics of park spaces e.g. park aesthetics, presence of security, lighting, signage, landscaping, park facilities or crowding, might limit or prevent park use. The paper also describe about variables such as age, sex, race, ethnicity and income can influence research results. For the collection of data for the research researcher used Interviews and questionnaire as his methodology and also reminder phone calls. The result shows that Latinos may encounter racial and nativist barriers in wildland parks, including a lack of Spanish-language information about those parks. It also informed that most of the participants has a strong desire to access urban nature spaces, limit of their ability to visit by racial reforms and unequal supply of parks in Los Angeles, California.

Susan, 2010 in their paper explains about the barriers to use and access to urban green parks according to their race and ethnicity. Analysis of this uses based on a cross-sectional national sample of adults (N = 5,157) participating in the 2006 Health Styles mail survey. These parks were defined as outdoor public areas within 10 miles or a 20-minute drive from a person lives that include their surrounding natural places. They conducted multivariate logistic regression analyses to examine the odds ratios by race/ethnicity (adjusted for sex, age, and household income) of reporting each environmental barrier, any park use, and any active park use (including additional adjustment for frequency of park use).The results of the study shows that Race/ethnicity was not associated with park access; however, Hispanics and non-Hispanic blacks were more likely than non-Hispanic whites to report barriers.

Christopher G. Boone, 2008, in his paper, discussed on the issue of environmental justice. According to this article parks are the amenities that provided the social, economic and environment benefits. People who live near parks benefit from access

to public space and opportunities are greater in their neighborhoods with public parks. The findings of this article shows that many racial or ethnic group have less access to parks than a significantly higher proportion of blacks, 38 percent, in metro Baltimore. Analysis of household income data also shows that lower income areas have better access to parks. Median household income of block groups with access to parks is lower than that for block groups beyond the quarter mile. These results are in part a function of higher residential and park densities in Baltimore, where blacks are the majority, than in surrounding counties. It explains about the distribution of parks in cities.

(Viniece Jennings, 2012), in his article reviews literature on the connection between environmental justice issues and urban green space access. This paper defines that unequal access to green spaces in urban area is generally not considered in traditional or pervious environmental justice research. This article discussed about such access is important because open spaces are related with economic, cultural benefits and psychological. The paper defines that fair access to natural resources and balanced land use practices are examples of ecological issues embedded in environmental justice. Social privilege has enabled many middle-class communities to enjoy a greater distribution of environmental amenities such as public parks. It also describe about some research that explained about access to green space reduces pollution revelation and promote health wellbeing. It defines that the availability of natural resources helps low-income women to better resist with stress and other mental illness. It also describes that not only the 'just' distribution of parks, but related to allocating acres by factors such as persons per unit of space, recreation funds per capita, neighborhood, or socioeconomic status that does not accounts with needs within the population

Jennifer R. Wolcha, 2014, in this Paper, compares efforts to green US and Chinese cities. The paper explained that, green space like parks is not always equitably distributed within cities. It also defines that access is often highly based on income of people, ethno-racial characteristics, age, sex, (dis)ability, and other axes of difference. It explains also the causes about green space is unequally distributed within the urban areas are varied, including the philosophy of park design, history of land development, evolving ideas about leisure and recreation, and histories of class and ethno-racial

inequality and state oppression. The paper also site examples like access to green space is also an environmental justice issue in China, due to historical patterns of urban development, high residential densities, and explosive rates of urbanization. The Western ideal of the park is relatively new to China. The paper also review that most studies have used Geographic Information Systems (GIS) to measure accessibility. Park access and especially recreational program access were significantly related to the development of obesity

Dennis R.Howard, 1984, in his paper, explained a about the issue about who uses the urban green parks and who are not? For this study, the consumer data was calculated by telephone interview in Dade County, Florida and Springfield and the by personal household survey interviews in in Austin and Texas. For consumer survey the random digit dialogue method was used to selects respondents. The study find the difference in uses according to income base, age base and also on racial base. The result of the research demand the more urban parks in cities for all according to their services.

Balrama S., 2005, In his paper describe about the people's attitude towards urban green spaces. He explained that people's behavior and attitude influence the use of urban green spaces. The study conducted in West Island, Montreal, Canada to know this attitude behavior of peoples towards use of urban green spaces. The study used two method for this that are collaborative GIS techniques and questionnaire survey to understand this behavior. The researcher explained that instrument design of urban green parks influences the use of these places. The result shows that people has two factor attitude towards urban green spaces: behavior and usefulness. It also conclude that attitude has multidimensional construct towards urban green spaces.

2.2. Methodology background: Unal, 2016, in his paper, aimed to investigate to adequacy of neighborhood green park facility in Cukurova district in terms of distribution of parks, neighborhood park areas, accessibility to park and the size of neighborhood park. The study concerns two main ideas of parks. One is the determining the standards relates to neighborhood park size, service area and population density. The second one is that serving are of parks was mapped using GIS based Network analysis. In this study, serving rea of parks measures as 500 meter area around its neighborhood. The concluded that with the help of GIS assumed service area, it finds that Cukurova district

had uneven distribution of parks and suggestion to enhance the service areas of neighborhood parks were made according to its findings.

Nicholls, 2001, in his paper informed that most of the application of GIS is used to measurements accessibly and distributional equity offered by public parks. The study informed that GIS techniques id used to information of poorly served areas of parks and also give the suggestion where new facilities of green parks might be best sighted so as to maximize the equity. The paper also explained that the methods to GIS environment to assess the levels of accessibility and equity of urban leisure facilities. There are two method used to complete this study. That are Radius method and one is Network Analysis to access to urban green parks in Bryan, Texas. The study concluded that GIS has useful tools to measures to accessibility to urban green spaces. So, 2016, in his paper introduced that urban green spaces promote physical activity, improve the general public health of urban residents, and enhance psychological well-being. The objective for this research is to assess a key aspect of environmental justice in the city of Phoenix, AZ: access to public green space. The purpose of this study is to answer the following research questions like how accessible are public parks or green spaces for White, Black, Asian, Hispanic, and American Indian populations within a walking distance of 0.5 miles? And which communities need increased access to public green spaces? The paper also explains that low-income and ethnic minorities often suffer from severe environmental pollution and degradation and also tell about minorities might face different types of environmental justice issues around their neighborhoods. The researcher used two common methodologies to study green space access using GIS: buffering and network analysis. Buffering defines park accessibility according to a specific distance and is represented by a buffer zone. Network analysis, calculates the access based on the road network and the types of road (i.e., Local Street and freeway). The result of this research shows that the White population exerts the highest level of park pressure among the racial groups while the Black population exerts the lowest level of park pressure.

Dai, 2011, in his paper ‘Racial/ethnic and socioeconomic disparities in urban green space accessibility: Where to intervene ’A variety of methods and techniques are available to approximation of green space accessibility. One common approach is the

calculating the rate of the supplies of urban green areas vs. the demands of people within a predefined region. For instance, accessibility could be calculated as the amount of green spaces within a neighborhood that defined by a buffer zone around the neighborhood park. This measure is often used in previous. Another approach is to calculating these measure are the nearest neighbor—the distance to the closest green space. It is used the simple Euclidean distance or distance along a road network in Geographical information system. These two techniques are encounter two issues. On the one hand, it is explained that people may have less the closest green space because of various reasons, such as its size, fearing of dogs and racial attacks by groups. On the other hand, the population pressure from different neighborhoods areas on the same green space is not measured. The third approach is the gravity model. For each neighborhood, it explained that all green spaces within the study area and uses the distance between each green space to this neighborhood as a travel friction like network analysis. This method explained that the first issue above discussed but the second is remains unanswered. Discussing these two issues requires the consideration of two relations—people from the same neighborhood has visit multiple green areas and a green space may have visitors from different neighborhoods. This challenge calls on advanced accessibility measures.

Chapter 3. Data Sources, Methodology and Area of Study

3.1 Secondary Sources:

Data Sources

- Open series topo sheet (Chandigarh- H43K9, H43K10, H43K13, H43K14, and Amritsar- H43C14) on the scale of 1:50,000: These topo sheets are used to digitizing the boundary of Amritsar and Chandigarh City.
- Bhuvan ISRO's Geoportal: It is used to digitize the boundary of Bathinda city and Ludhiana city. And also used for mark the location of green parks in selected cities.
- Google Earth: It is also used to mark the location of parks and slums in selected cities.
- Literature Survey: The relative literatures are used to understand the concept of this study.
- PUDA (Punjab Urban Planning & Development Authority) : The master plans of these cities are taken from PUDA website which are used to take land use data
- Land use planning reports of Cities: These are also used to take land use data information.
- BDA (Bathinda Develop Authority): This is also used the general information about city.
- City development Plan: These all are used for the information of land use and slums information of selected cities.

3.2 Methodology:

1) For the first objective, the study will be conducted as a selection of the master plans or land use plans of the major cities of Punjab and analyze the plans for green parks in these cities. The study uses the randomly selection the master plans or land use plans of six cities of Punjab. In this, it can check location of the green Parks in these cities. With the help of Google Earth, It check the distribution of green spaces/parks of these six cities. Then it check the distance of major green parks from low class houses/slums. From this it can check the location of green parks in the city,

because study conducted to relate the location of these parks with the location of lower income house like slum areas. Then it measured the location of these two areas in these selected cities.

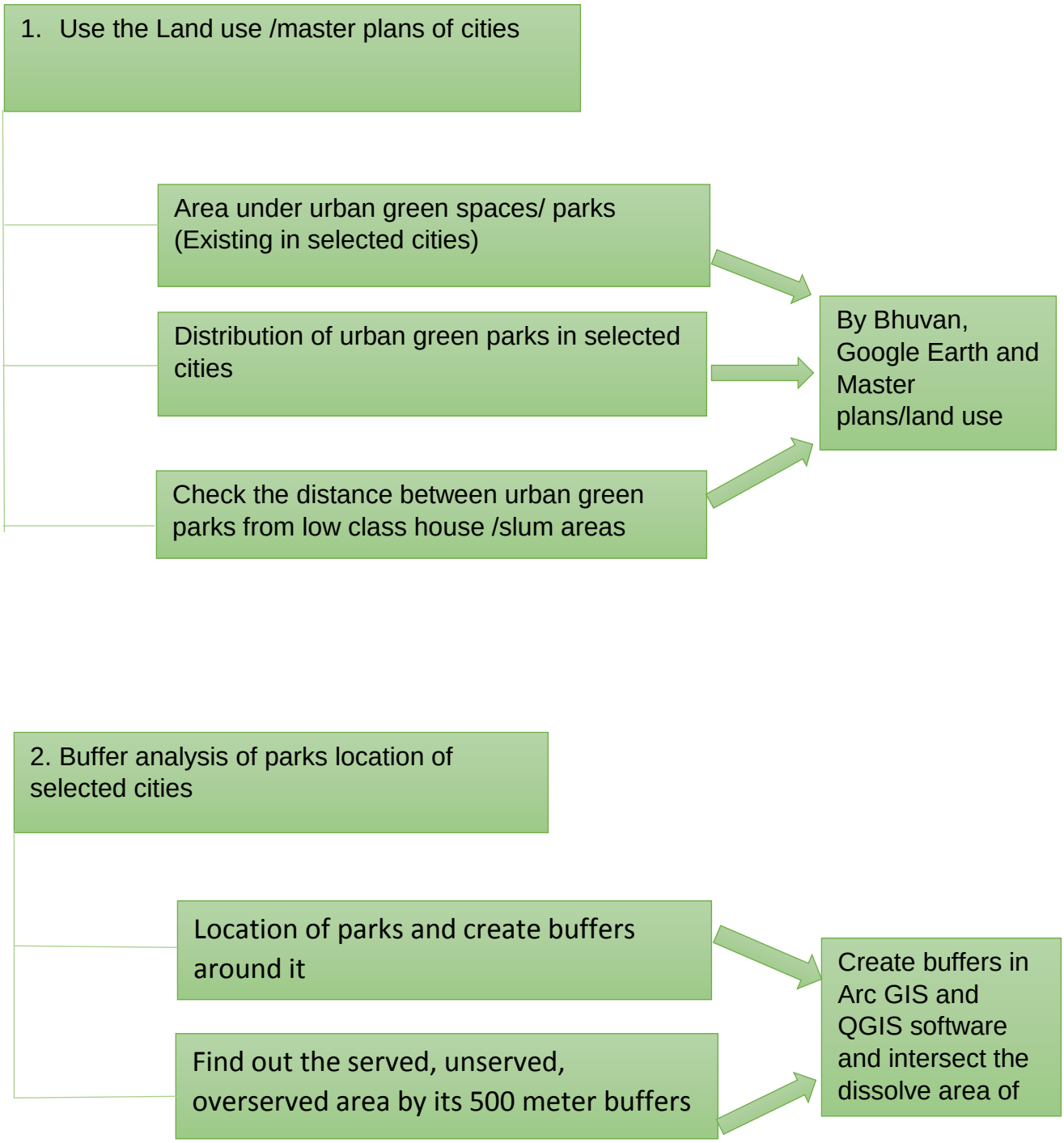
- Use of master/land use plans of selected cities: - The data of location of urban green parks in selected cities, for this, the study done by the help of downloaded the master plans or land use plans from website of PUDA, MCB, BDA. In this land use or master plans, it check the data of existing and purposed area under green space/parks. And from these plans it also check the distribution of urban green space/parks in these selected cities.

- Use of Google Earth:- With the help of Google Earth, the study will be done for to check the distribution of urban green spaces/parks and compare with the data provided by master/ land use plans of these selected cities. For the accessibility to urban green spaces/parks, it check the distance between locations of urban green parks from low class houses/slum areas in selected cities.

2) For the second objective, Buffer analysis method is conducted for urban green parks of selected cities and relate it with distributive justice with the help of GIS. The buffers of 500 meter, are created around the parks location. This shows the serving area of parks in the selected cities. This method shows the serving area into three categories overserved, served and unserved. By the location of parks, these buffers are created.

- Buffer analysis: Buffer Analysis is a general technique in GIS spatial operation. It mechanically creates zones with a definite width around one or more objects like point, line, or any geometric objects according to a given buffer distance. For buffer analysis, user can use the "Buffer" button or the "Multi-buffer" button in the application program in GIS software to create buffer(s) with a given buffer distance for one or more geometric objects. Buffer Analysis can be applied to datasets of point, line, region to build buffers for all objects or selected objects in the dataset (Supermap, 2018)

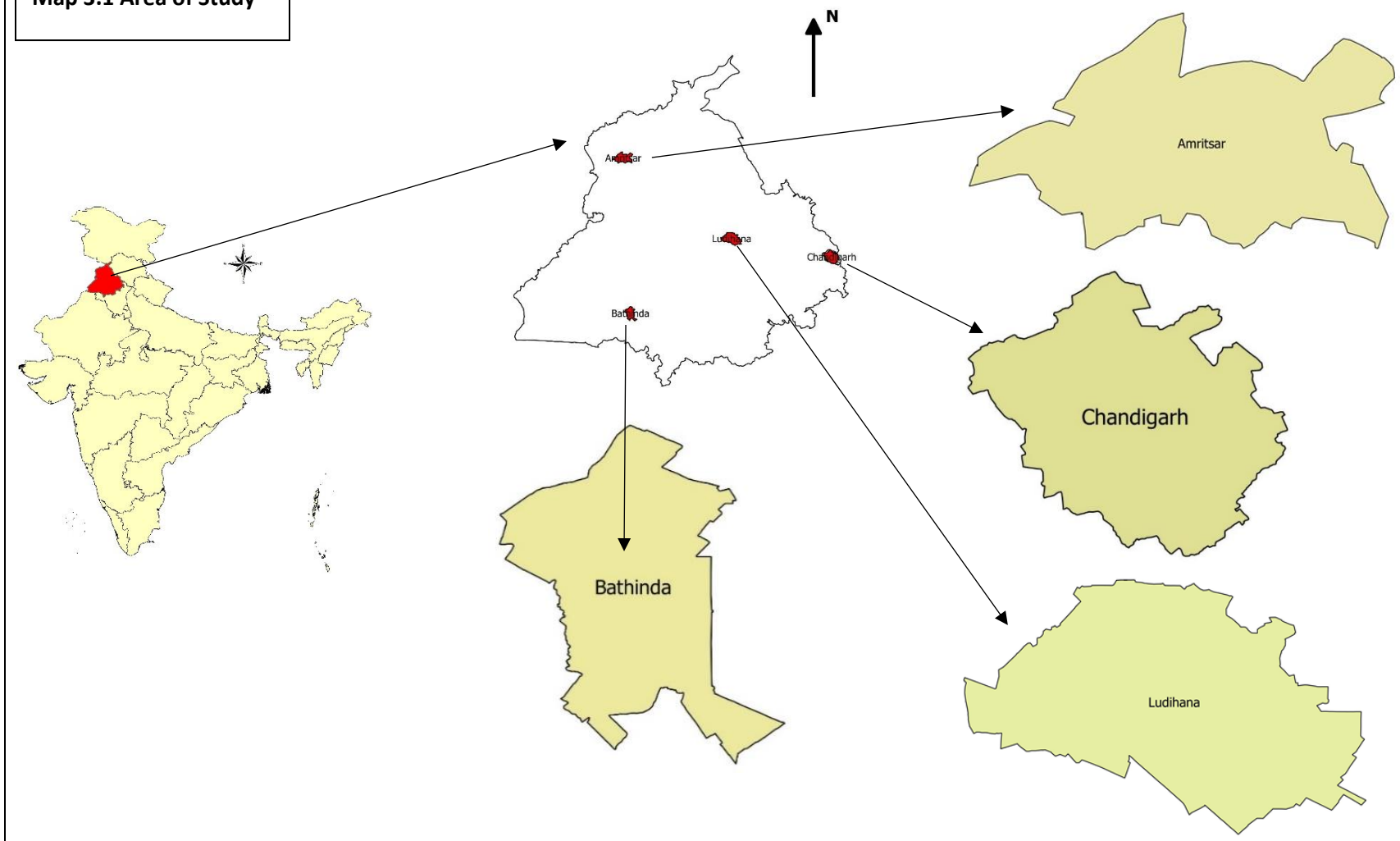
Figure 1: Flow Chart of Methodology



3.3 Area of Study: For this study, four cities of Punjab are selected. Punjab state located in the northwestern part of the subcontinent. It is bounded by states of Jammu and Kashmir by north, Haryana in the south and southeast, Himachal Pradesh to the northeast and Rajasthan in the southwest. Punjab in its present form came into existence on November 1, 1966. The joint capital of Punjab and Haryana is the city of Chandigarh. The four cities are Ludhiana, Bathinda, Amritsar and Chandigarh city are selected for Study.

A. **Ludhiana:** Ludhiana is knows as first metropolitan center of Punjab state. It comes under the Malwa region of Punjab State. Geographically the Ludhiana city positioned at 30 56' N and 75 52' E. The city located in center of state of Punjab. It is located near National Highway Chandigarh, the capital of Punjab and Haryana, 310 Kms. from New Delhi and 150 km from Amritsar. It is known as the most vibrant business center of Punjab. Ludhiana has of south with the Satluj, one of the five major rivers of pre-independent Punjab (PUDA, 2011).
B. **Bathinda:** Bathinda is the fifth largest city of Punjab state with its population of 2.17 lakhs. Bathinda city is also located in Malwa Region of Punjab in south. It located from 30˚-4'-30" N to 30˚-21'-20" N Latitude and 74˚-47'-50" E to 75˚-10'-00" E longitude. The city has its hinterland with fertile and rich in agriculture. The city has good railway connectivity as six railway lines link it to major towns in Punjab and its surrounding states. The city has highway network too provides good road linkages to important cities in all directions (PUDA, 2011).
C. **Amritsar:** It is located in the northwest in Punjab state. The city has 32 miles east of Lahore, Pakistan. Amritsar is located 31.63 degree N 74.87 degree E, at an average elevation of 219 meters above the mean sea level .Amritsar is also knows as the administrative headquarter of the Amritsar District. It is also known as religious city (PUDA, 2011).

Map 3.1 Area of Study



Source: Map created using QGIS

D. Chandigarh: The Chandigarh city is located and south west near Punjab and in north of India. The Chandigarh city has arounds three states Punjab, Haryana, and Himachal Pradesh. The Chandigarh city is situated under the foot of Shivalik Hills at altitude of 365 meters above the sea level. By physically, its boundaries are defined by two seasonal rivers the Patiali ki Rao and the Sukhna choe. Chandigarh has area of approximately 114 km². The city shares its boundary with the states of Punjab in the north Haryana in the south. It city has an average elevation of 321 meters. The surrounding districts are of Mohali, Patiala and Ropar in Punjab and Panchkula and Ambala in Haryana.

Chapter 4. Results and Discussions

The study concerns the urban green parks of selected four cities of Punjab. The results shows that there are highly variation in the distribution of urban green parks in these city. The study also find out the served, unserved and overserved area by green parks.

4.1. Ludhiana City: There are a few area under urban green spaces in this city. The following table shed light on the land use of Bathinda City.

Table 4.1. Local Planning Area Ludhiana-2007

Sr. No.	Existing land use	Area (in hectares)	% age of total area
1.	Residential	12273	9.65
2.	Commercial	851	0.67
3.	Mixed land use	1277	1.01
4.	Industrial	3251	2.56
5.	Recreational	300	0.23
6.	Traffic & Transportation	4275	3.36
7.	Utilities	150	0.12
8.	Government	502	0.40
9.	Public & Semi-public	1952	1.53
10.	Agriculture and Water Bodies.	102291	80.47
	Total	127122	100.00

Source: PUDA, 2011d

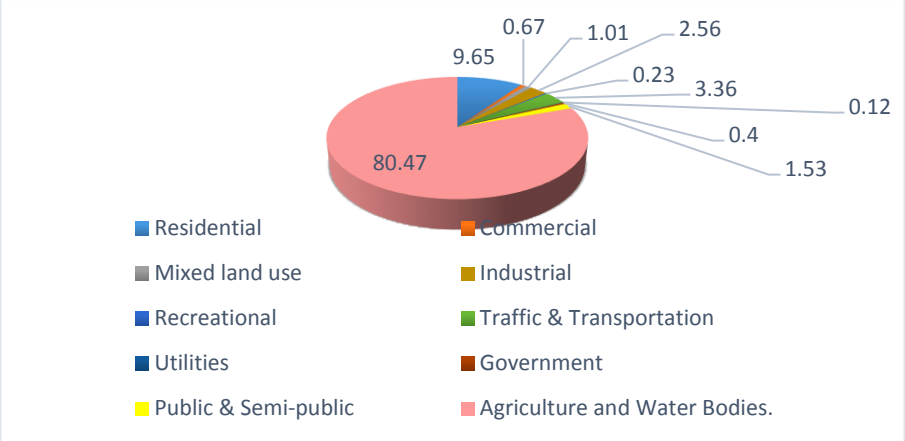


Figure 4.1. Land use of Ludhiana (2007)

Source: PUDA, 2011d

The figure 4.1 shows the land use of Ludhiana city in 2007 as pia chart. Ten land use types are shown in this figure. It shows that about 80 percent of LPA of Ludhiana city is covers by Agriculture and water bodies. It represents that only 0.23 percent of this LPA is covers under recreational area. This shows that there are a few area comes under the green areas. This differences raise the question of injustice.

Parks & open spaces: Ludhiana being the only Metropolitan city of the State has only one “Sports Stadium located in this part of the city and there is no Mela Ground etc. in this part of the city. There is acute shortage of organized open spaces/parks in area along Malerkotla road. Children are forced to play in streets which not only cause traffic problems but also cause accidents sometimes (PUDA, 2011).

Recreational Facilities: Ludhiana city has number of facilities as enumerated in the table 1.1 which cater to the recreational needs of the people of the city. There are recreational facilities in to the form of parks in the city. There are in all 263 parks which include both small and large sized open spaces. Most of these parks are planned in colonies which have been developed by the authorities like Punjab Urban Planning and Development Authority, Municipal Corporation, Improvement Trust, Department of Housing and Urban Development, Housefed etc. These parks are concentrated largely in the Bhai Randhir Singh Nagar, Surabha Nagar, Urban estates of Dugri, Dhandari Kalan, Samrala road, Gurdev Nagar, Model Town etc. These areas are covered few

parts of the city and was planned by parastatal agencies. These areas are covered few parts of the city and was planned by parastatal agencies. Colonizers developed the parks in private colonies with the government approval, which are comparatively lower in size, number and areas. Major part of the Ludhiana city was developed by without any planning so many parts of the city has no any parks and open spaces facilities. Most of residents are living in walled city area so they have the lack of accessibility to these areas. There are only 2 open spaces within the center of the city. Parastatal agencies make efforts in this direction to plan maximum number of open spaces and green parks like the Famous Rose Garden in the city. Punjab Agriculture University also offers large open spaces which are used by the city people. There are 209 slums in the city and has no any accessibility to these recreational areas. Due to lack of open and green spaces children are forced to play on the public spaces like roads/streets. Even the existing level of parks are insufficient and do not any conformation to the planning that specified for parks and open spaces. There is urgent need to plan these recreational facilities in those area that are unserved so the poorer people have also the facility of these areas (PUDA, 2011).

Table 4.2. Recreational Facilities in Ludhiana City

Sr. No.	Name of the Facility	Existing in Numbers
1	Parks	263
2	Cinemas	18
3	Multiplex	2
4	Stadium	3
5	Museum	2
6	Swimming Pool	4
7	Clubs	6
8	Library	2
9	Amusement Park	2

Source: PUDA, 2011d

Table 4.2 presents the recreational facilities of Ludhiana city. It shows that there are number of parks that facilitate the city. It also shows the number of other activities like stadium, clubs, amusement park etc.

Proposed Land use: Presently, Ludhiana Municipal Corporation is spread over an area of 159.37 sq. kms. (39364 acres). Keeping in view the projected population of the city up to 2021, its planning requirements and the planning standards, it is assumed that the city will grow to an extended limit of 75826 acres.

Table 4.3. Area under the proposed urbanizable limit for the proposed year 2003-21

Land use	Area in Hectares	%age
Residential	37970	50.08
Commercial	2393	3.16
Industrial	23027	30.36
Recreational	202	0.26
Traftic & transportation excluding roads	3770	7.60
Utilities	362	0.48
Government	2829	3.78
Public and semi public	2373	3.13
Resewed area for permanently prohibited for building operation.	900	1.18
Total urbanizable area	75826 (62.37%)	100
Area under agricultural and water bodies	45754 (37.63%)	
Grand total area of planning area	121580 (I 00.00%)	

Source: PUDA, 2011d

Slums: It is found that there are 209 slums existing in the city. Although there are major concentration on the north-east side of the Jalandhar-Ambala Rail-Road link. Budha Nallah has been found to be the most favorable location for the slums. There are spread over the entire city with and accordingly a large number of slums is located on the water body. A favorite place for development of slums is Ludhiana –Ambala Railway line. Most of the slum are also been found between the Budha Nalla and Tajpur Road. Similar concentration has been observed in the area between GT Road and the Sidhwan canal. There are lower proportion of slum had been development and observed in the area zoned by the road leading to Sidhwan Bet and Malerkotla Road. There are so many development schemas are implement, so these area has lower proportion of slum population (PUDA, 2011).

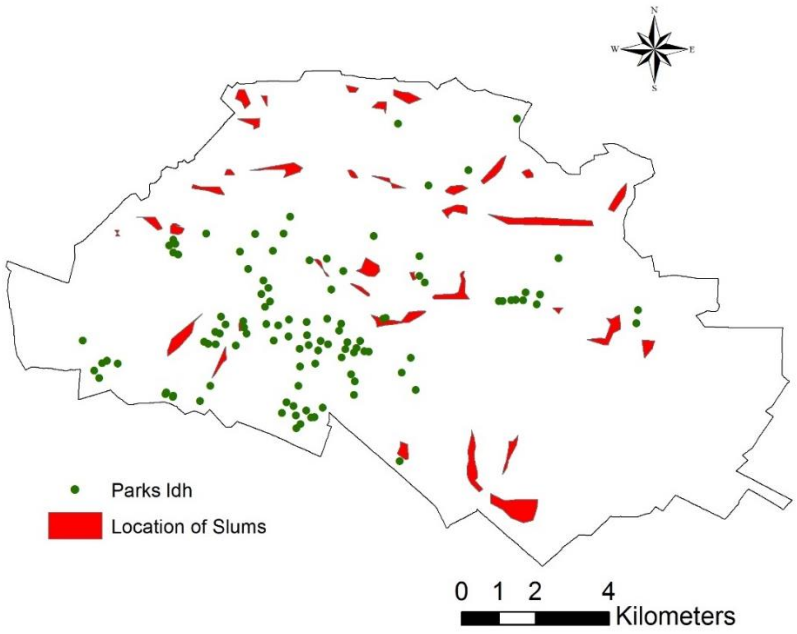


Figure 4.2. Location of parks and slums in Ludhiana city

The figure 4.2 shows the loaction of parks and slums in Ludhiana city. The map represents the distribution of parks with the respect to location of slums in Ludhiana city. There are many number of parks in Ludhiana city. Most of parks of the city are mainly concentrated in southern-west part of the city. In Ludhiana, most city parks are far from its slums areas. Major area with lot of parks are Saraba Nagar, Jwaddi Taksal, harnam Nagar, Model Grem, Aman Nagar, Basant vihar, Moti Nagar, Sector 33, Sunder

Nagar. Guru Anagad Dev Nagar etc. Major parks of these area are Leisure velly, Shri Satpal Mittal Memorial Park, Tanki Park, Analtas garden, Prem vihar Park, Angad Dev Park, Ishmeet Park, Local Park, Nikka Rose garden. These parks are mainly exixt in specific areas and has far from slums population. Major slums areas of the city are Bhattian, Budhanala, Heranagar, Jamalpur Colony, Pavitar Nagar, Shimlapuri, near Raikot Road and in some parts in city center. The slums areas of Bathinda city are suffers from lack Park facility. People of these areas are far from Parks services. This distribution raise the question of distributive justice with respect to parks.

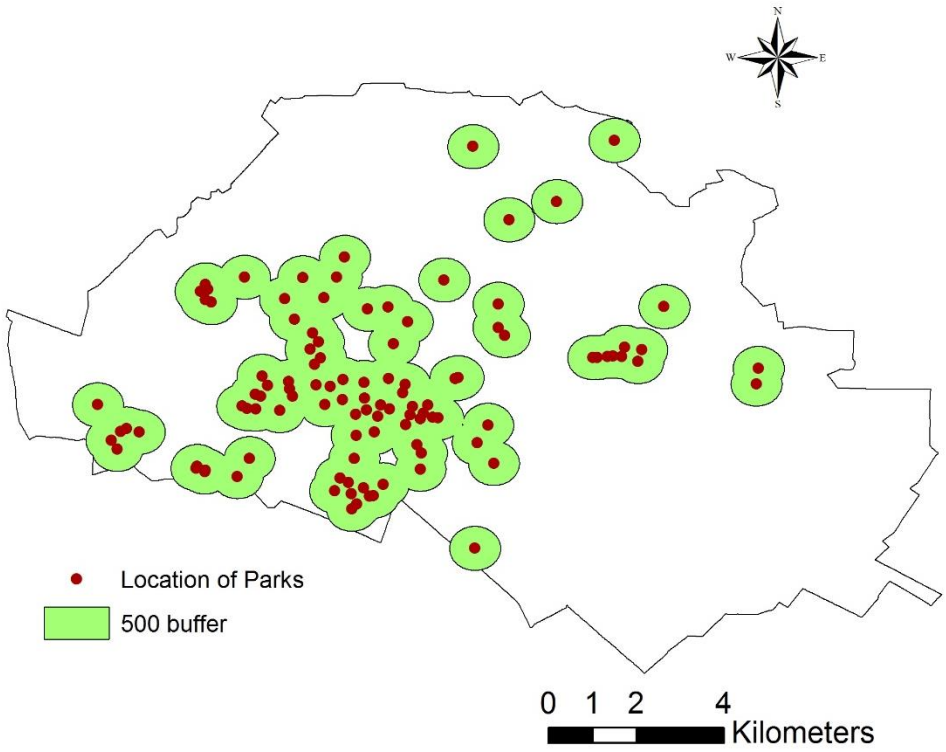


Figure 4.3. 500 meter buffer around parks in Ludhiana city

The figure 4.3. shows the buffer area around parks in Ludhiana city. This map shows the service area of parks by 500 meter buffers around it. This buffer analysis shows that one park of the city serve people comes under its 500 meter area arounds it. In Ludhiana city, there are so many parks in its southern-west. The map represents that parks of the city serve only its southern-west part. Most of areas that comes under the buffer service area of city parks are Saraba Nagar, Jwaddi Taksal, harnam Nagar, Model Grem, Aman Nagar, Basant vihar, Moti Nagar, Sector 33, Sunder Nagar. Guru

Anagad Dev Nagar etc. Major parks of these area are Leisure velly, Shri Satpal Mittal Memorial Park, Tanki Park, Analtas garden, Prem vihar Park, Angad Dev Park, Ishmeet Park, Local Park, Nikka Rose garden. These area are serve few part of the city. In Ludhiana city, eastern part has lack of facility of parks. These areas are Shimlapuri, Focal point, Industrial area, Jagjit Nagar, New Sunder Nagar, Chand colny, Chandsar Nagar, Swatander Nagar, Sherpur etc. People of this area has lack of park facility. And no have easy access to park area due to larger distance.

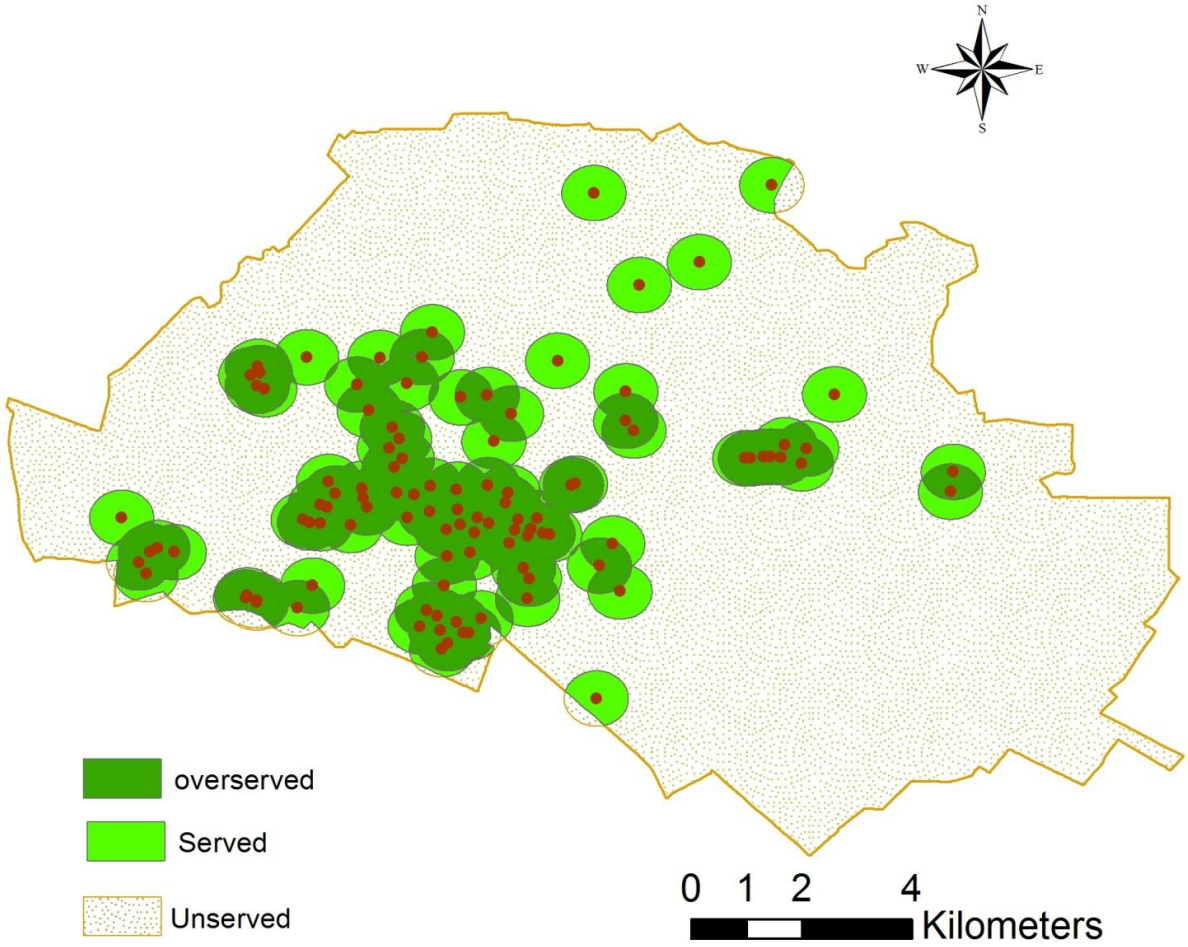


Figure 4.4. Park serving of Ludhiana city

Figure 4.4. shows the park serving area of Ludihana city. In Ludihana city, there are no many number of parks. The serving area shows by the 500 meter area covrage around

the park. In this map buffing analysis represent the service area of parks into three catagories: overserved served and unserved.

Overserved areas shows that area has high number of parks more then other areas of the city. Most of parks of the city are mainly concentrated in southern-west part of the city. In Ludhiana, most city parks are far from its slums areas. Major area with lot of parks are Saraba Nagar, Jwaddi Taksal, harnam Nagar, Model Grem, Aman Nagar, Basant vihar, Moti Nagar, Sector 33, Sunder Nagar. Guru Anagad Dev Nagar etc. Major parks of these area are Leisure velly, Shri Satpal Mittal Memorial Park, Tanki Park, Analtas garden, Prem vihar Park, Angad Dev Park, Ishmeet Park, Local Park, Nikka Rose garden. There are high concentration of green parks in these areas.

Served area shows the area that are served by parks but not so many number of parks faclity. So people of this area has no any choices to use another park because there are less number of parks than overserved area. In Bathinda city, there are few part of the city is comes under served category of parks.. These areas areas are Master colony, Guru Teg Bahadar Colony, Lajpat Nagar, Isher Nagar, Bajwa Colony. Major parks of thses areas are Gill park, Basant Vihar park, M.C. tubewell park, Government park. These areas comes under service area of parks but has not so many number of parks.

Unserved area of this categories shows that area has no any park facility. People of this area are very far from parks. In Bathinda city, more than half part of city suffers lack of park facility in their area. This difference raises the question of distributive justice. It mean that people of this area are prey of injustice for unequal distribution of parks in their area. Most of the unserved area is comes under the slums population. They has largest distance from green areas. These areas are Shimlapuri, focal point, industrial area, New Sunder Nagar, Jagjit Nagar, Chad colony, Chander Nagar, Swatanter Nagar, Sherpur. People of these areas are not easy access to city parks, they have to cover large distance to use park facility. This unserved area shows the unequal distribution of City Park.

4.2. Bathinda: Bathinda city has a few part of its recreation.

Table 4.4 Existing Land use of Bathinda City 2009

Land Use	Area in hectare	Percentage
Residential	2178.08	32.09
Commercial	205.56	3.03
Industry	974.46	14.36
Utilities	106.66	1.57
Public & Semi-Public	419.53	6.18
Transportation	384.16	5.66
Recreational	149.89	2.21
Agriculture	2363.43	34.81
Special Area	5.92	0.09
Total	6787.68	100.00

Source: PUDA, 2011c

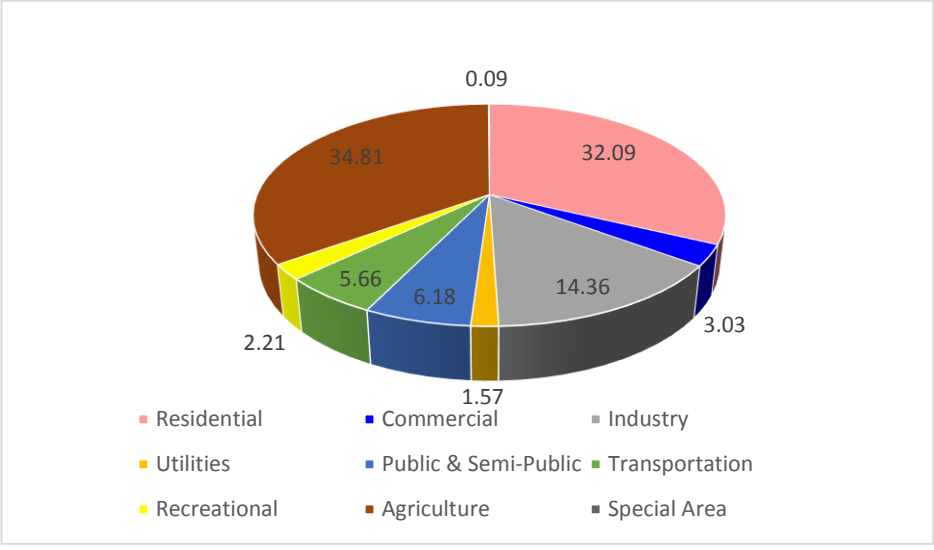


Figure 4.5 Land use of Bathinda City (2009)

Source: PUDA, 2011c

Figure 4.5 shows the land use of Bathinda city during 2009 as pia chart by using master plan data of city. There are nine types of land use shows in the different colors in this diagram. It shows that most of area of city comes under agriculture. It covers almost 34 percent of area and resident area cover 32 percent of total area of the city. On the other hand recreational area has only 2 percent. This area stands outs a meagre allocation as urban green guidelines.

Table 4.5 Existing Green Cover in MC Bathinda

Type	Area in Acres	Area in percentage
Parks	129.87	0.75
Plantation	29.93	0.17
Stadium\ playground	68.62	0.40
Open forest	122	0.71
Water Body	139	0.80
Cremation ground	11.84	0.07
Agriculture Land	5620	32.49
TOTAL	6121.30	35.39

Source: PUDA, 2011c

Recreation: The total area of recreational in Bathinda city is 149.89 hectares including lake area and it is 2.21 % part of the MC Bathinda. Under recreational use city has three lakes which cover an area of 63.92 hectares and are located in the northern part of the town near the Thermal Plant, Bathinda. These lakes give a enjoyable view and gives the relief to the city people. Although the lakes are the part of Thermal Plant but it plays the major role in the beauty of city. Without this, there is one city level green park known as Rose Garden located on Bathinda-Kotkapura road near Thermal Colony.

Parks and open space: The field studies conducted by the Department of Town & Country Planning, Punjab shows that there is one amusement park large size park in Bathinda Cantonment that is located at Bahia road and has Paid entry, known as

Chetak Park. Without this, there is one mini Zoo known as Chatt Bir within the boundaries of LPA, Multania Road, Bathinda. There is one city level park known as Rose Garden in Bathinda city. There are only three neighborhood parks in Bathinda city one is in Railway Colony which is also used for sports activities second in Urban Estate Phase-I and another in Urban Estate Phase-3 part-II. There is no many number of parks in city. However there is about one thousand square meters area under parks that shows in the account of MC Bathinda. All these parks cover 23 Hectares of an area of city. The other green parks of the city has small size and contribute a little bit of open and green spaces of congested city. The smaller sized parks are not evenly distributed in the city. These parks are available in the various residential colonies developed by various agencies like PUDA (BDA), Municipal Corporation Bathinda and Improvement Trust Bathinda within the provision of their respective Acts. Most of these parks it has been found as a physically location that all these are located in the eastern part of the Bathinda city. BDA Bathinda developed most of these parks (25) that are falling in Urban Estates. Without this Municipal Corporation by Town Planning Schemes developed 20 parks and Improvement Trust, Bathinda developed only two parks. The inner parts of the city specifically Central Business District, Mohalla Jhutti Patti, Mehna Mohalla, Seedian wala Mohalla, Harizan Basti, Birla Mill colony, Nai Basti, Guru Nanak pura Mohalla, Pujan wala Mohalla, Tellian wala Mohalla etc. are not having any green park or open space. Similarly Guru Ki Nagri, Harbans Nagar, Matti Das Nagar, Balraj Nagar, Hajura Kapura Nagar, Balla Ram Nagar, National colony, Farid Nagar, Deep Singh Nagar, Sanjay Nagar, Jiwi Nagar, Jujhar Nagar on eastern side of Railway lines and entire Nagars and Mohallas on western side of railway lines do not have any park (PUDA, 2011).

Table 4.6 represents Analysis of Land use plan 2009 and proposed plan Bathinda during 1996-2016.

Table 4.6 Analysis of Land use plan 2009 and proposed plan Bathinda (1996-2016)

Land use	Total area in hectare (1996-2016)	Total area in hectare (2009)	Difference in area
Recreation	343	149.89	193.11
Playground, stadium, sports complex	58.00	38.58	
City parks	278.00	47.39	
Historical building	7.00		

Source: PUDA, 2011c

Table 4.7 Recreation land use (1985-2016)

Sr. No.	Masterplan	Total Recreational Area in Hectare
1.	Proposed (1985)	1016.16
2.	Existing (1985)	13.00
3.	Proposed (1985-2001)	385.00
4.	Existing (1998)	45.00
5.	Proposed (1996-2016)	343.00
6.	Existing (2009)	149.00

Source : Land Use plan, BDA

The table 4.7 presents the land use of Bathinda during 1985 to 2016. It shows that there are highly difference in proposed plan for land use and existing land use.

Slums in Bathinda as per Census – 2011: The city has 17 slums out of which 8 are notified and 9 are Non-Notified. There are approximation that 11088 households living in these slums with the population of 45441. As per census 2011 record, there are total 50 wards in Bathinda Municipal Area. Without this, the master plan explains that 56 slums are distributed all over the city in different wards. The number out of total slums, 43 slums are notified and 13 slums are non-notified on the basis of census 2011 record. On the basis of 2011 census there are 8054 households residing in these slums with the population of 40905 persons. Most of the slums are existing in the western and southern part of the city. These slums areas are Janta Nagar, Arjun Nagar, Nai Basti, Amarpura Basti, Paras Ram Nagar, Partap Nagr, Hardev Nagar, Kheta singh basti, Harbans Nagar (PMIDC, 2016).

The figure 4.6 shows the loaction of parks and slums in Bathinda city. The map represents the distribution of parks with the respect to location of slums in Bathinda city. There are so many number of parks in Middle East part of the city. In Bathinda city, there are lack of park facility in western side of the city and south of city also suffers from the same problem. Major areas that has high facility of parks are Model Town, Guru Teg Bahader Nagar, Agarwal colony, Beant Nagar, Kamala Nehru colony, Patel Nagar, Harpal Nagar colony, Ganesa Basti, Shant Nagr. Major parks of these areas are Bathinda Park, Guru Nanak Park, Rose Garden, Capital Park, Chetak Park, Fountain Park, Patel Nagar Park. Ekta Park, Beant Nagar Park, Dhillon colony Park, Childern Park, Model town phase Parks, Bsant Vihar Park.

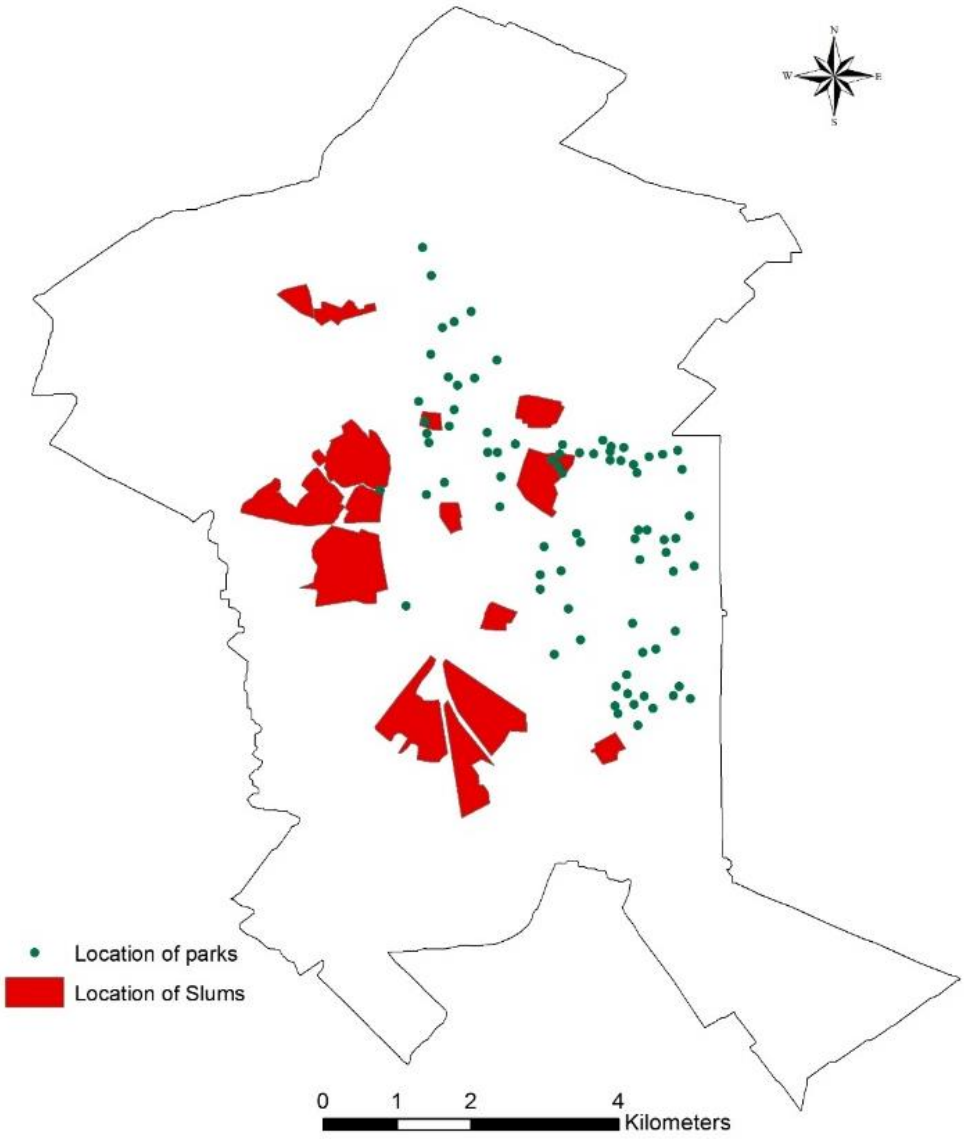


Figure 4.6 Location of parks and slums in Bathinda city

The slums areas of Bathinda city are suffers from lack Park facility. People of these areas are far from Parks services. These slums areas are Janta Nagar, Arjun Nagar, Nai Basti, Amarpura Basti, Paras Ram Nagar, Partap Nagr, Hardev Nagar, Kheta singh basti, Harbans Nagar. The map represents the distribution of parks in the city that are far from slums areas in Bathinda city.

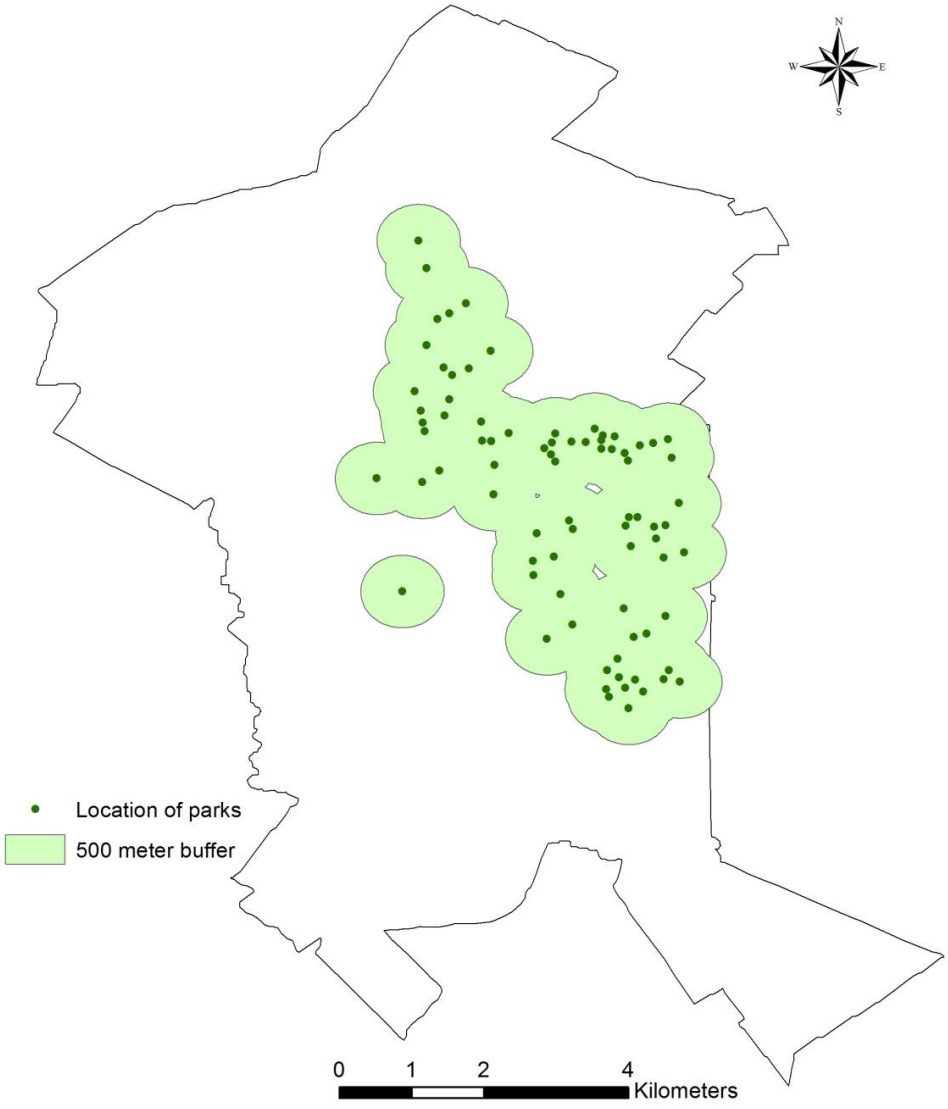


Figure 4.7. 500 meter buffer around parks in Bathinda city

Figure 4.7 shows the buffer area around parks in Bathinda city. This map shows the service area of parks by 500 meter buffers around it. This buffer analysis shows that one park of the city serve people comes under its 500 meter area arounds it. In Bathinda city, there are so many parks in its middle-east. The map represents that parks of the city serve only its middle-east part. The service area of parks in Bathinda city are Model Town, Guru Teg Bahader Nagar, Agarwal colony, Beant Nagar, Kamala Nehru colony, Patel Nagar, Harpal Nagar colony, Ganesa Basti, Shant Nagr. Major parks of these areas are Bathinda Park, Guru Nanak Park, Rose Garden, Capital Park,

Chetak Park, Fountain Park, and Patel Nagar Park. Ekta Park, Beant Nagar Park, Dhillon colony Park, Childern Park, Model town phase Parks, Bsant Vihar Park. The western and southern part of the city are not comes under this buffer areas. These area are Janta Nagar, Arjun Nagar, Nai Basti, Amarpura Basti, Paras Ram Nagar, Partap Nagr, Hardev Nagar, Kheta singh basti, Harbans Nagar. This distribution of parks raise the question of distributive justice. Because this distribution is unequal for many areas.

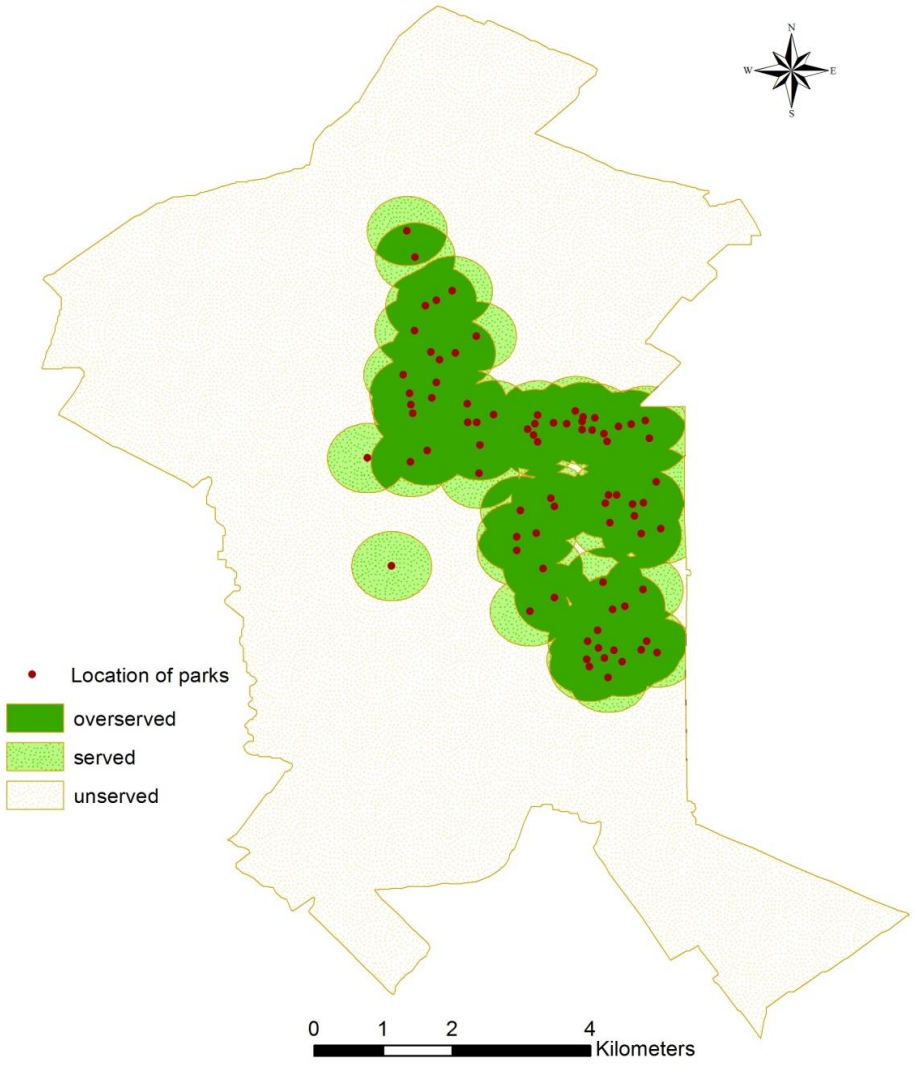


Figure 4.8 Park serving areas of Bathinda city

Figure 4.8 shows the park serving area of Bathinda city. In Bathinda city, there are no many number of parks. The serving area shows by the 500 meter area covrage around

the park. In this map buffing analysis represent the service area of parks into three catagories: overserved served and unserved.

Overserved areas shows that area has high number of parks more then other areas of the city. In Bathinda city, due to lack of many parks, there some parts of the city is overserved by the park faclitiy. There is middle-east part of the city has over congested by parks. The overserved area of parks in Bathinda city are Model Town, Guru Teg Bahader Nagar, Agarwal colony, Beant Nagar, Kamala Nehru colony, Patel Nagar, Harpal Nagar colony, Ganesa Basti, Shant Nagr. Major parks of these areas are Bathinda Park, GuruNanak Park, Rose Garden, Capital Park, Chetak Park, Fountain Park, Patel Nagar Park, Ekta Park, Beant Nagar Park, Dhillon colony Park, Childern Park, Model town phase Parks, Bsant Vihar Park. People of this area has many choices to use any park.

Served area shows the area that are served by parks but not so many number of parks faclity. So people of this area has no any choices to use another park because there are less number of parks than overserved area. In Bathinda city, there are few part of the city is comes under served category of parks. These areas are Raliway colony, Matidas Nagar, Civil lines Area. Major park of these area are Railway colony park, ITI Park, Civil lines Park. People of this area are served by park facility but they have not any choice to use another park.

Unserved area of this categories shows that area has no any park facility. People of this area are very far from parks. In Bathinda city, more than half part of city suffers lack of park facility in their area. This difference raises the question of distributive justice. It mean that people of this area are prey of injustice for unequal distribution of parks in their area. Most of the unserved area is comes under the slums population. They has largest distance from green areas. These slums areas are Janta Nagar, Arjun Nagar, Nai Basti, Amarpura Basti, Paras Ram Nagar, Partap Nagr, Hardev Nagar, Kheta singh basti, Harbans Nagar. People of these areas are not easy access to city parks, they have to cover large distance to use park facility. This unserved area shows the unequal distribution of City Park.

4.3 Amritsar: In Amritsar city, a few area covers under the recreational area.

Recreation: In order to meet the deficiency of such activities, a recreational area have been proposed along U.B.D.C. that is passing through north east of the Amritsar LPA and enters Tarn Taran district in the south of LPA. The proposed recreational area is located on the down-stream of U.B.D.C, i.e at the intersection of U.B.D.C and Tarn Taran Railway Line in the southwestern side where already a large area under orchards is present. In addition, a 45 meters wide green belt is also proposed along one side of the U.B.D.C up to the proposed outer ring road in both north and south directions is proposed to be developed as green belt/recreational area. While the 45 meters area on the both sides of the U.B.D.C, outside the proposed outer ring road and upto the L.P.A boundary in the north of L.P.A is proposed to be developed as green belt. Further, for meeting the regional level requirements of recreation, a Zoological Park is also proposed at Rakh Bhusian near Sarai Amanat Khan, which will help in preserving precious but dwindling categories of birds and plants/trees. The total area proposed under recreational use is 2,489.1 hectares, which works out to be 15% of the total urbanisable area of the city. In addition, area adjoining the walled city, which houses Roadways bus depot, Lakkar Mandi, Dussehra Ground etc. is also proposed to be developed as major recreational zone. Improvement Trust, Amritsar has also contributed in the development of number of parks/open spaces as integral part of residential projects undertaken by it. A 30 acre park by the name ‘Amrit Anand’ is being developed in the Ranjit Avenue, Block E on the Fatehgarh Churian Road, which will act as Mela Ground, Family Picnics, Heritage Court and Children Play Area. All existing parks/ open spaces available within/ outside the Walled City including Ram Bagh, Gol Bagh, Sakatri Bagh along Circular Road outside Walled City, etc. shall be planned as landscape projects for development of green spaces. The old glory of the Ram Bagh shall be restored by shifting all clubs operating within the Ram Bagh. In addition, all the open spaces which are under encroachment shall also be identified, vacated and developed (PUDA, 2011).

Forest Area: As the Amritsar LPA lacks in the provision of open and green spaces, therefore a zoological park has been proposed at Rakh Bhusian near Sarai Amanat Khan, which has already been declared as a protected forest (PUDA, 2011).

Slums: It is estimate that Amritsar under the Punjab Slum Areas (Improvement and Clearance) Act, 1961 covering a total area of 5.8 sq. kms constituting 4.26% of the area of the city. The city 64 slums that has been notified exist in the city by the Municipal Corporation. There are largest number of slums that was notified in 1986/87 are 32 (24 to 54) localities were declared as slums population. It is noted that majority of slums are located close vicinity in southern part of city of walled city, Amritsar. It shows that concentration of slums in the southern part was exercise as haphazard and unplanned development in the area it is due to absence of any major development scheme organized by the Improvement Trust or Municipal Corporation. On the other hand there is lesser number of slums Northern side of city is better placed. In this areas, majority of development schemes and better quality of development has taken place. (PUDA, 2011).

Table 4.8. Land use Break up of Amritsar LPA, 2010

Land use	**Area (Ha)**	**% of Developed Area**	**% of M.C. Area**
Recreation	124.89	1.50	0.88
Parks/Public open spaces	114.71	1.38	0.81
Playground, Stadium	10.18	0.12	0.07
Total M.C.	14237.22		100.00

Source: PUDA, 2011b

Table 4.9 Existing Land use Plan for Amritsar City, 2010

Land use	Area (Ha)	% of Developed Area	% of M.C. Area
Residential	4245.08	50.94	29.82
Mixed Land Use	66.48	0.80	0.47
Commercial	393.22	4.72	2.76
Retail and wholesale Shopping	261.79	3.14	1.84
Godowns, Warehouses, Regulated Markets	98.73	1.18	0.69
Hotel and Marriage Palaces	32.7	0.39	0.23
Industrial	445.73	5.35	3.13
Public\Semi Public	738.22	8.86	5.19
Govt. Land	882.14	10.58	6.20
Govt. Land (Use un-determined)	882.14	10.58	6.20
Utilities & Services	27.2	0.33	0.19
Traffic and Transportation	1388.67	16.66	9.75
Recreational	124.89	1.50	0.88
Parks/Public Open Spaces	114.71	1.38	0.81
Play Grounds, Stadium	10.18	0.12	0.07
Special Areas	22.42	0.27	0.16
Heritage & Conservation Areas	22.42	0.27	0.16

Total Developed Area	8334.05	100.00	58.54
Water Bodies	153.71	-	1.08
Agriculture	4996.93	-	35.10
Plantation & Orchards	277.4	-	1.95
Vacant Land	474.17	-	3.33
Dairy and Poultry Farms	0.96	-	0.01
Total M.C	14237.22	-	100.00

Source: City Hriday Plan, 2016

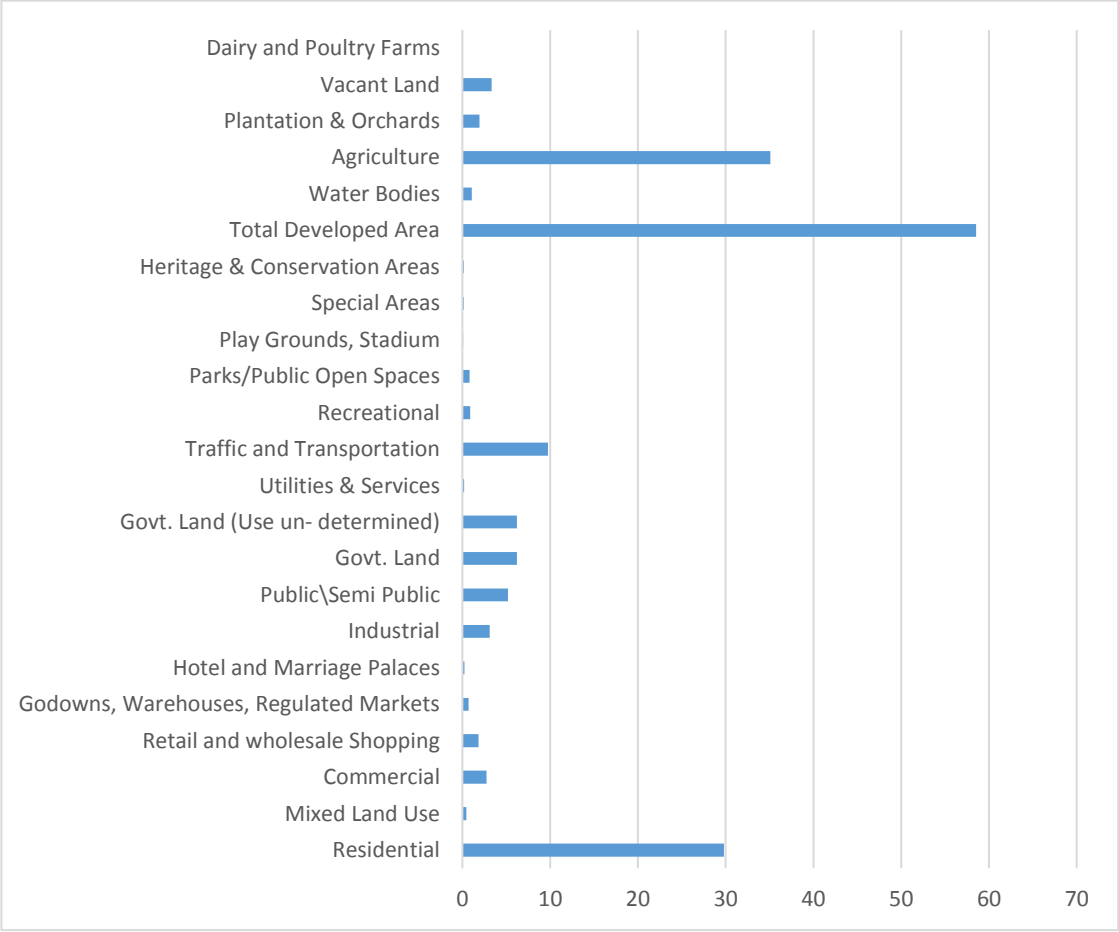


Figure 4.9 Land use of Amritsar (2010)

Figure 4.9 shows the land use of Amritsar city in 2010. The figure represents the land use categories in bar graph because of too many categories are defines in master plan

of city. It represents that agriculture area has higher proportion followed by residential area. It is near about 35 and 30 percent respectively. The area for recreational activities stands out 0.88 percent. This area stands outs a meagre allocation as compares to other three cities and according to urban green guidelines.

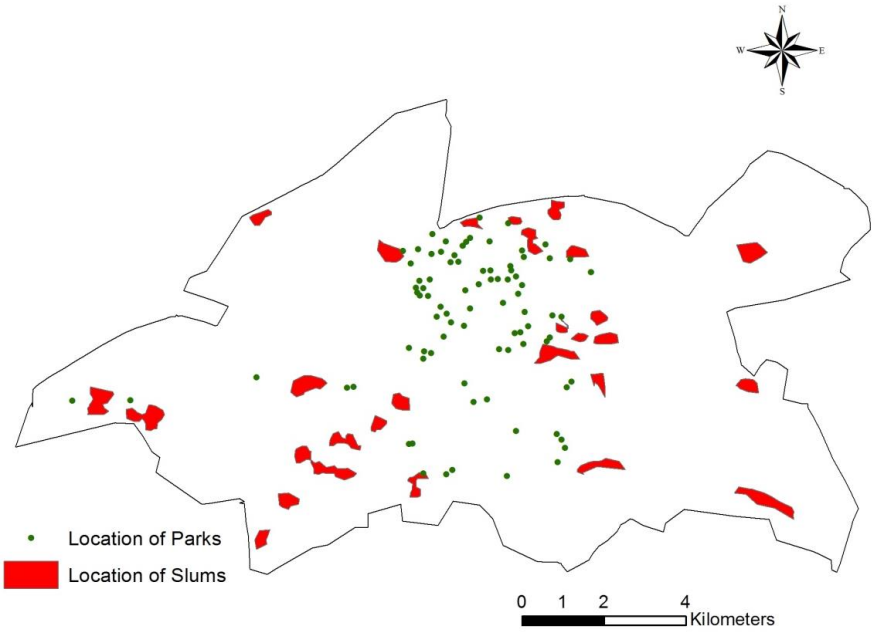


Figure 4.10 Location of parks and slums in Amritsar city

The figure 4.10 shows the location of slums and green parks in Amritsar city. The map represents the distribution of parks with the respect to location of slums in Amritsar. There is many number of parks in Amritsar city that are concentrated in central-north part of the city. Due to old city, there are many areas has on any park. And people has no any facility of parks. The map also shows the distance between slums area and existing parks in the city. It represents that most of the slums areas of the city, are far from the parks. This map shows the distributive justice of parks with respect to access to these areas by slums. The major park of this city are Rose Garden, Sardar Beant Singh park, Rose Avenue Park, Jalian wala Bagh, Childern Park, Gurunank park, Botanical Garden, Ekta park, Mehak Park, garden colony, Kot Karnail singh Park, Satkari bagh. In Amritsar city, there are 6 major spots of Slums. These are near Amrit nagar, Fathpur, around Khemkarn road, near by NH 54, Tehsilpura area and also arouns the Grand Trunk road in middle-east. Most of these area has no facility of parks.

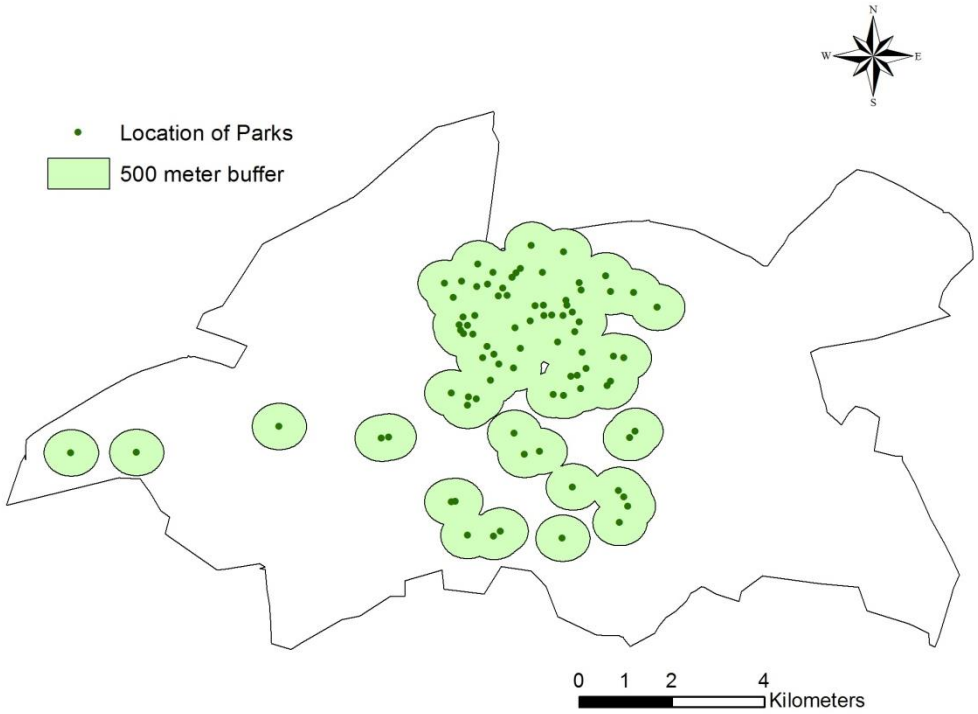


Figure 4.11. 500 meter buffer around parks in Amritsar city

The Figure 4.11 shows the buffer area around parks in Amritsar city. This map shows the service area of parks by 500 meter buffers around it. This buffer analysis shows that one park of the city serve people comes under its 500 meter arounds it. In Amritsar city, there are many parks of the city that serve the half part of the city. The green parks of the city mainly serve core of the city and middle-north part of the city. The area that comes under the buffer area of parks are Jagdambay colony, Jwahar Nagar, Gopal Nagar, Bwani Nagar, Nirkari colony, PUDA colony, Gagan colony, Preet Nagar, Dharmpura, Faquir colony, Dasmesh Nagar. Without this half part of the city hasn't comes under park's buffer area. These areas are Guru Nanak nagar, New Preet Nagar, Ranjit Nagar Colony, Subash Nagar colony, Jandpeer colny, New Kapoor Nagar, Guru Amardas Avenue etc. These areas has lack of park facility. And no have easy access to park area due to larger distance.

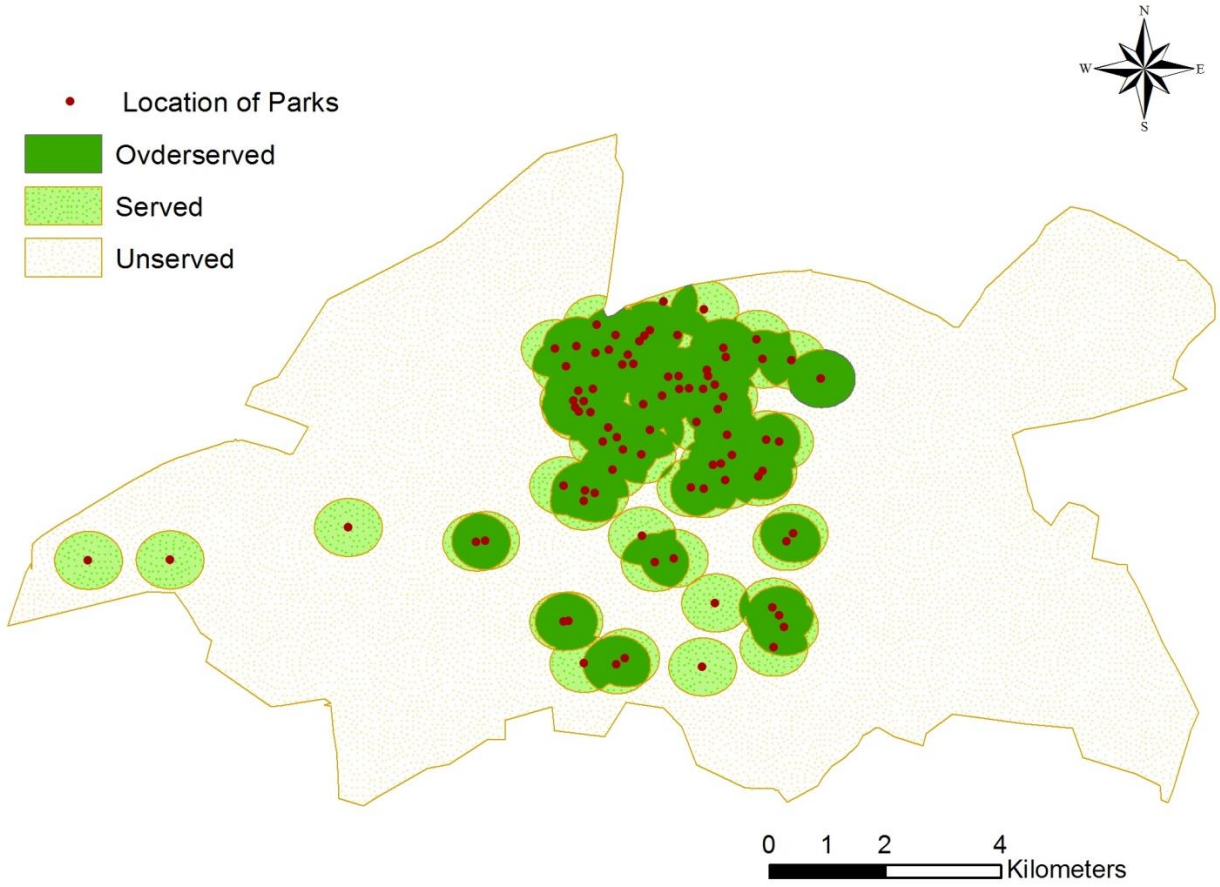


Figure 4.12 Park serving areas of Amritsar city

The Figure 4.12 shows the park serving area of Amritsar city. In amritsar city, there are no many number of parks. The serving area shows by the 500 meter area covrage around the park. In this map buffing analysis represent the service area of parks into three catagories: overserved served and unserved.

Oveserved area shows that area has high number of parks more then other areas of the city. In Amritsar city, due to lack of many parks, there some parts of the city is overserved by the park faclitiy. There is middle-north part of the city has over congested by parks. In this part major parks are Rose avenue park, Incom Tex colony green park, Childern park, Baba Budha ji park, Guru Nanak park, Gren avenue market park, Mehak park, Sardar Beant Singh park, Shri Kalgidhar park, Rose Garden, dasmesh Park, Kenndy avenue park etc. That park are lies in midde –north part of the city. Major areas that comes under that catagories are Jagdambay colony, Jwahar Nagar, Gopal Nagar,

Bwani Nagar, Nirkari colony, PUDA colony etc. People of this area has high facility of parks and easy access to these green areas. People have choices to use any park that comes under their buffer area due to smaller distance.

Served area shows the area that are served by parks but not so many number of parks. So people has no any choices to use another park because there are less number of parks than overserved area. In Amritsar city there are few part of the city is comes under served category of parks. These areas are Gagan colony, Preet Nagar, Dharmpura, Faquir colony, Dasmesh Nagar, New Kabir Park Colony. Major parks of these area are Guru Gobind Nagar park, Satkari Bagh, Aman Avenue park, Botanical Garden, garden Colnoy, Rose garden, Kot karnail singh Park, Jaliah wala Bagh, Kashmir Avenue Small Park. People of this area has access to these parks but not any choice to use another park.

Unserved area of this categories shows that area has no any park facility. People of this area are very far from parks. In Amritsar city, half part of city suffers lack of park facility in their area. Most of the unserved area is comes under the slums population. This difference raises the question of distributive justice. It mean that people of this area are prey of injustice for unequal distribution of parks in their area. They has largest distance from green areas. Major area that comes under the unserved category are Guru Nanak Nagar, Preet Nagar, Ranjit Nagar, Subash Colony, jandpeer Colony, New Kapoor Nagar, Guru Amardas Avenue. These area has lack of greenery and access to parks. Most of this area is the part of new development or periphery area, due to this emerging settlements there are no any park existing.

4.4 Chandigarh: Chandigarh known as green city. The Chandigarh city has most part comes under greenery.

Recreation: Chandigarh is known all over the world as an outstanding example of architecture, planning and landscaping. Chandigarh, is perhaps one of the few cities of the world of the 20th century, whose original layout plan has a meticulously planned, hierarchy of open spaces, landscaped areas, recreational areas and tree-lined roads, avenues and gardens spread all over the city. The Urban Development (UDPFI) norms for open spaces recommend that the overall quantum of town level /city level parks

should range between 10 sq. meter to 12 sq. meter per person, which would include parks, play fields ,specified parks, amusement parks, maidans, multi-purpose open spaces, botanical garden, geological park and traffic park etc. An analysis of such-like open spaces within such the green open spaces available either in the form of private housing, schools, colleges or other institutional large campuses such as Punjab Engineering College, Panjab University; over and above the planned green areas in the city layout, contribute as much as the overall city greenery and open spaces. The city brings out that in the first phase 1850.33 acre (19.69%) was planned as open spaces. The zoning plans of group housing mandates 15% of community open spaces within campuses to maintain closeness with nature and for outdoor activities. Important open and green spaces rose garden, Rajendra Park, near sukhna lake, Memory Park, Butterfly Park, Rock garden (PUDA, 2011).

Table 4.10 Availability of Green/Open

Land Use	**Area (in acers)**
Green area available within the sectoral grid	2342
Green area available in Manimajra	71
Botanical Garden	180
Total planned green area	2593
Required green area	2616.55
Shortfall	23.55
Forest Area in U.T. Chandigarh	8490.54
Total Green Area including Forest	9455
Green/Open Spaces (percentage)	33.5% of the total area

Source: PUDA, 2011a

Slums: Chandigarh is knows as planned city. There are no so many slum population in city. It is relevant to mention that the population living in the slums was approximately 69,000 in the year 2006. However as per the Chandigarh census 2011 the population living in slums is 94,950 persons (PUDA, 2011). Most of these slums area are exist near the boundary of the city. There are some area of slums in city that are Raju colony, Ranjit colony, Madras colony, Nehru colony, around industrial area and near the

boundary of city. These areas has lack of urban facilities than other areas of Chandigarh city. Most of these slum area are far from city parks also.

Table 4.11 Existing Land Use of Chandigarh

Land use	**Area (in acers)**	**%age**
Residential	10672.16	37.88
Commercial	1339.73	4.76
Transport	2046.10	7.26
Indl./IT Park	1326.50	4.71
Pub/Semi Pub	2968.79	10.54
Recreational	2428.47	8.62
Public Utilities	302.33	1.07
Railway land	316.29	1.12
Defence	1573.00	4.52
Forest	2113.97	7.50
Vacant land	3082.67	10.94
Total	28170	100.00

Source: PUDA, 2011a

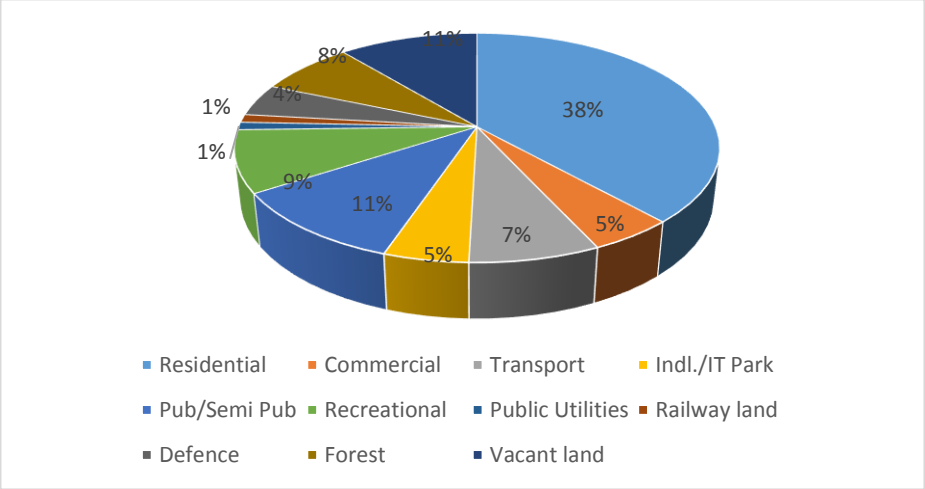


Figure 4.13 Land use of Chandigarh city (2003)

Figure 4.13 shows the land use of Chandigarh city based on master plan data of 2003 of city. It represents that residence area has higher proportion followed by vacant land of total city area. It is near about 38 and 11 percent respectively. The area for recreational activities stands out 9 percent. This area stands outs a much more allocation as compares to other three cities and but still falls shorts according to urban green guidelines.

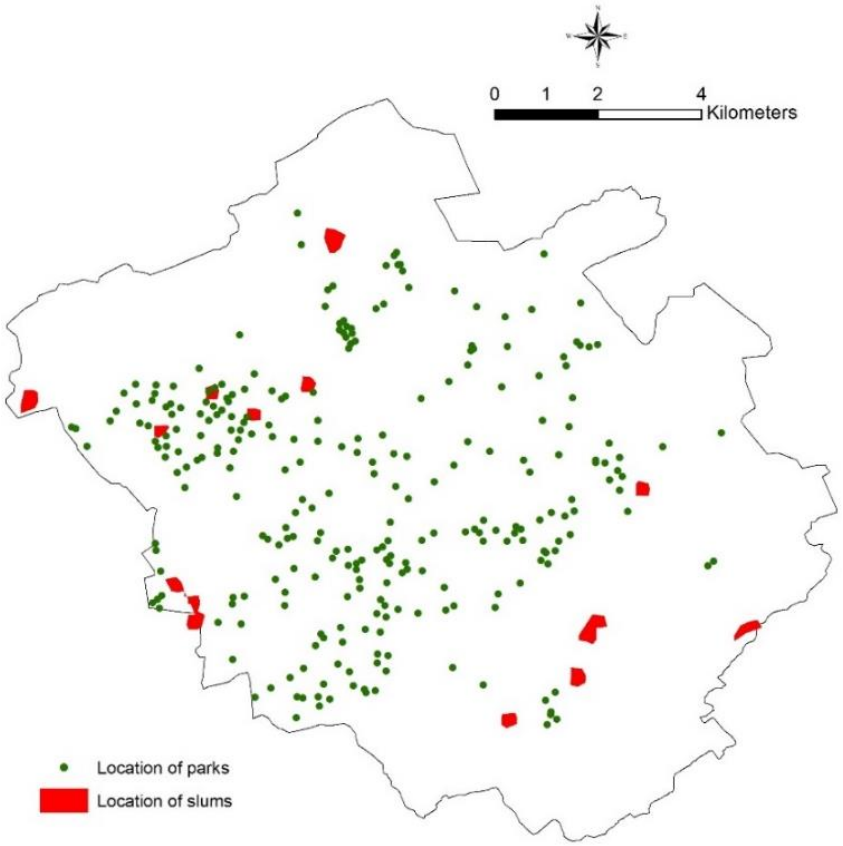


Figure 4.14 Location of parks and slums in Chandigarh city

The figure 4.14 shows the location of parks and slums in Chandigarh city. It represents that there is so many parks in chandigarh city and its consentration in center of city and in sectors. This area have the high concentration of parks. This area of sector 41, sector 40, sector 42, sector 43, Sector 34, sector 33 Sector, 20 sector 27 sector 18, Sector 16 and sector 9 has lots of park to serve their people. Major parks of the city are Munciple park, Jogging park, sector parks, Apparment parks, Community Garden,

Community parks, Dahlia park, Rose garden, rock garden. The map also shows the distance between slums area and existing parks in the city. Most of the slums area is located near the boundery of the city. Slums area of Chandigarh city are near the boundry of the city, Raju colony area, Ranjit colony area, Nehru colony, Madras colony area and some parts near industrial area. It represents that some part of the slums areas of the city, are far from the parks. But in the nothern west part of the city slums located near the parks.

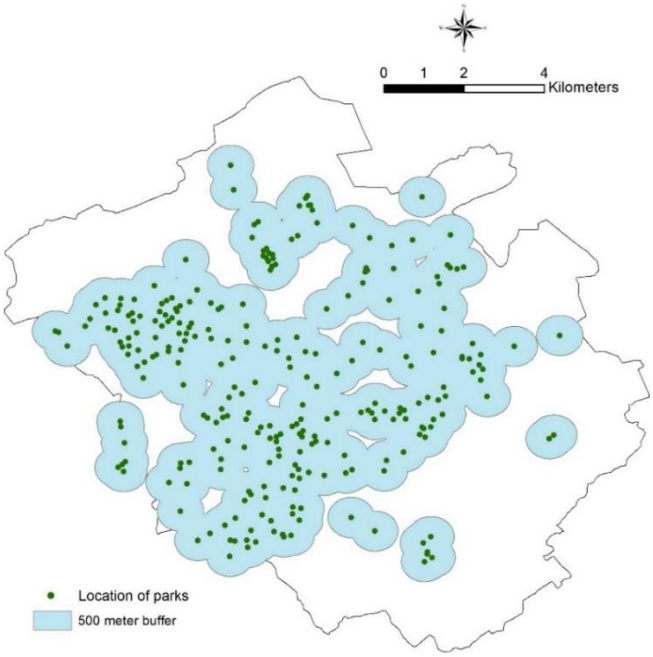


Figure 4.15. 500 meter buffer around parks in Chandigarh city

The figure 4.15. shows serving area of parks with the respect of 500 meter buffer around parks. This buffring area shows the park service in the city around any park. It means that one park serve 500 meter area around it. In Chandigarh city there is lot for parks that serve most area of the city. This area area lies mostly into the center of the city. The area of sector 41, sector 40, sector 42, sector 43, Sector 34, sector 33 Sector, 20 sector 27 sector 18, Sector 16 and sector 9 has lot of parks to serve their peple. Major parks of that serve most cf the Chandigarh city area are Munciple park, Jogging park, sector parks, Apparment parks, Community Garden, Community parks, Dahlia park, Fragrance garden, walking park, Nehru park, Pubic parks, green belts, Rose

garden etc. But some few part of city is not comes under this buffring area that area are Sector 5, some part of sector 23, Sector 25, Sector 48, Shital Nagar Society, Majumdar Block, Bapu Dham Colony, Kishangarh, south of Dadu Majra Colony, Jujhar Nagar, Nayagaon, Kansal etc. These areas are suffers lack of park faclity. It shows the distribution of park in Chandigarh is uneqaual, some parts enjoy more but even some has nothing to use.

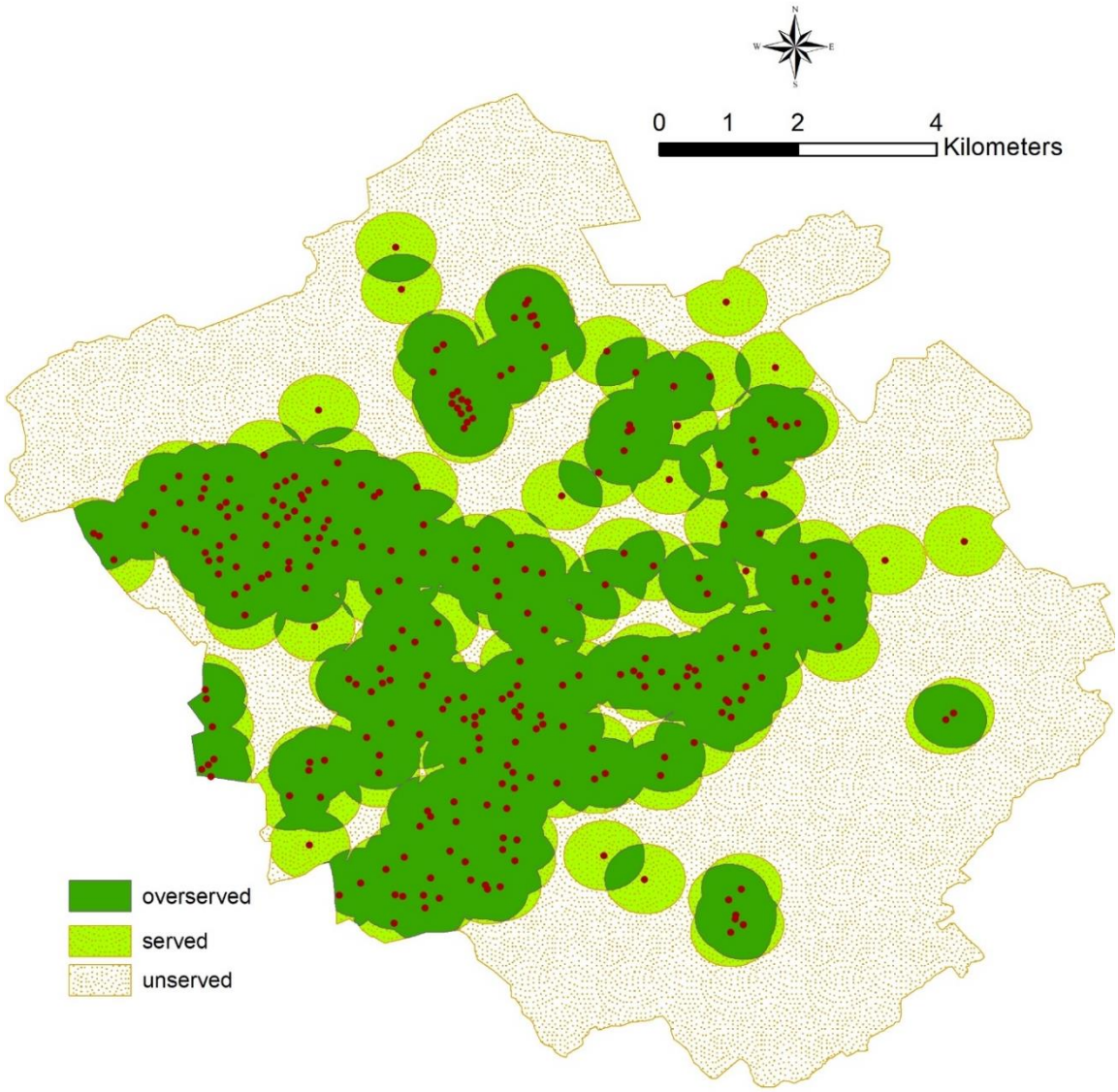


Fig. 4.16. Park serving areas of Chandigarh city

The figure 4.4.4. shows the serving area of parks in Chandigarh City. Chandigarh is planed city. Due to this planing, most part of the city is green more then other cites of Punjab. It knowns as a green city. The serving area shows by the 500 meter area covrage around the park. In this map buffing analysis represent the service area of parks into three catagories: overserved served and unserved.

Oversed area shows that area has more choice to use parks because it has many number of parks. So the people of this area has more choices to acess their parks. In chandigarh city there is half part of the city is overserved by park facility. Overserved area of parks lies in the center of the city. This area have the high concentration of parks. This area of sector 41, sector 40, sector 42, sector 43, Sector 34, sector 33 Sector, 20 sector 27 sector 18, Sector 16 and sector 9 is comes under the overserved area of parks. This area has Munciple park, Jogging park, sector parks, Apparment parks, Community Garden, Community parks, Dahlia park, Fragrance garden, walking park, Nehru park, Pubic parks, green belts, Rose garden etc.

Served area shows the faclitiy of park less then overserved area. Thses area have access to parks but havn't any choices. Thes areas have the many number of parks. The area lies under served of parks in Chandigarh city are Mast Garh, Dhanauran,Sector 2, Sector 7, Sector 17, Sector 24, Sector 26, Sector 32, Sector 46, Sector 63, Daddu Majra Colony, Safeda Colony, Industrial Area Phase II etc.

Unserved area shows that area has no facility of parks. People of this area have not easy access to the parks due to far distances from the parks. In Chandigarh city there are one third of area has comes under the unserving area of parks. These area are mostly near the boundary of the city. These area are Sector 5, some part of sector 23, Sector 25, Sector 48, Shital Nagar Society, Majumdar Block, Bapu Dham Colony, Kishangarh, south of Dadu Majra Colony, Jujhar Nagar, Nayagaon, Kansal etc. These area are has no many number of parks. People of this area has lack of recreational facility.

Chapter 5. Conclusion

Urban green spaces are the important part of urban environment. The study concluded that there are variation in the distribution of urban green parks in urban areas. It explains that most of the parks are concentrated in one particular area in city. The study findout the area existing urban green parks of selected cities. By this information, it is concluded that cities has a few area under its recreation that question the fair distribution of each facility. It find out that well planned urban area has the high quantity of urban green parks then other. For example, Chandigarh city, a planned city, has the high number of parks than other city. Without this idea, study also presents that there are uneven distribution of parks in selected cities. There are so many areas that has no any facility of urban green parks. This uneven distribution question on the distributive justice. The study find out that most of the urban green parks are far from the slum population in the city. It explains that most of the slum population has no any facility of urban green parks. It also concerns the reasons of this inequality. It explains that most of unserved area comes under the slum population and newly developed area. The study finds that people prefers their neighborhood parks than periphery parks. It defines that distance is matter in using the facility of parks. The study also find out the areas of parks services, its unserved area, and overserved area of parks. It conclude that there are some areas in city area overserved by the parks facility than the unserved area which area has no any facility of green parks. Finally, the study raises the question of distributive justice of urban green parks. There are needs of urban green parks in unserved area.

The study gives some suggestion on service of green parks by its findings. It suggests that there are highly need of planning for green parks in unserved area of these cities. It also suggests that planners have to concern about the planning of parks for every area in the city. This suggestion on the basis on distributive justice, which explains that there are need to be fair distribution of green parks for every area. The suggestion also concern the distribution of parks for the slum population in the city.

References

1. Balrama S., S. D. (2005). Attitudes toward urban green spaces: integrating questionnaire survey and collaborative GIS techniques to improve attitude measurements. *ELSEVIER*.

2. Black, C. (2017). *Urban Green Spaces.* Retrieved May 5, 2018, from World Health Organization: http://www.who.int/sustainable-development/cities/health-risks/urban-green-space/en/

3. Byrne, J. A. (2011). When green is White: The cultural politics of race, nature and social exclusion in a Los Angeles urban national park. *ResearchGate*.

4. Cecil C. Konijnendijk, M. A. (2013). *Benefits of Urban Parks: A systematic review.* Ifpra.

5. Christopher G. Boone, ∗. G. (2008). Parks and People: An Environmental Justice Inquiry in Baltimore, Maryland examines the distribution of parks in Baltimore, Maryland. *Taylor & Francis, LLC.*, 767-787.

6. City Hariday Plan. (2006). *City Development Plan.* JNNURM Government of India.

7. Dai, D. (2011). Racial/ethnic and socioeconomic disparities in urban green space accessibility: Where to intervene. *ELSEVIER*, 234-244.

8. Dennis R.Howard, J. C. (1984). Who are the consumers of public park and recreation services? An analysis of the users and non-users of three municipal leisure service organizations.

9. Jennifer R. Wolcha, ∗. J. (2014). Urban green space, public health, and environmental justice: The challenge of making cities ‘just green enough. *ELSEVIER*, 234-244.

10. Matthew McConnachie, C. S. (2010). Public green space inequality in small towns in South Africa. *Habitat International*.

11. Mohammad Mehdi Sadeghian, Z. V. (2013). The Benefits of Urban Parks, a review of urban research. *Journal of Novel Applied Sciences*.

12. Nicholls, S. (2001). Measuring the accessibility and equity of public parks: a case study using GIS. *Routeledge*.

13. PMIDC. (2016). *Detailed Project Report under Pradhan Mantri Awas Yojana – Housing for All – Bathinda (Punjab).* Jaipur: Yashi Consulting Services Pvt. Ltd. .

14. PUDA. (2011a). *Chandigarh Master Plan-2031.* Chandigarh: Government of Punjab.

15. PUDA. (2011b). *Master plan Amritsar.* Amritsar: Government of Punjab.

16. PUDA. (2011c). *Master plan of Bathinda.* Bathinda: Government of Punjab.

17. PUDA. (2011d). *Master plan of Ludihana.* Ludhiana: Government of Punjab.

18. So, S. W. (2016). Urban Green Space Accessibility and Environmental Justice: A GIS-Based Analysis in the City of Phoenix, Arizona.

19. Supermap. (2018). *Introduction to Buffer Analysis.* Retrieved May 15, 2018, from Supermap Website: https://www.supermap.com/EN/online/deskprodotnet/Features/Analyst/Vector/bufferanalyst/HowBufferWork.htm

20. Susan. (2010). Racial/Ethnic Differences in Perceived Access, Environmental Barriers to Use, and Use of Community Parks. *Centers for Disease Control and Prevention*.

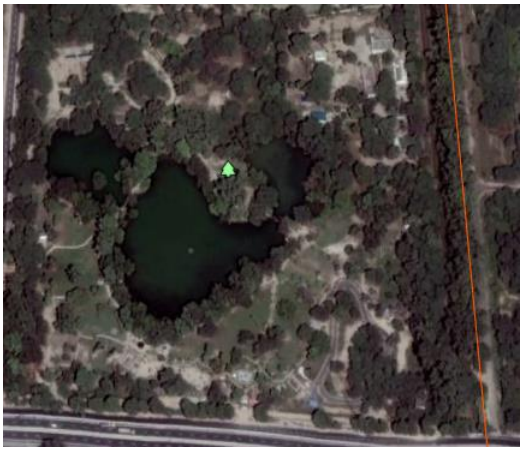
21. Unal, M. (2016). GIS-Based Accessibility Analysis for Neighbourhood Parks: The Case of Cukurova District. *Journal of Digital Landscape Architecture*.

22. Viniece Jennings, C. J. (2012). Promoting Environmental Justice Through Urban Green Space Access: A Synopsis. *ENVIRONMENTAL JUSTICE*.

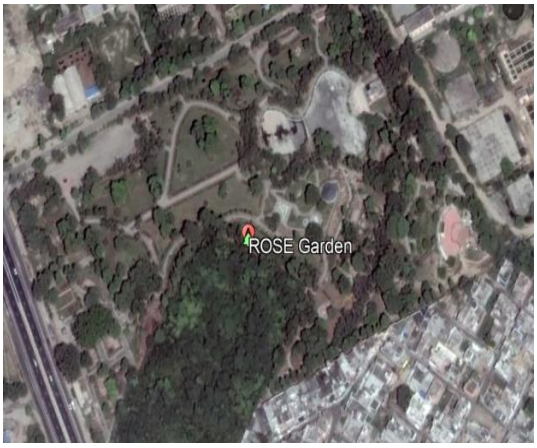
23. Wolch, J. B. (2009). Nature, race, and parks: past research and future directions for geographic research. *Progress in Human Geography 33*, 743–765.

Annexure 1

Aerial view of some green spaces in Bathinda city



Chetak Park, Bathinda



Rose garden, Bathinda

Source: Google earth, 2017

Parks visited in Bathinda city

Gol Chakar Park

Green park of Central University of Punjab

Annexure 2

News regarding green Spaces and parks in Bathinda and Ludhiana Cities

बठिंडा में बदलाव की शुरुआत

❑ महानगर को होगा अभिमान : शहरवासियों मेरी सूरत पर तुम करना गुमान

- शहर को महानगर का रूप देने की कवायद, तेजी से हो रहा है शहर का कायाकल्प
- देश की अग्रणी कंपनियों द्वारा मेट्रो सिटीज का माहौल तैयार किया गया
- मनोरंजन सेक्टर की बड़ी कंपनी बिग सिनेमा के बाद अब एसएल ग्रुप ने शुरू किया फन सिनेमा

रमनजीत सिंह, बठिंडा

'बठिंडा विद अ न्यू लुक'

हर हाल में बदलेगी सूरत : सिंगला

The Indian EXPRESS
Wednesday, May 30, 2018

Garbage dump in Jagraon is now green belt

Foul smell had been emanating from the dump, giving a tough time for the devotees of a nearby temple.

Written by Raakhi Jagga | Ludhiana | Updated: April 3, 2015 12:00:04 am