Maintenance of Neighbourhood Parks.

Perspective from Resident Welfare Association Presidents in East Delhi, India.

Submitted to **Fakultät Architektur**

Technische Universität Dresden

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Born on October 1, 1989, India

This dissertation is submitted for the degree of **Doktor der Ingenieurwissenschaften (Dr. Ing.).**

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Date of Submission: 5th October, 2018

Date of Defense: 13th December, 2018

Declaration of Authorship

I, Shikha Ranjha, hereby assure that the thesis titled 'Maintenance of Neighbourhood Parks. Perspectives from Resident Welfare Association Presidents in East Delhi, India' and the work presented in it are solely my own. I confirm that:

- This work has been produced by me, without any help from third parties or aids other than those mentioned while in candidature for a research degree at Technische Universität Dresden.
- Information and ideas taken directly or indirectly from other sources have been identified and duly acknowledged.
- While collection, evaluation of material, and writing of this manuscript no help was received from any person other than guidance by the thesis supervisor. I have acknowledged all main sources of help.
- No third parties have received monetary benefits from me for work presented in this thesis.
- The work has not been previously presented at Technische Universität Dresden or any other institution in Germany or abroad, nor it has been published anywhere.

Shikha Ranjha

2nd October, 2018

Acknowledgement

Abstract

Urban green spaces such as neighbourhood parks and playgrounds hold significance because they offer services and benefits related to human health and wellbeing. Despite recognition of these services by scientists, conservationists, and policy makers, these spaces in many urban areas face pressure and threat to their presence. Especially in developing countries where urban green spaces are inadequately managed, and often encroached upon, thus resulting in loss of quality. While local authorities have historically been responsible for managing urban green spaces, lately there is an increased involvement of citizens in green space management. It is therefore relevant to study how citizens contribute to managing these spaces and ensure their continuity and quality.

The study here follows the Open Space Strategic Management approach, described as a complex process comprising of three different levels: *strategic*–formulation of policy, objectives, and targets; *tactical*– formulation of time bound plans; and *operational*–actual actions on these plans to maintain and upkeep the space. The conceptual approach has been operationalised to the area of East Delhi, citing Resident Welfare Associations (RWAs) as a working example of the citizen organisation responsible for green space management. The research specifically focuses on the *operational* level and tries to explore their contribution towards the maintenance of these spaces.

For this purpose, interviews were conducted with the presidents of these organizations (N=34), and information was collected about the actions undertaken by RWAs that constitute as green space maintenance, and their subsequent perceived influence on the green space quality. The findings suggest that for East Delhi, action such as arrangement of financial support in taking care of the local space is a major contribution by the RWAs that have higher influence on the perceived quality of space in terms of being visually appealing. Other actions such as providing guidance, raising up park related issues, and manual help have selective effect on the space being perceived as of good quality in terms of aspects such as user safety, cleanliness in the park space, and in creation of recreational opportunity in the green space for all users.

The results from this study will contribute towards the body of literature on role of local citizens and citizen organizations taking part in management of smaller green spaces. The outcomes of this study can be utilized for recommending a comprehensive participatory strategy and design guidelines for green space management in the study area, especially for smaller spaces such as neighborhood parks. This should also contribute towards creation of knowledge to work towards achieving safe,

inclusive, resilient, and sustainable green spaces as mentioned in UN Sustainable Goal 11, and the New Urban Agenda.

Keywords: *urban green space, open space management, East Delhi, Resident Welfare Association, neighborhood parks*

Contents

List of Figures

List of Tables

List of Abbreviations

μg/m^3	Micrograms per cubic metre
CCS	Centre for Civil Society
CPL	Community Participation Law
CPWD	Central Public Works Department
DDA	Delhi Development Authority
DJB	Delhi Jal Board
DLGS	Dresden Leibniz Graduate School
EU	European Union
FAO	Food and Agriculture Organisation
GN	Gandhi Nagar
MA	Millennium ecosystem Assessment
MCD	Municipal Corporation of Delhi
MoUD	Ministry of Urban Development
MPD-2021	Master Plan for Delhi 2021
MV	Mayur Vihar
NCT	National Capital Territory
NDMC	New Delhi Municipal Corporation
NGO	Non Governmental Organisation

NO$_2$	Nitrogen di-oxide
NO$_x$	Nitrogen oxide(s)
PhD	Doctor of Philosophy
PIL	Public Interest Litigation
PV	Preet Vihar
RSPM	Respirable Suspended Particulate Matter
RWA	Resident Welfare Association
SO$_2$	Sulfur di-oxide
SPSS	Statistical Package for the Social Sciences
Sq.m./ sq.mts.	Square metre
Sq.kms	Square Kilometres
UK	United Kingdom
UN	United Nations
UN SDG 11	United Nations Sustainable Development Goal number 11
U.S.A.	United States of America
WHO	World Health Organisation

1. Introduction

1.1. Background

Green spaces are an important part of the urban landscape for their multi-functionality and the plethora of services and benefits that they offer. The most discussed benefit in terms of urban environment are the various ecosystem services they provide, such as cleaning the air, filtering water, cycling nutrients, re-generating soils, regulating climate, and sequestering carbon (Bolund and Hunhammer, 1999; Weber *et al.,* 2006). Other benefits include human wellbeing and mental health, cultural benefits like space for educational and recreational purposes (Kleiber *et al.,* 2002, Nordh *et al.,* 2009). Urban green spaces can be classified into several categories depending on the factor for classification. Most concise list is given by Forest Research (2010) that enlists parks, gardens, allotments, outdoor sports facilities, cemeteries, churchyards and other similar places as urban green spaces. For this particular research, the focus is on small neighbourhood parks, as most often they are not the focus of research in urban studies (Jim, 2013). Here local green spaces such as 'a neighbourhood park', or a 'playground' in an urban setting has been considered as a green space.

The discussion of urban green spaces must be mentioned along with cities, their significance and the challenges they face. On one hand they foster social and economic growth, thereby driving knowledge creation and innovation, but on the other they also grapple with rapid urbanisation, the process that is even more exaggerated in developing nations where it goes uncurbed. As a consequence, cities face environmental problems like biodiversity loss, loss of natural habitat, surface flooding, and deteriorating air quality among others. In dealing with some of these challenges, lies a more critical need to find ways to minimize the associated risks and maximize opportunities for wellbeing of urban dwellers and providing them with a decent quality of life, by managing the nature and form of urban structures, part of which lies in provision of quality green spaces.

According to United Nations (UN, 2014), currently half of world's population lives in cities, and is expected to increase to almost 70% by 2050, which will put immense pressure on the existing urban infrastructure which is already crippling underneath the current environmental, economical, and social stressors. There are several commitments and promises made at the global level for creation of these urban centers as more sustainable and resilient to the forecasted onslaught of population

pressure. One of them is the UN Sustainable Development Goals[1], which are a set of 17 goals with detailed 169 targets to be realized by 2030. These targets cover a broad range of issues related to sustainable development such as world poverty, food and nutrition, health and education, urban development, biodiversity protection, and climate change. Out of the 17 goals, Goal 11 pertains to creation of sustainable cities and communities[2]. Detailed language includes the usage of terms like creation of "inclusive, safe, resilient and sustainable" cities. It aims to create sustainable urban settlements by promoting inclusiveness and capacity for participatory management in planning of urban areas in all countries by 2030. This includes access and availability of quality green and open spaces to urban citizens, especially in case of developing nations, where exists a need for provision of such spaces to enhance quality of life standards in fast growing urban areas. These spaces must be universal and equitable in their distribution and access, regardless of the geographical location.

In the developed world, EU (European Union) has been quite effective in working towards achieving targets set under this goal, especially when it comes to sustainable and inclusive urban settlements. Various EU programmes such as the EU Biodiversity Strategy 2020 and EU Green Infrastructure Strategy have been quite successful in making cities more green, sustainable, and resilient to various risks[3] (European Union, 2014).

Similarly the New Urban Agenda[4] set forth by UN Habitat III, has committed to promote safe, inclusive, green, and quality public spaces, often touted as multifunctional spaces due to the plethora of services and benefits they offer to their users (UN, 2016). In relation to creation of urban green spaces the document calls for creation of well-connected network of open and green public spaces in central and peripheral urban areas as a response to landscape fragmentation issue. The promotion of these spaces is done in terms of the physical and mental health benefits that they will offer and will make the urban areas an attractive and livable places to live in, bringing in various societal benefits. Urban agenda also stresses on the commitment to provide support for encouraging and financially funding any support for participatory and civic engagement strategies to facilitate and enable creation and management of such spaces. This also falls in line with the UN SDG 11, which calls for participatory and integrated planning of urban settlements.

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[1] UN SDGs. Available at: https://sustainabledevelopment.un.org/sdgs. Last accessed: 22nd November, 2016
[2] UN SDG Goal 11, Available at: https://sustainabledevelopment.un.org/sdg11, Last accessed 22nd November 2016
[3] List available at: https://ec.europa.eu/sustainable-development/goal11_en. Last accessed 16th March, 2018
[4] UN HABITAT III, New Urban Agenda. Available at: https://habitat3.org/the-new-urban-agenda/. Last accessed: 22nd November, 2016.

To briefly mention, inclusiveness here aims at removing economic inequalities amongst the city dwellers, provision and access to all basic services and removal of discrimination towards marginalized section of the society (UN Habitat, 2015a). By saying safe cities, it implies prevention of crime in the urban areas and developing cities in a way that it removes segregation (UN Habitat, 2015b). And resilient cities would be more independent and self-reliant in terms that it provides opportunities for development, yet at the same time protects critical ecosystems and natural resources (UN Habitat, 2015c). The interlinkage of urban green spaces with respect to these three terms: inclusive, safe, and resilience, has been further discussed in the next chapter.

All these missions and commitments focus on urban regions due to the projected increase in urban populations and limited capacity of these regions to handle this population rise, especially in developing part of the world. In case of India, United Nations backed report suggests the urban population is expected to reach 600 million inhabitants (or 40% of its total population) by year 2030 (New Climate Economy Report, 2014). In face of this huge demographic change, state has to provide with not just more housing opportunities, but also provision for open spaces to maintain a decent quality of life as promised in the UN sustainable development goals. The detrimental effect due to such large scale of urban expansion reduces India's GDP by 5.7 % annually (approximately $ 80 billion) (New Climate Economy Report, 2014) and still no major steps or initiatives were recorded in this direction until the Smart Cities Mission. The Indian government keeping the expansion of urban infrastructure in mind launched the Smart Cities Mission in 2015 (Ministry of Urban Development, 2015). The underlined message behind this mission is to promote basic urban infrastructure that will give a "decent quality of life" to the citizens. It specifically makes use of the terms "clean and sustainable" environment. Not escaping criticism from urban experts, the mission has been accused of "bypassing political chaos and employing participation shortcuts to produce aggrandizing structures of glass and steel"[5], thereby avoiding the topic of provision for open spaces.

1.2. Problem

The problem being looked at in this study is described in three parts, first looking at what problem exists in the particular study area, second looking at the problem from a perspective of gap in the scientific literature and theory, and third by stating the relevant significance of this study, as to why it is needed now.

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[5] The Hindu, Smart Cities Mission. http://www.thehindu.com/opinion/op-ed/smart-cities-mission-flaws-in-a-flagship-programme/article8784609.ece

Urban green spaces, their availability, distribution, access and quality are often a major concern for all cities. Both quality and quantity of these spaces is negatively affected due to encroachment by residential and other infrastructure projects (McWilliam *et al.,* 2015), and inadequate management of the existing spaces (Burton *et al.,* 2014). The issues related to urban green spaces are even more exacerbated in developing nations, where any available land in urban centers would much rather be used for other purpose (Jim, 2013) than providing quality parks. Due to various reasons, including lack of resources, the agencies responsible for greening the city of Delhi fail to clear administrative hurdles for the process of maintenance of these spaces (Bhalla and Bhattacharya, 2015). The general lack of sympathy is also generated due to differences in opinion amongst the different economic classes of urban population. High income residents who usually reside in (relatively) low density areas place higher value and benefit with open and green spaces, however the requirement or need may not be perceived as severe as in case of low income residents, who reside in high density areas (Gandhi, 2013) . For them the value and benefits associated with built land are placed higher than green spaces, in spite of greater need for common open and green areas. This problem is evident in the area of East Delhi (India), which has been found poor in terms of open space planning and accessibility (Parashar *et al.,* 2013), specifically when it comes to urban green spaces (Gupta *et al.,* 2016). According to Delhi Parks and Gardens Society[6] (2016), a state level agency responsible for monitoring the condition of parks and recreational spaces in Delhi, parks managed by government agencies are often not in good shape, and only a few are very well managed. This was also evident in a survey conducted by the society for the year 2015-2016, that found around 64% of parks in East Delhi to be "Poor" and only 35% as "satisfactory" (Delhi Parks and Garden Society, 2016; also see Section 2.3.1). This shows the responsible local authorities for maintaining green spaces have not been so efficient in their duties (Adak, 2015), due to which citizen groups such as the Resident Welfare Associations (RWA), have overtaken the responsibility for managing parks (Sharma, 2017). This study therefore aims to look at how these Resident Welfare Associations in particular look after the local green spaces, and contribute towards their maintenance and quality in East Delhi. Research answer to this question might contribute to assess the position of RWAs with respect to maintaining urban green spaces in the rest of Delhi, and even beyond in other Indian cities.

Scientific literature shows trends of how often studies related to benefits, governance, and management of urban green spaces take place in the cities of developed countries. These cities are not only the frontrunners for research, but also act as labs for developing and creating innovative

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[6] Delhi parks and Garden Society. Available at:
http://delhi.gov.in/wps/wcm/connect/doit_dpg/DoIT_DPG/Home

approaches with respect to green spaces. Literature review also indicated a major under representation of the situation of green spaces in developing countries. The reasons for such lack of information could be the poverty in large parts of urban population (Kabisch *et al.*, 2015), and also the absence of experience and genuine interest in planning of these spaces (Galluzzi *et al.*, 2010; Balooni *et al.*, 2014). Other reason could be the gap in knowledge due to lack of adequate funding for social science research in developing countries (Mukul, 2011; OECD, 2013). Kabisch *et al.,* (2015) also point out the apathy of upper class, urban policy makers and planners towards the recreational needs of low-income classes. They point this out by citing Konijnendijk *et al.*, (2011), who state that 88.1% of research published in the journal Urban Forestry and Urban Greening are from high-income countries, and only 2.5% of the studies represent low- or low-middle-income countries. Although this bias could exist for several reasons, but the main ones could be a different focus of research in urban environments, for example flooding or air pollution (Jim, 2013); or a limited interest in exploring the benefits of these spaces by the research community (Galluzzi *et al.*, 2010). Also, to make a comprehensive comparison between green spaces in developed and developing nations can be difficult due to cultural and social behaviors and preferences in these countries. Gap also exists in literature when it comes to scientific research specifically related to smaller urban green spaces such as neighborhood parks and playgrounds (James *et al.*, 2009). Due to urban densification trends in cities in developing nations, the green areas are limited resources, and many people live at greater distances from bigger green spaces (as was also observed in the study area). Smaller green spaces in this case can provide a reprieve from this problem and deserve a closer look. This study will also aim to add relevant information to this existing gap in research.

It must also be mentioned that traditionally speaking, urban green spaces fall under the remittance of state authorities (van der Jagt *et al.*, 2016), however lately an increasing trend has been observed, where, more and more citizens (actors outside the state) are voluntarily taking up this responsibility of looking after their local green spaces (Mattijssen *et al.*, 2017). This transfer of responsibility could be in coordination with the local authorities (Mattijssen *et al.*, 2015) or could be just fulfillment of the space leftover due to insufficient interest shown by the state towards the condition of these spaces. This increasing cases of citizens taking up an active role in managing green spaces, need to be explored more and documented, therefore it is relevant to study how citizens can contribute towards keeping these places, and realize a continuity in preservation of quality green spaces. And, additionally, it is of highest relevance to conduct such a study in the context of a developing country.

Therefore this study will contribute towards the significant literature gap that exists when it comes to information from developing countries and also contribute to knowledge regarding involvement of citizen groups in maintaining green spaces.

1.3. Structure of the thesis

This thesis is structured into various chapters that begin with the review of literature, elaborating onto the theoretical framework used for the study, the methods involved, the results obtained using the methods, and finally the discussion and conclusion of the study based on these results. The chapters listed are:

Chapter 1: As has already been read by the reader, it gives a very brief introduction of the study, the background, and the problem statement to what exactly the research is looking at and what gaps it aims to contribute towards.

Chapter 2: It comprises of the literature review, state of the art in the field of green space management that forms the basis for this study. The review also points out certain gap in the literature, and how this study will contribute towards filling it. It also gives a detailed description of the theoretical framework used in the study, and how it is explained with the context of the study area.

Chapter 3: This chapter illustrates the research hypothesis framed for this study, and its subsequent sub hypotheses. It also explains how each hypothesis is operationalized keeping the framework in mind.

Chapter 4: It describes the study area, the reason why it is chosen for this particular research, and the target population within this area. It also describes the reason for selection of the target group.

Chapter 5: This chapter gives a detailed account of the methodological approach used for the research. It begins by describing the sample used for the study, the survey interview methods used for data collection, and finally what methods are used for analysis of this data. It also briefly discusses the validity, objectivity, and reliability of the research and its limitations.

Chapter 6: It shows the results obtained from the data analysis. The chapter is divided into two sections, first part gives more descriptive information, while the second part details about the analytical nature of the results.

Chapter 7: It forms part of the discussion on these results, what they mean, what do they infer for the problem statement. The chapter discusses results from the perspective of what actions have RWAs taken with respect to green space upkeep, and how their action have had an influence on the overall quality of the space. And how, this as a whole has relevance against the backdrop of UN goal of creation of safe, inclusive, resilient and sustainable urban environment.

Chapter 8: The chapter gives a brief conclusion about the whole research; it talks about the theoretical considerations and the study's contribution towards the general theory development. It also reflects briefly on what the future research directions can be. It also suggests certain recommendations for green space development in the area.

1.4. Intended audience

Since this PhD project takes an interdisciplinary approach where concepts from landscape architecture and park management have been borrowed, it can be said that the research and findings from this thesis can be useful for a certain group of people. The results from this thesis can be an inspiration for landscape architects, policy makers, and urban planners for the future planning and design of recreational green spaces in dense urban areas.

1.   Policy makers

Government agencies form a major role in formulation of appropriate and effective policy, and have the most immediate responsibility for creation of an enabling environment for development of urban parks. Thus the findings from this research can help them to understand the opportunities and work towards creating an efficient policy environment for involving citizen groups in park management. Also, the results from this thesis can feed into their own agenda for achieving urban sustainability through development of quality green spaces via public participation.

2.   Non-governmental Organizations

Most often NGOs are responsible in promoting sustainable development in urban regions and are considered to be powerful in influencing policy reforms. Therefore, findings from this study can help them with their role in influencing formulation of policy related to park development and maintenance. And lessons learned can be applied in other places as well.

3.   Other Stakeholders

Stakeholders involved in urban development such as architects and planners in general can find this research of importance in order to understand parks and their design and development. They can consider the results from this thesis as a baseline for the situation in the area, and build upon their own designs on it taking considerations from the discussion chapter. Also, other researchers can adopt similar theoretical and methodological perspective and apply for their own research.

2. Literature Review

All research studies start with a detailed review of literature related to the phenomenon the researcher is interested in. It includes a collection of studies found in the scientific literature related to the selected problem and evaluates the various ways in which the problem has been described and summarised in these studies (Boote and Beile, 2005). Often the literature review helps in defining the theoretical basis and nature of research questions for the study. In this thesis, the purpose of the literature review was to examine a selection of theories that have accumulated over time, related to the concept of green spaces and their management in light of urban issues. This review helped in identifying and establishing existing theories, the relationship between them, and to what degree these theories have been operationalised and applied.

Information related to urban green spaces, their typology, benefits they provide and theories related to their management was collected using review of academic literature published in peer-reviewed scientific journals. Secondary information on the concept of functional uses of green spaces is obtained by reviewing a number of scientific articles available both electronically (online) and as published works in academic journals. Other literature sources like reports published by the organizations or individuals involved were also studied. Information from mass media, specifically archives from newspapers was utilized as guidance for some research. Information specific to the study area was collected from the local government's website and other agencies responsible for urban services.

Table 1: Themes and keywords used for literature review (Own Compilation)

S.NO.	THEME	KEYWORDS USED FOR SEARCHING
1.	Green spaces	'open space' 'public space' 'Green space', 'Urban Green space' 'loss of urban green space' 'open space planning' 'recreational green space'
2.	Ecosystem services	'ecosystem services' 'ecosystem services urban' 'ecosystem services cities' 'benefits of green spaces'
3.	Management of green spaces	'management of greens' 'urban green space maintenance' 'place making' 'community management of open spaces' 'strategic management' 'park management'

The literature has been searched in major scientific databases like Web of Science[7] and Science Direct[8]. Access to these databases was provided by the institution's and university library network[9].

In addition to discussing the definition and benefits of urban green spaces, this chapter also provides background settings for provision of green spaces with respect to the overarching concept of sustainability. It further discusses the legal and policy provisions for design and planning of green spaces in the city of Delhi, contributing to the background information for the research context and identifying gaps. It also discusses theoretical concepts related to management of green spaces, and suggests a theoretical framework adopted for this particular research.

2.1. Urban Green Spaces

The earliest provision of green and open space in town planning was only mentioned at the end of 19th century in the works of Frederick Law Olmsted, Sr., an architect and a planner by profession (Eisenman, 2013). However the term gained momentum and recognition during the industrial revolution, when people started questioning the ecological and social impacts of subsequent fast urbanization (McHarg, 1992; Mumford, 1961).

Urban planners like Ahern (1995), debate the typology of green spaces, as it constitutes a wide variety of spaces such as parks, gardens, wilderness, woods, allotments, and urban forests. He describes urban greens as not some isolated open spaces, but part of an overall network termed as greenways. This concept is supported by other authors (Grimm *et al.*, 2008; Hodgson *et al.*, 2009) as they discuss a network of green patches connecting bigger green spaces in the city, in order to eliminate the issue of lost connectivity, isolation and patchworks, a phenomenon often described in relation to loss of urban green spaces (Lafortezza *et al.*, 2008). They are then considered a part of a bigger network of inter-related spaces and is called green infrastructure[10] (Weber *et al.*, 2006; Tzoulas *et al.*, 2007; Benedict and McMohan, 2002). However, for this study the focus is on smaller green spaces only. The presence of green spaces in urban areas has various benefits, and cities strive to make them available to their dwellers as a part of raising their quality of life.

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[7] Web of Science:
https://apps.webofknowledge.com/UA_GeneralSearch_input.do?product=UA&search_mode=GeneralSearch&SID=4FD3BMW2pGuBmMoSbEe&preferencesSaved=
[8] Science Direct: http://www.sciencedirect.com/
[9] TU Dresden and SLUB.
[10] Green Infrastructure not only involves all kinds of vegetated green space, but also infrastructure related to water (blue infrastructure), which contributes towards overall urban sustainability.

Table 2 shows various cities and the availability of green spaces per capita in these cities (Sustainable Cities Network, 2011; Hansen *et al.*, 2015, Paul and Nagendra, 2017).

Table 2: Per capita green space availability. (Own compilation from different sources)

S.NO.	CITY (COUNTRY)	PER CAPITA GREEN SPACE (SQ.MTS.)
1.	Curitiba (Brazil)	52.0
2.	Toronto (Canada)	12.6
3.	New York (U.S.A)	23.1
4.	Rotterdam (Netherlands)	28.3
5.	Amsterdam (Netherlands)	17.62
6.	Madrid (Spain)	14.0
7.	Paris (France)	11.5
8.	Berlin (Germany)	16.82
9.	Aarhus (Denmark)	31.3
10.	Malmo (Sweden)	35.0
11.	Edinburgh (U.K.)	32.6
12.	London (U.K.)	27.0
13.	Tokyo (Japan)	3.0
14.	Delhi (India)	21.5

Per capita green space is the usually sign of how liveable the city is, and hence how good the quality of life of its dwellers are. The standard for provision and size of green spaces per capita are different, depending on the context and area. Similarly there is a lack of consensus on its definition too. Taylor and Hochuli (2017) reviewed 125 journal articles to define greenspace, and found the definition varied according to the subject, context and discipline of the study. In order to define what green space means, it is necessary to acknowledge all the meanings that exist and the individual studies that refer to it. One must also notice that these definitions are highly subjective and vary widely, but

broadly include areas that are covered with natural vegetation (Lachowycz and Jones, 2013). In an urban context, the most commonly used words associated with green space were small urban parks, street verges, cemeteries, playgrounds and such, basically any space covered with green vegetation and may have a recreational purpose (Taylor and Hochuli, 2017). This is consistent with its previous description by Forest Research (2010) that defines green spaces as any area covered by grass, trees or other type of vegetation in an otherwise urbanised area. These green spaces often provide various social and environmental benefits to the surrounding community. Depending on the location and function, these spaces can be either public or privately owned. Kabisch and Haase (2013) define green spaces as a patch or stretch of vegetation, which includes parks, open spaces, private gardens, and green corridors along the streets. Few of the categories have been described in Table 3.

Table 3: Types of green spaces (own compilation).

S.NO.	TYPE	EXAMPLE/DESCRIPTION	PURPOSE/ FUNCTION
1.	Parks and Gardens	Includes all kinds of public parks and privately owned gardens	Recreational Community events
2.	Natural and semi natural green spaces	Urban forest Open wasteland	Biodiversity and habitat conservation Environmental awareness
3.	Green corridors	Path along main streets and roads, waterways, and railway lines	Walking, cycling (leisure) Part of a larger ecological network
4.	Amenity green spaces	Within housing societies Institutions like office spaces, educational institutes, hospitals and such	Aesthetic purpose Playground activities Community events
5.	Cemeteries	Burial grounds	Spiritual purpose Biodiversity conservation
6.	Religious places	Temple complex, churchyards	Informal activities Often places for rest and contemplation
7.	Horticultural space	Includes community gardens	Urban agriculture

S.NO.	TYPE	EXAMPLE/DESCRIPTION	PURPOSE/ FUNCTION
		Public nurseries	
		Riverbeds	

For this study only the recreational green spaces with respect to urban areas have been included. This is done keeping in mind that currently half of world's population lives in cities, and is expected to increase to almost 70% by 2050 (UN, 2014), which will put immense pressure on the existing urban infrastructure. Particularly in case of India, United Nations backed report suggests the urban population is expected to reach 600 million inhabitants (or 40% of its total population) by year 2030 (New Climate Economy Report, 2014). Another factor is urbanization that causes loss of per capita urban green space, which further reduces exposure of natural environments to urban dwellers (Barton and Pretty, 2010) and thereby affecting their quality of life. World Health Organisation (WHO) stresses on the importance and provision of urban green spaces, as it is believed that lower exposure to natural environments can be directly associated with a number of lifestyle diseases such as obesity, heart diseases, stress, and mental fatigue (Ulrich, 2006; WHO 2006). Therefore it is important to provide and maintain quality green spaces which are available and accessible by all urban dwellers. Although green spaces can be listed in various forms, this study broadly defines urban green space as any "neighbourhood park" or "playground" in an urban setting. It is accepted that there may be small and subtle qualitative differences between these settings, still these terms hold similar meaning for the purpose of the review.

Neighbourhood parks in general, are defined as the most basic unit of park systems and are spaces available to a neighbourhood for social interactions and recreational purposes. Their size, functions, and rules are often defined in the zoning plans of a city. Carr *et al.*, (1992), describes neighbourhood parks as one of the several public spaces available to the urban dwellers. They describe it as any open space in the neighbourhood that is developed for recreation, and is managed as part of the city's zoned spaces or part of residential projects. These spaces provide a common identity to the surrounding dwellers which is reinforced by participation in social activities and neighborhood proximity. A recent body of work in the book by Tan P.Y. (2018) have accounted a conceptual framework for spaces in and around the city that may be classified as being part of the neighborhood landscape. The framework lays heavy stress on defining neighborhood landscape important in the sense that it contributes towards the ecosystem services, urban sustainability, resilience, and urban liveability (Kuei-Hseien and Tan, 2018). Overall, the function of neighbourhood

spaces such as parks is to provide services for human well being and benefit, thereby contributing at a larger urban landscape as well.

Lynch (1981) classification of these spaces is also similar to Carr and his colleagues' however he made a particular distinction between regional parks and urban parks on the basis of their functions and how they are used by the public. According to him, neighbourhood parks are classified under the category of urban parks as spaces within urban limits for people's everyday activities such as walking, jogging, and or just sitting. Neighbourhood parks are important in the sense that they can provide opportunities for people in a residential part of the city to connect with 'nature' in their daily lives (Kaplan *et al.*, 1998). Their provision and presence is an important part of urban planning and is reflected in their contribution towards social, economic and environmental benefits to their immediate environment (Francis, 2003). These spaces although carefully planned, designed, and managed often face problems such as inadequate maintenance and safety of users (Burton *et al.*,2014; Newcastle City Council 2004), a phenomenon also observed in the study area (Adak, 2015). This gives rise to the question as to how much significance is given to their functions post-design. Whether, the management of these spaces and their legal provisions are taken as serious as the benefits that they offer to the urban citizens. This research study therefore tries to contribute towards this aspect by looking at the management and maintenance of neighbourhood parks in the city of Delhi.

It is evident that there exists a gap in literature on existence of studies on smaller green spaces such as neighbourhood parks. This was observed during this literature review as well. Although information exist on health benefits associated with these spaces, but not much information is present related to planning and management of green spaces that are smaller in size, existing in urban neighbourhoods (James *et al.*, 2009). However, in this review to address this gap, other cities are mentioned, wherever there is a prominent green space that can be compared to neighbourhood parks: these could be smaller pocket parks, or squares and small gardens. Their planning, design, and management are discussed in order to have background information to add support to the research focus of this study. Traditionally speaking urban green spaces are owned by the state (national, regional, provincial or local government), and their management responsibilities are handed over to local authorities and municipalities (Carmona *et al.*, 2004; CABE Space 2005). In some instances, these responsibilities can also be transferred further to local residents, community associations or even private contractors. This usually happens in case where either the local councils are lagging behind in resources both physical and financial in order to take care of these spaces (Carmona *et al.*,

2004) or it is found that contracting it out is more cost-efficient (Delshammer, 2015). Some of these cases are discussed here.

Most European countries are exemplary in the fact that they take care of their urban green spaces quite well. Majority of urban dwellers have open and free access to green spaces in the city, whether public or private owned spaces (Hansen *et al.*, 2015). There are also examples of local citizens being involved in management of these spaces as a part of innovative urban governance mechanisms. Starting with the Dutch context, example worth mentioning would be the city of Groningen with its exemplary working situations of community involvement in smaller green space management. In Groningen, the local municipality designs the sectoral and zoning plans for land use and land change, that contains the provision for planning of parks (Carmona *et al.*, 2004), that are labelled recreational green space owned by the state. The municipality also has policy programmes that encourage gardening initiatives and involvement of local citizen into such activities as an answer to increasing concerned and socio-ecologically conscious citizens that want to get involved in urban green space governance. The city for example has *De Eetbare Stad* (The Edible City) initiative, where a green participation co-ordinator is appointed by the city that helps involve communities to improve their neighbourhood by helping them start gardens and grow food locally (Edible city of Groningen, 2018, Spijker and Constanza, 2018). Such initiatives have provided the local people with a feeling of contentment and responsibility rather than depending on the local authority alone to do something and make a change (Carmona *et al.*, 2004).

In case of Aarhus (Denmark), there are voluntary neighbourhood boards, comprising of local residents and businesses that are legally obliged to be involved in all matters concerning their immediate neighbourhood, including smaller green spaces such as parks and gardens. The spatial plans related to provision of urban green spaces are laid down in the Municipal Plans, where specific green space planning includes Nature Quality Plan, Park Development Plan, Forest Development Plan, and Outdoor Recreation Plan (Olaffsson *et al.*, 2015). Denmark has always been high on public participation initiatives, which is also reflected in the green space governance in Aarhus city. Olaffsson *et al.*, (2015), describe few examples of citizen initiatives in taking care of local green spaces in the city. One such example is a local user group taking up the responsibility of taking care of a rose bed in botanical garden making it functional and available for use by other people. Here, a high level of interest in the use of space by local users was a primary reason for their involvement, however, it has also been pointed out in literature that it can be a challenge sometimes for the city officials to setup a process for such engagement initiatives (Carmona *et al.*, 2004; Olaffsson *et al.*,

2015). In this case, it has been city planners' experience that already existing structures such as local community associations and groups can provide a certain organisational setup that can give structure and protocol for these actors' involvement as is the case in Aarhus (Olaffsson *et al.*, 2015). These kind of local community associations are also found in Delhi in the form of Resident Welfare Associations (RWAs). To describe them briefly, they are a group of citizens that form the association as a voluntary group to represent the needs and concerns of their neighbourhood. In the city of Delhi, there are more than 2000 registered RWAs. These associations are described in detail in Section 4.2.

In the Swedish context, Malmo must be mentioned. The city has over 50 % of urban area as green spaces (Delshammer, 2015). The city has a Green Plan that provides guidelines for all green areas within the city including parks (Carmona *et al.*, 2004). The Plan maps out recreational opportunities in the city that may also have ecological values, and includes both public and private land. The local authority is responsible for rolling out this plan and takes appropriate decisions related to green spaces in the city. Maintenance however of these spaces is contracted out to private contractors (Delshammer, 2015). The city's Parks Department employs these contractors, which over the years have progressively increased the demand and expertise of the process. This has in turn resulted in increased responsibility, and quality of parks delivered (Delshammer, 2015) and also reduced costs as using different contractors for different areas within the city creates competition to deliver quality maintenance at reasonable price (Carmona *et al.*, 2004, Delshammer *et al.*, 2015). The city of Goteburg in Sweden also represents similar example where local authority do not undertake the responsibility for maintenance of smaller green spaces, and instead hands it out to either private contractors or housing rental agencies with their own designated park managers (Castell, 2010).

Another example can be the city of London and its garden squares. The garden square is very specific to Britain; these were built in the late 18th century during the Georgian era of architecture in the city (Jordan, 1994). The purpose behind building them was to provide a communal green space in a residential area with high urban density (Royal Borough of Kensington and Chelsea, 2015). They serve as spaces for recreation and leisure for families and residents and access to these spaces is only provided to the residents living in buildings surrounding the space. The best preserved example in London can be seen in the Royal Borough of Kensington and Chelsea, which has over hundred of garden squares, with specific legislation for their management. There is an annual tax raised on these garden squares paid by the residents living around these spaces. The charge is collected as a part of the council tax bill (Royal Borough of Kensington and Chelsea, 2015). The garden and squares

ownership can vary, these spaces can be owned by the council, or a public trust or charity, or even private individuals. The management of these spaces is looked after by the Garden Committee and a Parks Management Plan is formulated to create shared visions for management and maintenance activities for the green space (Royal Borough of Kensington and Chelsea, 2015). Outside the state gamut, there is London Parks and Garden Trust[11], a charitable organisation that promotes knowledge and education about these garden squares and their respective history, and also host events during the year where sometimes private squares are open for public to visit, an efficient way to raise consciousness about these spaces amongst general public. A typical garden square is surrounded by dense built environment usually tall terraced buildings. The space may have dedicated footpaths, and more plants and vegetation than hardened surfaces (See Figure 1 and Figure 2). The boundaries are differentiated with hedge or bushy plantation along the perimeter and a waking path around the park (Jordan, 1994).

The important thing to note here is that usually these garden squares are the size of less than an acre (Jordan, 1994), comparable to the size of smaller parks in Delhi where average size is found to be around 0.2[12] acres (See Delhi Parks and Garden Society, 2016 for size of various smaller parks in the neighbourhood, ranging from 2.5 Acres to 0.04 Acres. Also See Appendix G). Another notable point to be found is in the designs of Sir Edwin Lutyens. He was responsible for designing the capital city of Delhi (New Delhi District) in early 20th century on the principles of garden city concept; co-incidentally he also designed some parks and gardens in London during the same period (The Lutyens Trust, 2018). It can be safely assumed that the inspiration for providing green spaces in dense urban areas of Delhi in the form of 'colony parks' or neighbourhood parks as they are called was derived from here (Buch 2003, in Paul and Nagendra, 2017). Green Spaces in Delhi have been described in Section 2.3.

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[11] London Parks and Garden Trust. Available at http://www.londongardenstrust.org/aboutus/index.htm#Aims
[12] 1 Acre = 4,046 sq.mts. 0.2 Acres= approx. 800 sq.mts.

Figure 1: Example of a Garden Square in London. Source: Google Images [13]
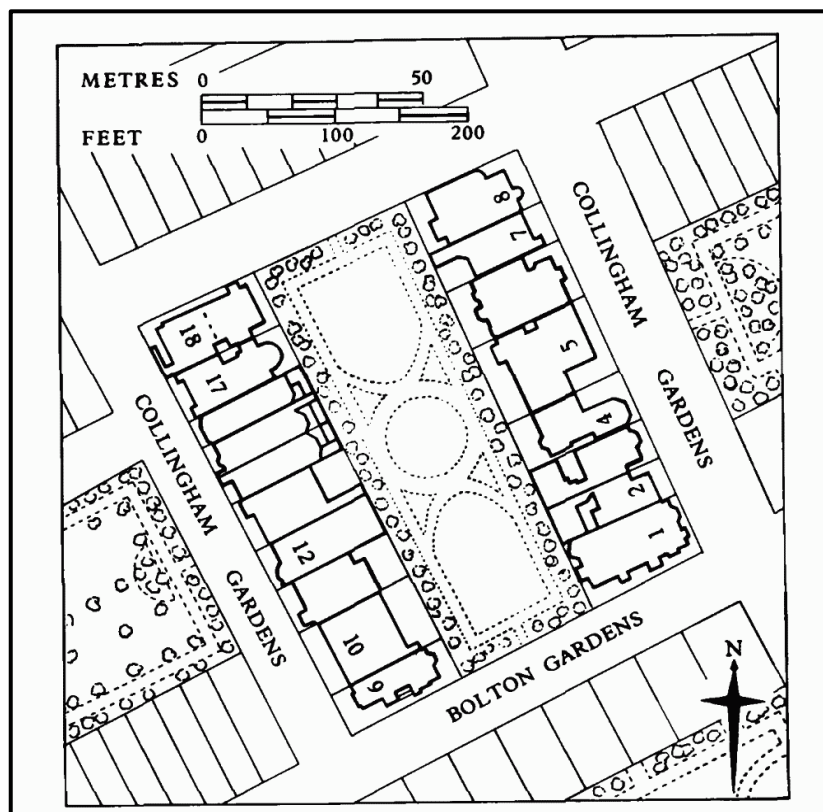
Figure 2: Example design of a Garden Square in London. Source: Survey of London (1986)

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[13] Available at: https://www.flickr.com/photos/55935853@N00/2432814041 (Google Image Search, labelled for reuse)

In Asian Context, a better example of resident involvement in managing parks can be seen in Tokyo, Japan. The legal provision for Parks in the city are mentioned under the Urban Parks Act, 1956, that classifies these spaces into three groups: urban parks, specified by the Urban Park Act; parks other than urban parks, which are deemed equivalent to urban parks; and natural parks, specified under Natural Parks Act (Bureau of Construction, 2015). The Urban Park Act mentioned above sets national standards and framework for open space provisions, under which it also stress a great deal on community participation in the management of green spaces. The revisions to the Act over time relaxed conditions for involvement of NGOs and community group to establish and manage some of the publicly owned spaces. This has boosted involvement of residents in planning and management of urban green spaces, in particular senior citizens, who may have the necessary experience, knowledge and skills in aiding the process (Carmona *et al.*, 2004). Support for such residents is also provided by the City and Regional Planning department who concludes that there must be formal contracts between the local authority and the resident groups on maintenance activities and routines and also a platform for training volunteers to gain skills and establish standards for quality green spaces in the city (Carmona *et al.*, 2004).

In the context of U.S.A., it is a bit difficult to explain recreational urban spaces as green spaces, due to the preference of urban planners for bigger parks in the past that were built on the outskirts of the city with the intention to give reprieve to citizens from the built environment, these spaces can be categorised as regional parks. Post this came the recreational facility type, where spaces were created within residential neighbourhoods, however the focus was less on green space, but more on providing playgrounds: a safe place for kids to play, and gym like activities. These spaces are owned and maintained by the city government and not necessarily have area covered with vegetation to be considered green space. The closest examples to green spaces in the urban limits that can be classified as neighbourhood parks in terms of their size are the pocket parks in several US cities. These spaces are too small to provide spaces for creation of a recreational facility (sports field or outdoor gym), however they do have greenery, have spaces to sit and even sometimes a small playground for kids. These spaces are often built in dense urban areas, for example: Paley Park in midtown Manhattan (Houstoun, 2016). It must also be mentioned that these spaces lack legal provisions on how much space should be green versus hardened as their ownership is usually private therefore landscape designs are private as well, which makes it uncertain as to whether it should be classified as an urban green space or not (See Figure 3).

Figure 3: Image of Paley Park in Manhattan, classified as a pocket park. Source: Google Images[14]

However it is not the case everywhere in the country. Several Cities have their own Parks and Recreation Boards that are legally separate from the municipality. It has an elected Board responsible for developing and maintaining the city's park systems (MPLS Plan, 2009). Examples can be seen in the city of Minneapolis, Austin, Dallas, and several others.

The above mentioned examples from different contexts can somehow also be compared with Delhi (especially in terms of design, size of the space, and access in case of London Garden Squares). Although the argument can be made that all these cities and Delhi differ in their scale, but in terms of engagement in urban green space management, they bear a striking similarity where the administrative structure for planning phase is always national, regional and local. The spatial plans are made at all three levels, and provision of green spaces is provided. Maintenance is also traditional in the sense that municipality is responsible for it. The similarity can also be found at neighbourhood level in some cases where individuals and groups engage in gardening and maintenance of smaller urban green spaces. The argument will be clearer once the planning and design structure in case of Delhi is explained in more detail. Section 2.3 covers this information.

The presence of green spaces in urban areas is legally obliged. But their need can be better explained in terms of benefits and services that these spaces provide. There is no dearth of literature

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[14]Source Link: https://upload.wikimedia.org/wikipedia/commons/4/41/Paley_Park_jeh.jpg. Labelled for reuse.

talking about the benefits derived from green spaces. Urban green spaces perform a variety of functions and are often appreciated for their environmental, cultural and health benefits. The environmental benefits include biodiversity conservation (Kattwinkel *et al.*, 2009), carbon sequestration (Liu and Li, 2012), reduction in noise pollution (Pathak *et al.*, 2011), purification of ambient air (Jim and Chen, 2008), and reduction in urban temperatures (Gill *et al.*, 2007; Schwarz *et al.*, 2011). In addition to environmental benefits, green spaces also offer social and cultural benefits, by providing opportunities for people to make contact not just with nature, but also with each other (James *et al.*, 2009). Health benefits include provision of clean air for breathing, space for physical exercise and promotion of mental wellbeing (Tzoulas *et al.*, 2007; Cohen *et al.*, 2007; Tyrväinen *et al.*, 2014). Furthermore, they also offer recreational benefits and promote social interactions in the neighbourhood (Kazmierczak, 2013). This integration of different services and benefits within the same geographical area is described notably by the use of term 'multi-functionality'. Multi-functionality of a space can be considered as its ability to provide various ecosystem services, which have been briefly described in the next section (Hansen and Pauleit, 2014; Davies *et al.*, 2006, 2011).

There are very few studies detailing specifically into benefits of urban green spaces in India. Chaturvedi *et al.*, (2013) conducted a study on relationship between air quality and presence of trees in the city of Nagpur (central India), they found that the city (with the green space of 31 sq.m. per capita) enjoys a healthy quality of air with concentrations of SO2 (6 $\mu g/m^3$), NO_2 (18 $\mu g/m^3$), and RSPM (53 $\mu g/m^3$) contained well within the permissible limits of 80, 80, and 100 $\mu g/m^3$, respectively. Another study done in Bangalore found that street trees reduce levels of suspended particulate matter and contributed to 65 % reduction in SO_2 levels in the city (Vailshery *et al.* 2013). Also other research indicates towards ability of green cover in cities of Gandhinagar (green space of 160 sq.m per capita), and Chandigarh (green space of 55 sq.m per capita), appear to reduce SO_2 and NO_x concentrations in general (Sustainability Outlook, 2012; Chaudhry *et al.* 2013). As is evident, the studies focus on the ability of green spaces and their elements in dealing with air purification and air pollution, and there is almost no evidence supporting the recreational benefits of these spaces. Therefore more research is required which is focussed on other aspects and functions of such spaces for Indian cities as well.

2.1.1.Multi-functionality of Green Spaces: Ecosystem Services

An ecosystem[15] is defined as community of organisms living and interacting with each other, and providing, as well at the same time availing certain benefits and services from each other. These benefits or services are termed as ecosystem services. Human beings are the primary beneficiary of these services, which include the provisioning of clean water, decomposition of waste, purification of ambient air among other things. The concept of ecosystem services has been discussed for long, but it was not up until the Millennium Ecosystem Assessment in the early 2000's that it was properly formulated and integrated as a concept (MA, 2005). The assessment grouped these services into different forms depending on the function they facilitate, these categories are: provisioning of food and water; regulating via control of climate and disease; supporting with respect to nutrient cycles and pollination; and cultural in terms of recreation and spiritual benefits (See Table 4).

The concept of ecosystem services involves the human benefits derived from ecosystem functions, and in case of urban areas, from green spaces within the city (Ernstson *et al.*, 2008; Young, 2010). As mentioned previously, the environment related services include: purification of ambient air (Tallis *et al.*, 2011), regulation of climate and precipitation patterns (Bowler *et al.*, 2010; Dellepetri *et al.*, 2012), carbon storage (Davies *et al.*, 2011) and storm water run-off regulation (Yao *et al.*, 2015) to name a few. Much detailed version of description of ecosystem services, their measurement and valuation can be found in the book published by Daily in 1997[16]. Following this was the literature on economic evaluation of these services, by Costanza *et al.*, (1997). This paper up until now is followed by several policy makers while formulation of polices interfering with functioning of natural environment. The values calculated in the article were updated in another journal article by the authors (2014).

With respect to this research, only ecosystem services in regards to a park are mentioned. A space surrounded by residential colonies such as a neighbourhood park contributes to ecosystem services by providing space and recreation for the immediate neighbourhood in which it is located.

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[15] As described by Sir Arthur Tansley in "The use and abuse of vegetational terms and concepts". Ecology 16 (3): 284–307 (1935).
[16] Nature's Services: Societal Dependence On Natural Ecosystems. Edited by Gretchen Daily; Forewords by John Peterson Myers and Joshua Reichert. http://islandpress.org/book/natures-services

Table 4: Table for ecosystem services, as adopted from the Millennium Assessment of Ecosystem Services (MA, 2005)

➢ SUPPORTING SERVICES	➢ PROVISIONING SERVICES
• Necessary for production of all other ecosystem services • Like, nutrient recycling, primary production, soil formation	• Services that provide products from the ecosystem • Like, food, raw materials (wood, fodder), water, minerals, and energy
➢ REGULATING SERVICES	➢ CULTURAL SERVICES
• Benefits obtained from the regulation of ecosystem processes • Carbon sequestration, climate regulation, waste decomposition, purification of water and air	• Non material benefits people obtain from ecosystems through spiritual enhancement, cognitive development, reflection, recreation, and aesthetic experience • Use of nature as motif in books, as religious and heritage values, ecotourism, for science and education

A study by Nordh (2010) discusses how small urban parks contribute towards mental restoration of their users, similarly studies have discussed on the ability of parks with the potential for increasing social integration and community interactions (Gehl, 2010 in Peschardt *et al.*, 2012). Another study conducted in the city of Karachi (Pakistan), found out that park user's main reason for visiting these spaces is walking and spending time with friends and family (Schetke *et al.*, 2016) thereby incurring health and wellbeing benefits. In addition to this, there are ornamental plants and trees for aesthetic appeal, play areas, and walkways for leisure. In a study in one of the south west district of Delhi, it was found that people had set up their shops beneath tree species that line the side of the main roads and boundary walls of parks, as these trees provide dense shade (Bhalla and Bhattacharya, 2015). It was observed that different kind of livelihood activities such as that of a cobbler, tea stall owner, barber, bicycle repair shop, and vegetable and fruits seller were utilising these shady trees for their benefits (Bhalla and Bhattacharya, 2015). In addition to this, people also mentioned the benefits such as cooling and shade under these trees, and over 50 % of the people interviewed in the previous study mentioned utilising these spaces for sitting and playing underneath. Thereby, confirming the contribution of green spaces towards cultural services.

The benefits and services offered by green spaces, especially in urban settings have not gone unnoticed, and have been mentioned in both the UN Sustainable Goals and the New Urban Agenda. This need and approval of quality green spaces to contribute towards the much broader topic of urban sustainability is what is addressed in the next section.

2.2. Green Spaces and the New Urban Agenda

New Urban Agenda was adopted in the UN Habitat III conference held in Quito in late 2016. It aims at discussing and integrating further the Goal 11 of UN Sustainable Development Goals, that aim to create 'inclusive, safe, resilient, and sustainable cities'. However, the literature accompanying the UN SDG 11 does not explain much in detail what is entailed by all the words that they use, therefore the onus of explaining and describing in detail was un-decidedly transferred on the UN Habitat, and the Urban Agenda. The document focuses heavily on the urban data and indicators (Caprotti *et al.*, 2017), and describes open spaces' accessibility and their quality as one of the measurements to reach this goal. This section here will discuss the role and importance of green spaces with each of the terms mentioned in both UN SDG 11, and the New Urban Agenda, that are: *inclusive, safe, resilient,* and *sustainable*.

It has been noted that a series of issues such as unemployment, low income, bad health, and high rate of crime often can result in social exclusion of certain individuals or group of individuals from the society (Percy-Smith, 2004). This also leads to creation of socially excluded areas within the urban limits. Kazmierczak and James (2007) argue that urban green spaces in such areas can create inclusion of such groups within the community by improving their quality of life. Public green spaces are often public spaces and freely available to all individuals and can be used for relaxation and leisure purposes by people irrespective of their individual status. But sometimes these spaces are outside city limits, like bigger regional parks (especially in U.S.A.) and can inhibit access of people who may be old, sick, or simply cannot visit these places due to lack of public transport, and their economic status (Ward Thompson, 2002). In this scenario, urban green spaces can provide these individuals the opportunity to experience these spaces. Urban areas are high density areas, and especially in developing countries, under these scenario smaller urban green spaces can be essential to enable residents of such areas to meet and establish relationships with each other, and furthermore bring on a sense of community in a relaxing and undemanding way (Kazmierczak, 2013; Peschardt *et al.*, 2012). In addition to this CABE Space (2005) on the basis of a strong body of literature suggested that visit to urban green spaces can provide an opportunity to relieve stress and gain a fresh perspective on life, especially for individuals under stress. Kuo (2001) reports that

people who lived closer to vegetated areas were more efficient in managing their life struggles than people who did not and therefore were less prone to social exclusion. Also, Dunnett *et al.*, (2002) mention how presence of green spaces nearby increases the chance of participation by urban residents in design and maintenance of these spaces, thereby improving inclusion and community ties. UN Habitat (2015a) suggests improving spatial planning within urban regions to establish strong linkage between land use and accessibility, and to eliminate gaps between slums and consolidated neighbourhoods. And one way to do that would be to plan and provide urban green spaces to these areas in such a way that they are available and accessible to all groups of society. Despite this common assumption as to how green spaces can contribute towards social inclusiveness and reducing inequalities, a more in depth analysis is required to support these claims (Haase *et al.*, 2017). Strategies to provide quality green spaces that focus on only one section of society, well intentioned though can also miss opportunity to transform the city in a positive manner and can also trigger new threats to the region (UN Habitat, 2015c). For example, presence of quality green spaces also increases property prices, as has been found in several cities such as New York, Copenhagen, and Hamburg (Haase *et al.*, 2016). This can further lead to segregation in the community as low income residents may have to move out of the neighbourhood, thus relinquishing their rights to accessing a quality green space.

The current image of the cities is that they are often unsafe, and have higher risks of crimes occurring with few strategies to combat this environment. Poor planning, urban design, and mismanagement of urban services often leads to agglomerations where criminal activity is dominated over other socially positive activities (Algahtany and Kumar, 2016). UN Habitat (2015b), states that many cities in the developing world are poorly planned and the rapid urbanisation around these plans have led to high urban segregation patterns that have led to rising income inequalities, and creation of areas which are separated by privatised guards and gated communities, something similar mentioned in the previous paragraph. This segregation pattern also leads to creation of ghettos and spaces that may be not considered safe enough by certain sections of society. For example in UK, a number of Asian women reported that they perceive their local green space as 'dangerous' and explained this in terms of their gender, as to how they feel uncomfortable walking through these spaces just because of the presence of a group of youngsters, mainly male, who seem threatening as they are loud and noisy (Newcastle City Council, 2004). In light of this, it is just not enough to make green spaces available and accessible, it is also important to make them safe to use especially for groups perceived at risk in the society. Therefore, it is not just the actual crime incidence, but also the fear of crime, disorder and show of anti-social behaviour in green

spaces, that deter most people from using it (Newcastle City Council, 2004; CABE Space, 2005). However, as it has been mentioned previously, the green space can provide value to the neighbourhood and its users by creating a place of identity and belonging to the community, thereby encouraging more and more people to use these spaces. This active use can also deter criminal activity, and presence of anti-social elements and create a landscape of social cohesion for the local community (UN Habitat, 2015b). In addition to this, certain protective measures such as improved security in and around the parks will also encourage people to use them, and in turn deter unruly behaviour in these spaces (CABE Space, 2005). Local communities can also engage and participate in designing of these spaces in a way that it would make them feel safe in using such spaces. An example would be the initiative by UN Habitat and Delhi based women's NGO where they organised a workshop on making public spaces safer for them to use. Several urban planning and design recommendations were suggested, and this was considered to be a beginning of a discussion and a discourse for making public spaces accessible and safer for a certain section (here women) of the society (UN Habitat, 2010). Similarly participation of residents in planning and design of local green spaces, and the planting schedule can be seen as an opportunity to address safety concerns (Johnston and Shimada, 2004).

Phrases like 'climate-proofing' and 'resilient city' have been in frequent use in the past decade, which puts emphasis on the significance of urban systems that would be able to bounce back from disaster and shocks (Pelling, 2003; Boyd *et al.*, 2008; Leichenko, 2011). Urban regions have been declared as the most sensitive to disasters, especially coastal regions (Burkett and Davidson, 2012), however at the same time cities are the drivers of sustainable change and therefore require robust strategies to be able to bounce back or overcome if faced with such shocks. Lately focus on urban resilience has been mainly researching climate change and its impacts on cities. This focus describes increasing resilience with concentrated efforts towards typical urban pressures, like urbanization and demographic change, in light of climate change. Recent example of such efforts would be the resiliency initiative by the city of New York, which was widely damaged by Hurricane Sandy in 2012 (New York City Special Initiative for Rebuilding and Resiliency (NYCSIRR): New York City Office of the Mayor, 2013). Many other cities followed suit, especially coastal cities, whose plans include mitigation and adaptation against coastal flooding and storm surges (Aerts *et al.*, 2014)[17]. Their strategies aim to motivate urban planners and designers to plan and project in a manner that it can contribute and foster resilience to climate change and its impacts (Rosenzweig *et al.*, 2010). While a

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[17]

http://enhanceproject.eu/uploads/cms/media_item/file/30/J2014Science344_EvaluatingFloodResilience.pdf

major share of these literature and strategies focus on infrastructural response to sudden shocks and disasters (Alberti *et al.*, 2003), very little attention has been given to non-disaster related services which can efficiently contribute towards long term resilience of urban regions (McPhearson *et al.*, 2015). In most cities, these services are provided by the natural environment and are often sidetracked and ignored while planning and management of resilience; although very recently few cities have begun to understand and recognize how ecosystems can help mitigate climate change impacts and enhance adaptive capacity for post disaster related recovery (Scarlett and Boyd, 2015). Vargas-Moreno *et al.*, (2014) describes urban resilience where green open spaces maintain sustainable socio-cultural, natural, and economic aspects of the city in a way that it realizes ways for urban transformations via community development. From this perspective resilience becomes a quality of urban sustainable development, and also its one of the main drivers (UN Habitat, 2015c). Urban green spaces are a part of sustainable urban form which is known to bring "nature into cities" and offer a unique landscape for biodiversity and well being of urban dwellers (Jabareen, 2012). A resilient approach to planning and designing of such green spaces can be to improve governance challenges particularly in developing world where corruption and lack of interest in environmentally sustainable strategies is common (UN Habitat, 2015c).

As is seen from the discussion above, there are efforts and challenges at the same time to integrate the role of green spaces in creating safe, inclusive, resilient and sustainable cities. However, the literature is not so detailed and elaborate on the scientific evidence for such efforts, and there exists a gap in this field, where the existence and benefits of green spaces demands to be discussed against the backdrop of such policy goals. The eventual aim should be to achieve and maintain urban sustainability through the creation of safe, inclusive, resilient, and sustainable urban green spaces.

2.3. Green Spaces in Delhi- planning and design

Greening of urban cities has become a significant issue over the past few decades in light of increasing concern for deteriorating urban environment. According to United Nations about 70% of the world's population is expected to live in cities by year 2050 (UN, 2014), which will increase pressure on the existing urban systems. In case of Delhi, World Bank reports suggest that by 2030, the city is expected to host 36 million people, only second to Tokyo (UN, 2010). The city is already under tremendous pressure to provide for its 16 million inhabitants, and is seriously lacking urban infrastructure to meet the challenge of sustaining this increase in population (Jain and Siedentop, 2014). It has also been documented that with increase in population in the past few decades, Delhi has been losing its open spaces to a rapidly increasing built up area (Jain *et al.*, 2016). In the face of

these challenges, it is crucial to observe and analyze how will the city design and plan itself in order to meet the SDG 11 for creation of a sustainable city that is all inclusive, resilient and, safe for its inhabitants.

It is important to mention that Delhi has historically been an important center of economic and cultural activity, due to being the capital for many ruling dynasties of the Indian subcontinent. British era saw the city being converted to the official capital for Britain governed territory of India, and most of the planned neighborhood's and spaces in the current New Delhi district are the efforts of English urban planners and designers, most important being Edwin Lutyens (Ganju, 1999). Currently, the main authority responsible for urban planning procedures is the Delhi Development Authority (DDA) which was established by a formal act in 1957. The main task of DDA is to frame and devise policies for urban planning, and draft out Master plans for the capital region. The master plans contain provisions for zoning and planning several urban amenities including green spaces in urban areas.

The section below discusses various policies and guidelines that either in a direct or indirect way affects the provision and management of green spaces in the city of Delhi. It begins by talking about the Master Plan for Delhi, as it is the major document underlining the planning and provision, and then discusses the Landscape Guidelines for designing bigger parks and gardens in India. It also briefly mentions the legal provision for trees in the city.

2.3.1.Planning: Master Plan of Delhi

In case of Delhi, land use change and land use plans fall under the remit of the Delhi Development Authority (DDA) that has so far published three Master Plans for Delhi[18] (MPD 1962, 2001, 2021). The master plan provide an overall strategy or developmental framework that includes urban design, landscaping, infrastructure, service provision, circulation, present and future land use and built form. In theory, the plans seem to be the perfect mixture of policy and guidelines for urban development; however shortcomings like implementation failures, unnecessary restrictions on land use, blatant violations of mentioned guidelines and inherent corruption in the agency also exist (CCS, 2006; Jain 2013) that act as major hindrances.

Post-Independence (1947), there have been creation and implementation of three master plans so far. The first one was in 1962, developed after expert guidance and consultation with the Ford foundation (CCS, 2006). The second master plan was supposed to be framed by 1982, but was

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[18] https://dda.org.in/planning/draft_master_plans.htm

postponed due to the city hosting Asiad games at that time. The new plan was framed a decade later in 1991, mainly focusing on DDA acquiring new land and subsequently develop them for both housing and commercial establishment purposes. CCS (2006) working paper also states, that most of the strategies lined in the plan were top-down approaches, and failed to internalize several issues leading to unfulfilled commitments and chaotically planned areas in the region. There are several provisions related to open spaces mentioned in the document, but their actual implementation was left for imagination. Kumar (1996) points out how the development agency in Delhi outright flouts its own policy of open space availability to the citizens by converting such spaces into religious structures and schools.

The third and current master plan was released in 2007, called MPD-2021 (See Figure 4 and Figure 5), and seems like a comprehensive document with many underlining strategies for land use/land use change planning approaches. The Master Plan (Figure 4) depicts different land use areas with different color. The built-up area shaded as yellow, the light green colour for community and district parks (bigger in size than a neighbourhood park), the dark green for regional parks, and the fading yellow-green for agricultural land that forms the green belt buffer zone around the city boundary. White (or unfilled color) depicts land that can be urbanized. Legend in Figure 5.

The mentioned plan has been commended as to being the first time to discuss mixed land use, however the language of the document follows a more policy like approach rather than a set of clear and practical guidelines.
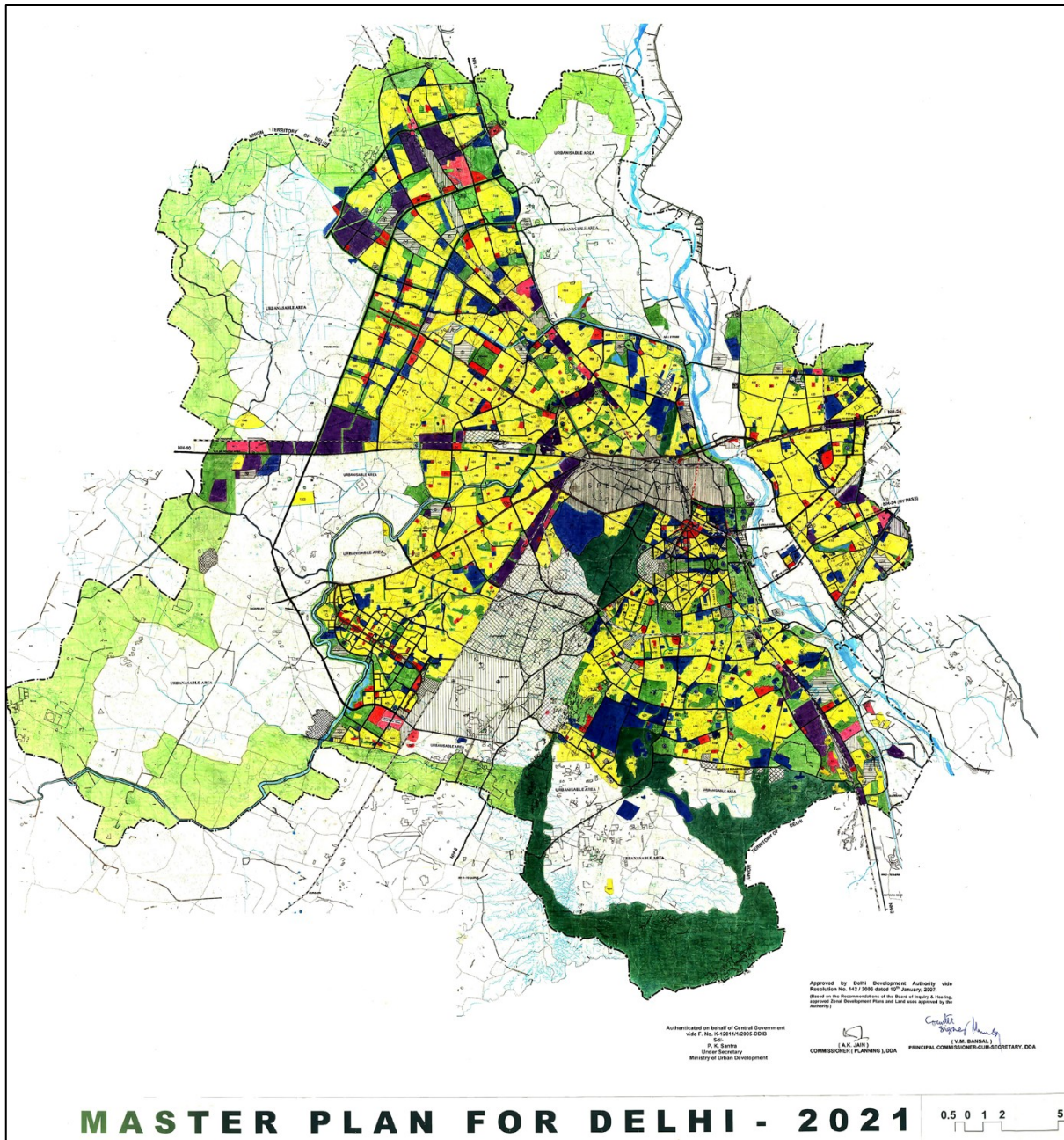
Figure 4: Master Plan of Delhi 2021. Layout plan. (Source: MPD, 2021)
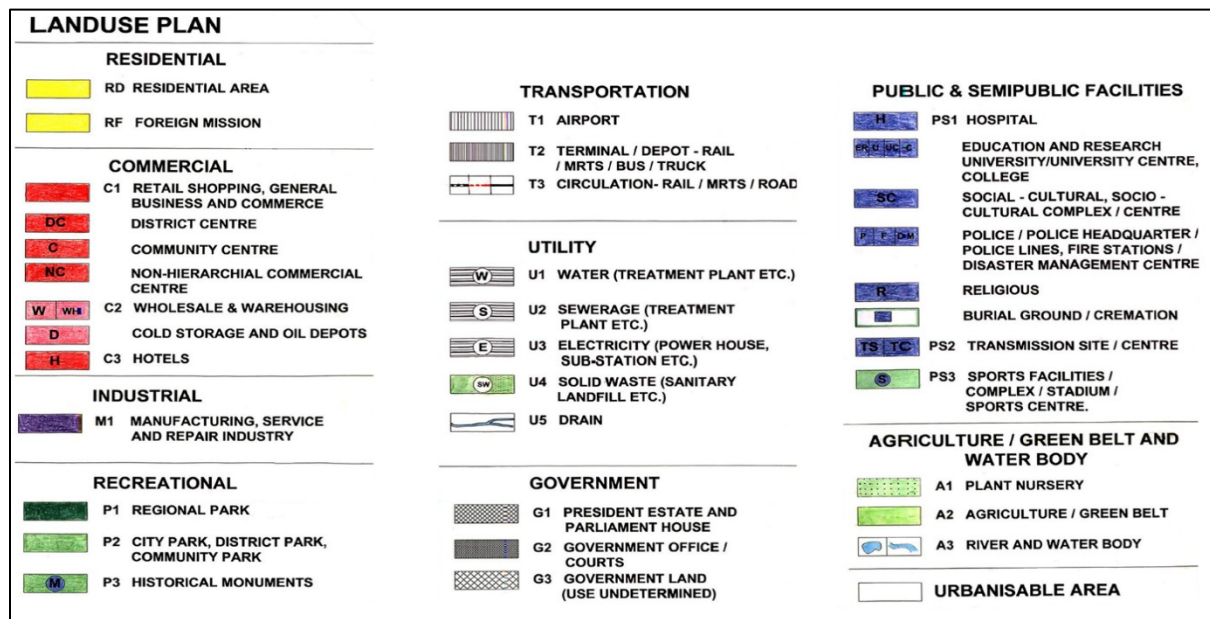
Figure 5: Legend for the Master Plan

Urban planning in Delhi has a proposed hierarchical structure to the city as mentioned in the MPD-2021. The pattern of establishing a community in the city starts at the neighbourhood level with a senior school and shopping facilities for day-to-day necessities. The next levels are Community, District, and Zonal/Sub-city levels (See Table 5).

Table 5: Heirarchy of urban structure in the city. Source: MPD-2021

S.NO.	LEVEL	POPULATION SERVED (NO. OF PEOPLE)	FACILITIES
1.	Housing Area	5000	Primary School, Middle School, **Totlots, Housing Area playground and park**, Milk Booth, convenience shopping
2.	Neighborhood	10,000	Senior School, religious building, Electric Sub-Station, Multi-purpose community hall, underground water tank, **Neighborhood playground and park**, Taxi stand
3.	Community Population	1,00,000	Hospital (up to 200 beds), Polyclinic (50 beds), Family welfare clinic, Maternity clinic, Dispensary for pets, Police post, School for Mentally/Physically challenged , Bus Terminal, **Community Park**, Playground, Community Sports Centre, Waste Water Treatment Plant
4.	District	5,00,000	Hospital (up to 500 beds), Veterinary Hospital, Police

S.NO.	LEVEL	POPULATION SERVED (NO. OF PEOPLE)	FACILITIES
			Station, Vocational Training Institute, General College, Professional College, Old Age home, Night Shelter, Adult Training Centre, Working women hostel, Orphanage, **District park**, District Sports Centre, Bus Depot, Cremation Ground
5.	Zonal/Sub-city	10,00,000	Medical College, Nursing and Paramedic Institute, Telephone Exchange, Sub City Wholesale Market, Bus Depot As per required, Head Post Office & Administration Office, Sewage Pumping Station, Municipal Office for water & Sewerage, Sewerage Treatment Plant, **City Park**, Multipurpose ground, Divisional Sports Centre, Burial ground/ Cemetery

With respect to green open spaces the main points in the master plan was to develop and maintain green belt buffer zones on the boundary of the city to prevent desertification; green belt between residential and industrial areas; develop and maintain city's natural areas such as the *Aravalli* ridge, and *Yamuna* river bed biodiversity zone; develop bigger city parks for leisure purposes. In addition to this provide the urban dwellers with well planned parks in the residential colonies, according to the urban hierarchical structure as mentioned in the table above. Parks in the Master Plan are classified as recreational areas. These areas are generally categorized as parks, playgrounds, botanical gardens, and open spaces with natural features. The area under recreational and green use is in the form of District Parks, City Parks, and Community Parks etc. and includes 15% of the total area in the city (MPD-2021).

According to DDA, the major types of parks classified under recreational category in Delhi are called:

1. Regional Park: this is the area in city limits that is preserved on account of its natural or historical importance. In Delhi, there are 4 regional parks that are classified as protected areas because of the indigenous biodiversity found in these areas. These parks are created in the ridge area in Delhi. Ridge in Delhi is an extension of the *Aravalli* Mountain range in Central India. For administrative reasons, it is divided into 4 zones, each zone representing one regional park. The table below shows the regions and their respective area. The information is available on DDA's website[19].

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[19] https://dda.org.in/ddanew/regional_parks.aspx

Table 6: Regional Parks in Delhi.

NAME	AREA IN HECTARES
Northern Ridge	87
Central Ridge	864
South Central	626
Southern Ridge	6200
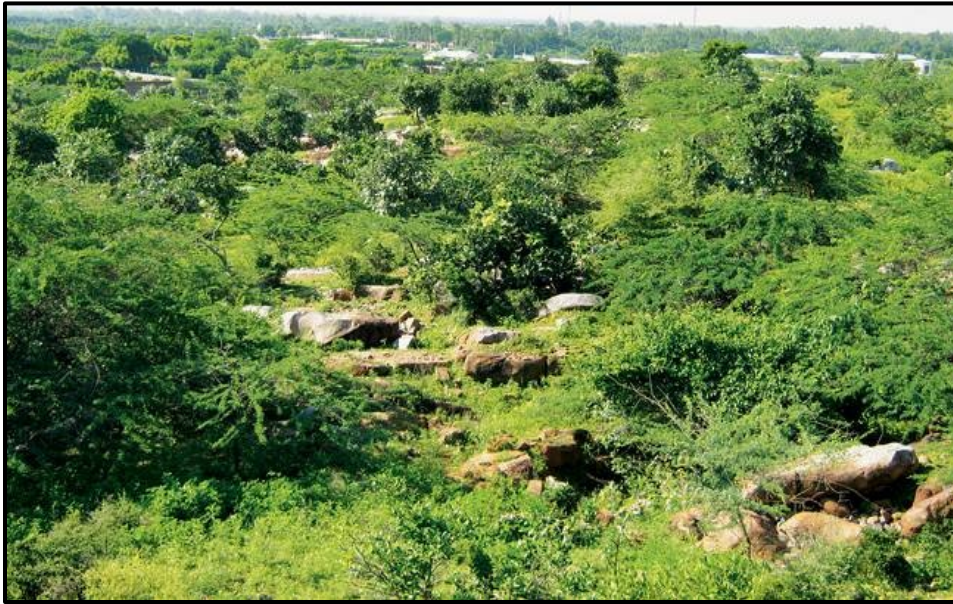
Figure 6: Image of Delhi Ridge. Source: India Today (2016)

2. District Park: is the designated term for a bigger park in urban limits. These parks are for leisure purposes and have to be present in each district of the city, legally obliged to be spaced in order to provide atleast 9.7 sq.mt. of recreational space per person in the area. These parks are designed with gardens, picnic huts, water fountains, playfields and such. In addition to this they are also designed to improve the microclimate of the city. In Delhi there are 111 district parks. Examples are Deer Park in Hauz Khas, Chitragupt Park in Rohini, Kondli District Park in East Delhi.

3. Neighborhood Parks: Parks that are developed at a neighborhood level to serve the population of 10,000-15,000 people. They are mainly designed with trees, green shrubs, and aesthetic flower beds for the visitors. The main purpose is to provide walking and jogging space for the people living around these spaces. Delhi has more than 18,000 such spaces. Further smaller sized green spaces are totlots and smaller housing society parks. Although the Master Plan deigns an area of 1 Hectare to these spaces, but a neighborhood park was

rarely found to be of that big size in East Delhi (See Delhi Parks and Garden Society, 2016; Appendix G).

Figure 7: Picture of a neighborhood park in East Delhi. (Picture taken by author, 22nd July, 2016)

Figure 8: Picture of a neighborhood park in East Delhi. (Picture taken by author, 26th July, 2016)

The size and provision of the recreational green spaces as mentioned in the master plan are shown in table below.

Table 7: Planning norms for recreational green space in Delhi. (Source: MPD-2021)

S.NO.	TYPE OF PARK	POPULATION SERVED (APPROX. NO. OF PEOPLE)	AREA IN HECTARES[20]
1.	Sub-City Park	10 Lakh[21]	100
2.	District Park	5 Lakh	25
3.	Community Park	1 Lakh	5
4.	Neighborhood Park	10,000	1

As it can be noticed from the table above there is general size and rule of population served to be followed in order to provide these spaces to the urban dwellers. Smaller green spaces, such as community parks, neighborhood parks are also only mentioned in terms of their size and population serving capacity. However guidelines on how they are to be built, how the space is to be procured, and what are the standards of quality for these parks are missing.

Earlier according to the approved Zonal Plans in 1998 neighborhood parks were obligated to be shown, however in MPD 2021 these are not required to be shown in the Zonal Plan and thus moved to the section of approved layout plans and not shown in the land use plan of Zonal Development Plan[22]. Although, the plan do mentions the size of these parks and playgrounds (See Table 8).

Table 8: Planning standards according to MPD 2021. (Source: MPD 2021)

S.NO.	CATEGORY OF PARK	POPULATION SERVED (NO. OF PEOPLE)	AREA (HECTARES)
1.	Neighbourhood park	10000	1.0
2.	Housing society park	5000	0.50
3.	Totlots	2500	0.0125

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[20] Planning document mention sizes only in Hectares. While it must be noted that the actual spaces are much smaller in size and most often are reported in acres, as can be seen in Delhi Parks and Garden Society, 2016.

[21] 10 Lakh equals 1 Million

[22] Available at: https://dda.org.in/ddanew/pdf/Planning/ZDP%20Zone%20E%2030.07.10.pdf. Last accessed on 20th of January, 2018.
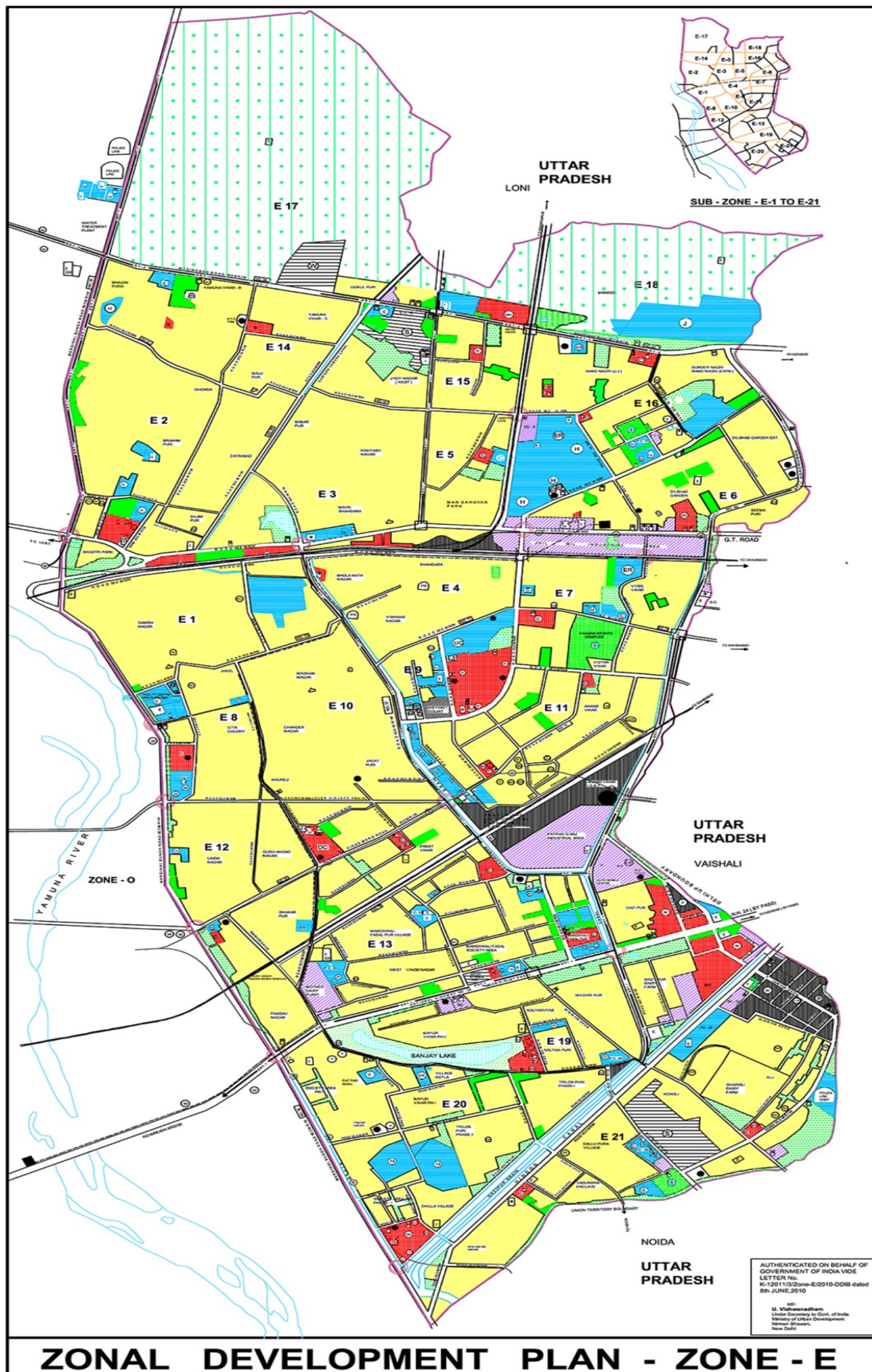
Figure 9: Zonal Plan for East Delhi. Source: DDA, 2010
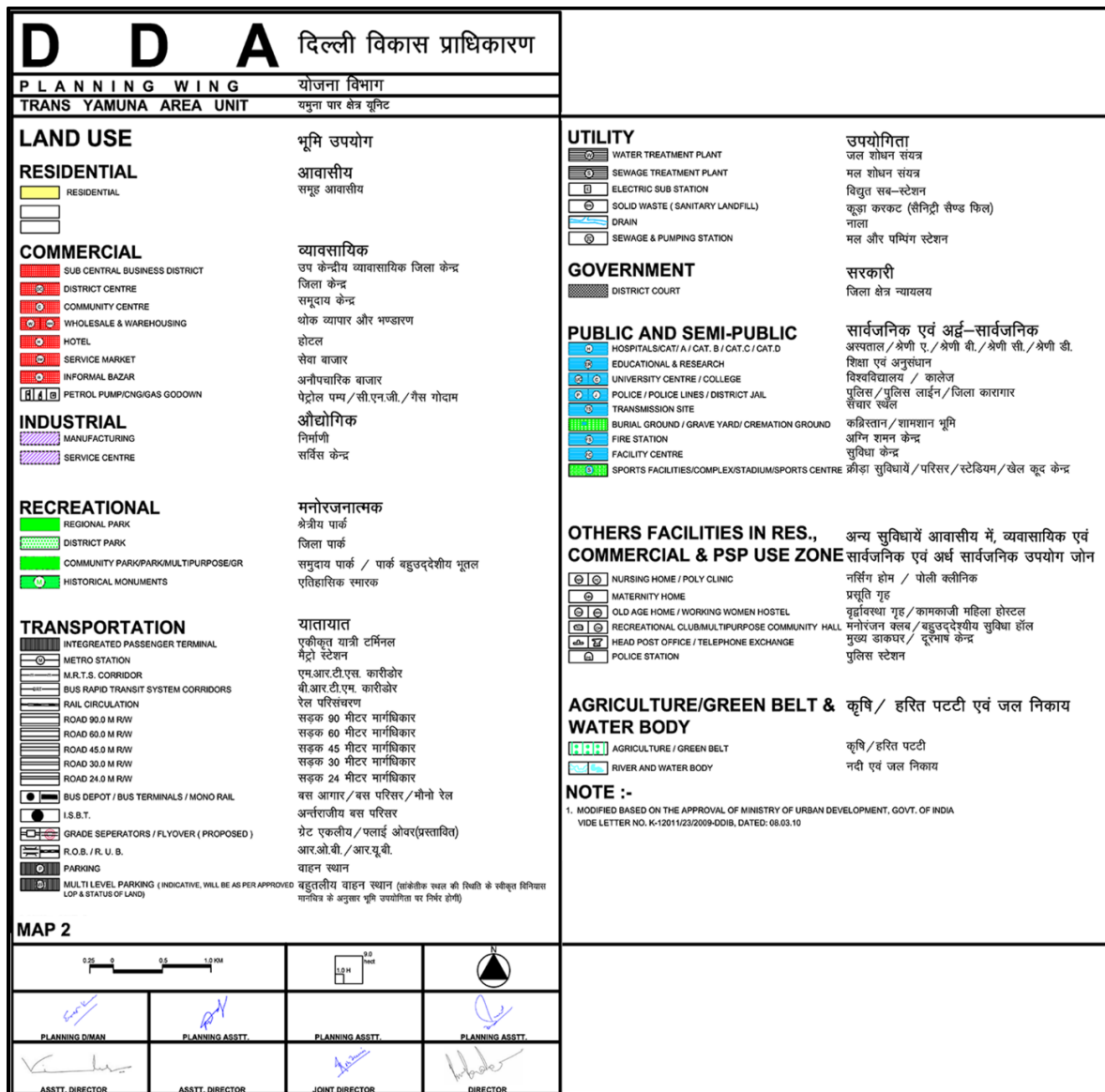
Figure 10: Legend for the Zonal Plan in Figure 9

Despite the legal standards outlined in the master plan, how much of the planning standards are implemented or followed is unclear due to lack of substantial studies and information overlooking this topic. There are studies that map out the green cover in the city using various image sensing techniques (Mohan *et al.*, 2011; Jain *et al.*, 2016; Gupta *et al.*, 2016), but there is a serious lack of research on per capita availability and accessibility of green spaces, especially at the neighbourhood level. Also, in the Zonal district plan for East Delhi by the development authority, only a few smaller parks at community level are represented, which is far from the reality. The area has over 1100 smaller parks, which are not shown in the zonal plan as can be seen in Figure 9 (Legend in Figure 10). The last comprehensive list of neighborhood and smaller parks and their condition was done in a

survey conducted by the Delhi Parks and Garden Society (2016) that recorded 1179 parks in the Zone E (East Delhi District) during the year 2015-2016.

2.3.2. Design: CPWD landscape guidelines

Landscape guidelines are set and required in order to design a landscape. A comprehensive guideline for landscape planning in India has been provided by the Central Public Works Department (CPWD). These guidelines provide further opportunity to be adjusted and tweaked according to the state-wise conditions (CPWD, 2013). The guidelines begin with providing guidance on what role does vegetation plays for a particular area, and how it should drive the selection of plant material to be used. It briefly describes two styles of landscape designs traditionally used in India, and explains them by citing examples of two big public gardens in Delhi. These two traditional styles are the Persian style and the English style gardens. In a usual Persian style garden, there is a central water source from which several smaller channels carry water through the garden. It is usually a square shaped garden divided into quarters, which are further divided into smaller quarters depending on the size of the garden. Mughal Gardens[23] in the Rashtrapati Bhavan, Delhi is a classic example.

Figure 11: Picture of Mughal Garden in Rastrpati Bhavan, New Delhi. Source: The Presidents Secretariat, Rashtrapati Bhavan, 2016.

English style gardens on the other hand usually feature vast lawns, woods, and pieces of architecture as a centre of attention point. These gardens are designed with winding alleys and footpaths, using

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[23] See more at https://presidentofindia.nic.in/mughal-gardens.htm

the natural landscape features, and often incorporate grand statues and artefacts around the path corners and such. Lodi garden[24] in Delhi, is an example of an English style garden.

In addition to describing the landscape style of bigger public gardens, it also gives separate advice on indoor planting materials for commercial buildings, and landscaped parking lots. However, again, like the MPD 2021, these guidelines are more of a general nature rather than clear set of rules to be followed, perhaps due to the fact that they cannot be taken word by word for every land pattern in India which is so distinct and diverse. They also, point towards gardening and maintenance of bigger city level parks, rather than neighborhood parks. However they do mention that the provision of open space at neighborhood level should not be less than 4.5 sq.mts per person as per the Master Plan requirements, they still do not mention how to achieve this. It could be due to the fact that planning, maintenance and design of neighborhood parks do not fall under their authority.

2.3.3.The Delhi Preservation of Trees Act, 1994.

Delhi Preservation of Trees Act, 1994[25] was passed in order to save the trees planted in the National Capital of India from getting lost due to felling and cutting. It aims to do so by keeping a check on cutting of trees by the land owners. This act gave birth to Tree Authority, including a Tree Officer for the preservation, development and maintenance of trees in the capital region. According to this Act, any person aiming to cut a tree on, or near his property need a permission from the Tree officer by giving due and genuine reasons for felling. In order to cut and remove one tree, if given the required permission, the individual has to plant 10 trees in compensation. It also established a tree helpline for complaints regarding illegal felling of trees. The act also provides for recovery of money from the individual responsible for failing to protect trees from danger. Other provisions under the act are selection and availability of plants and tree saplings according to the planting site and its conditions. The positive effect of the act is the increase in tree cover in the capital in the past two decades (Imam and Banerjee, 2016). However, the act is for trees alone, and do not in any way hint towards preservation and development of parks, where the growth is usually at shrub level including grasses and flowering plants.

2.3.4. Gaps in provision

The above three sections cover the main provisions that exist with respect to open space planning and design in Delhi, especially green spaces designed for recreational function. From the observation

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[24] See more at https://www.tourism-of-india.com/lodi-gardens.html
[25] Available at: https://archive.org/details/1994Delhi11. Last accessed on 22nd of February, 2018.

above it is quite evident that there exists planning policy and design guidelines for bigger green spaces such as regional parks, and city parks of aesthetic value, however no concrete policy or guideline that specifically looks at managing and designing parks at the neighborhood level is visible. The size is mentioned in the Master Plans, although their depiction at zonal level is completely omitted, thus leaving the local municipalities sometimes with the burden to allocate spaces for neighborhood parks as they deem fit. Similarly the appropriate provision of how much green space should exist per person at a neighborhood level is mentioned only in the landscape guidelines, but how it is to be implemented and enforced, and monitored is missing again. The park survey done by Delhi Parks and Garden Society also points towards the lack of empathy of state towards these smaller spaces, as many parks in the district of East Delhi were seen as poor, thereby pointing towards the inherent disregard for these spaces (Delhi Parks and Garden Society, 2016). (Discrepancy was also noted in the fact that planning documents often mention the size of these places in Hectares, while the monitoring agency: Delhi Parks and Garden society mentions the size in Acres. Perhaps a standard reporting size must also be asserted).

In addition to this, the Delhi Preservation of Trees Act, focuses on trees alone. Provided these trees could exist in the neighborhood parks too, but it does not specifically recommend or suggests an advice for their care in these parks. Thus the state driven green space planning and management system lacks considerable specifications for neighborhood parks. Therefore this further adds to the argument to focus on these smaller spaces and explain their management from a non-state perspective as an alternative to the current responsible state authority, where it explains the role of RWAs in looking after these spaces. RWAs are further explained in section 4.2.

This ignorance towards neighborhood parks in legal provisions combined with the lack of research in the scientific literature, commends one even more to look at these spaces and identify the aspects that exist in their management in order to address them more effectively. The next section will describe what management of green spaces actually mean, how it has been covered in literature so far, and what does it specifically mean for this study.

2.4. Urban Green Space Management

2.4.1. Global Management approaches

Urban green space management is often described under the umbrella term of landscape management, as these open spaces form an essential part of the landscape of the region (Jansson

and Lindgren, 2012). Landscape management, in turn is seen as an extension of the landscape planning process, which refers to the process or activity of designing effective and efficient uses of land in a sustainable manner. However, literature often doesn't delineate between what can be referred to as planning and what can be referred to as management. Earliest mention of this distinction is by Steiner (1991), where it is mentioned that management can be seen as a goal or an end outcome of planning process (Gans, 1968 pg. 9 in Steiner, 1991). The author here tries to explain a step by step, flexible and iterative method of planning in managing growth in a US county, where a list of issues and goals are identified, with the last step being the administration and evaluation of a devised plan to resolve these issues in the regional growth plan. Steiner (1991) also stresses on the need for special attention towards the management of decision making process. It is common in practise to separate the process of planning from management especially at an organisational level in local and regional authorities. For example, the difference will be as to what kind of organisation is being looked at, its power, authority, and responsibilities. Also, the funds and resources allocated to either of the process, and the specific time at which each process takes place (Steiner, 1991).

Literature also states that management is expected to follow the planning process (Jansson and Lindgren, 2012). Once a place is planned, designed and put in place, the activities that follow to keep it in a constant functional state can be considered part of the management process. Albrechts (2004) describes them as a part of an overall strategic planning process for open spaces, involving creation of goals and visions, with time bound actions, along with a certain sense of transparency and accountability, principles similar to other management processes.

Another major constituent of an urban landscape are the urban forests. Therefore management must also be described with the perspective of these green spaces. Urban forests are defined as all the network or connecting systems of trees and woodland in urban and peri-urban areas (FAO, 2017). This could include all grown trees in a park, forest, woodland, street sides or even remote corners of the area. Urban forestry is the collective term used for the practice of management of these green spaces with respect to their continuous contribution towards urban sustainability. The concept can be traced back to the tree wardens of North America as a part of tree conservation laws devised in early 1900s (Campanella, 2003). Later on the practice gained popularity in Europe where trees were already considered as a major component of urban green spaces and hence need to be protected and managed; here the management is defined more as an activity rather than an organizational management (Gustavsson *et al.*, 2005). Urban forestry lately has become more oriented towards the same principles of being integrative, participative and inter disciplinary as

strategic planning (Konijnendijk *et al.* 2006). Gustavsson *et al.* (2005) describe management about people or institutions carrying out certain activities that address issues at *strategic, tactical, and operational* levels. Strategic level involves identification and establishment of a decision making process in order to clearly formulate objectives and goals. Tactical level involves creation of time bound plans in order to realise the actualisation of these objectives and goals. And last, operational level is where these plans are turned into reality, important elements being arrangement and organization of human and financial resources for maintenance process of green spaces. This makes the process of management look far bigger and dynamic than maintenance alone which may just involve upkeep of the space. In European context, Konijnendijk, (2003) mention how planting of forest and trees and their management was already being seen as a tool for environmental, social and economic development in several urban agglomerations. Although the earlier European urban forestry approaches focused more on technical perspective, many researchers since then have stressed on the use of more strategic and tactical aspects to be incorporated (Ode and Fry, 2002; Konijnendijk, 1999, 2003). Other considerations to be taken into account with respect to management of urban forests are user preferences (Ode, 2003), and citizen participation methods (Tyrvainen *et al.*, 2003).

Although the main elements of urban forests are trees, and therefore the techniques of management are designed with this focus on mind. However, urban green spaces also encompass other elements like urban parks and gardens. Most studies related to park management start with discussions on the strategic and organizational aspects in the process (Delshammer, 2005 in Jansson and Lindgren, 2012; Randrup and Persson, 2009). The first mention of strategic approaches is by Morgan (1991), where argument is given in support of use of strategies to involve public for management and to seek continuous feedback in the form of surveys and analysis. Similarly, Page *et al.*, (1994) states that the strategic management of parks should include local community in a way that the local needs are adapted in the park management. Young (2010) on the other hand focuses on the organizations responsible for management rather than space itself. A similar perspective adapted by Randrup and Persson (2009) presents a framework model for park management by municipal organizations. The three main corners or elements of their model, is the green space management, the green space itself and its elements, and the green space users. Their model represents three levels of activity in the management process that bear similarity to the three scales mentioned previously by Gustavsson *et al.* (2005). These set of activities are labeled as policy, tactics and operations (Randrup and Persson, 2009, See Figure 12). They also stress on the need of long term planning, and collaboration of organizations and actors (users) across areas other than just the

municipality, an approach which was improved and adapted in studies by researchers on green spaces in housing societies in Nordic countries (Lindgren, 2010; Molin, 2014).

Similar approach is also explained under the concept of place keeping (Dempsey and Burton, 2012). Place keeping was first mentioned in literature by Wild *et al.* (2008), who define it as a long term management process that ensures social, economic, and environmental benefits that can be procured from a place. The inspiration behind place keeping is quite simple: it aims to move a step further from production of high quality spaces by providing opportunities for upkeep of space as well, which can be valued and utilized by users and will make them want to use it again and again. However, it must be mentioned that various dimensions of a place take time to develop, for example increased biodiversity benefits can be procured once the trees are mature, or sense of community ownership and attachment can be created only if the space is used for informal events or get together (Dempsey and Burton, 2012). Also, it must be mentioned that the extent to which place keeping ensures its aim can be limited by the definition of terms: high quality and sustainable space. It can however be explained through efforts undertaken in countries like United Kingdom (UK), Denmark and Sweden, that place keeping leads to formation of quality green spaces (Mathers *et al.*, 2015).
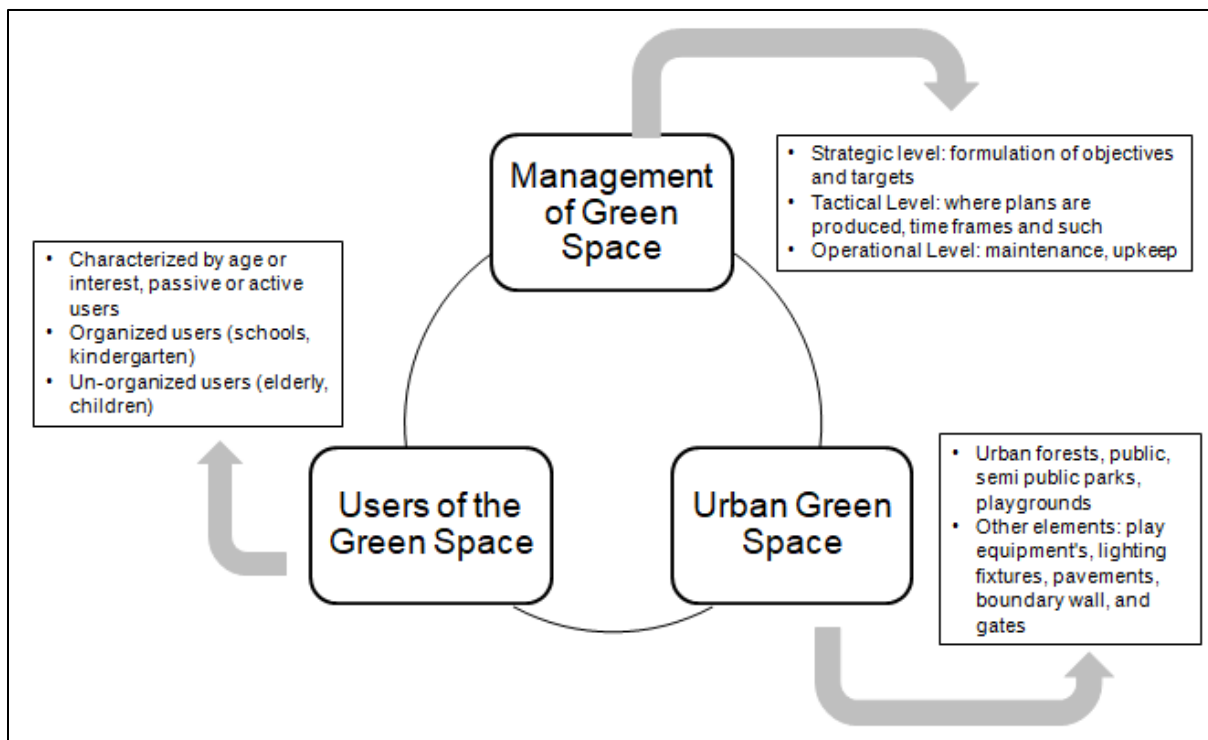
Figure 12: Green space management by municipal organisations as described in Randrup and Persson (2009)

Lately, these approaches or concepts have been adopted and revised to use in studies looking at management of green spaces in urban areas by actors other than the local government. Often these actors are the housing society's staff, community groups, or even lone and motivated individual citizen. The most cited cases of management of green spaces involving citizens in one form or another often come from Nordic countries, where participative management is a common theme amongst various local municipalities (See Table 9). (Few of the examples have been discussed before in Section 2.1.) There are cases where citizens are actively involved in management of local green spaces due to environmental and social consciousness. The local authorities are also encouraging of such initiatives, and often there are no conflicts between such grassroots efforts and the authorities, also noted is that a spirit of cooperation prevails amongst them (Castell, 2010). The size and type of these spaces can vary, they can be smaller spaces such as pocket parks, community gardens, even green squares and spaces in between public residential units (common example of social housing in Sweden) or they can be bigger parks as well (example from Netherlands). These studies in northern countries show the influence of local citizen initiatives on green space management. However, this also shows a gap for such studies being conducted in global south, in countries such as India. This thesis therefore aims to somewhat contribute to this research gap with a case study of East Delhi, India.

In case of bigger parks, it was observed that an effective management is possible if there were established set of rules and procedures for the management process (Mattijsson *et al.*, 2017), and that there was an extensive support from the local authorities, and also the needs and design of these spaces were politically influenced somehow (Mathers *et al.*, 2015). Benefit by involvement of users or residents in management was observed in spaces smaller in size such as community gardens, and municipal parks (also pocket parks and squares), where it was observed that there was an impact on the human aspect of the place, such as experience of the place being well looked after and being safe (Molin, 2014, Lindgren, 2010). Positive impacts on the biodiversity of the green spaces due to involvement of volunteers in green space management was observed in places which were again smaller in size, and thereby easily managed without involvement of complex set of procedures (Dennis and James, 2017). Context specific changes, and management procedures were observed in all green spaces irrespective of size and type, which stresses on the argument that each space is special in its own way, and though general rules of management may be adapted from other successful case studies, however, in the end an effective management can only be seen if the process takes into account needs and requirements of the local users and participants.

Table 9: Examples of studies on green space management (own compilation)

S.NO.	PLACE	AIM/OBJECTIVE	CONCEPTUAL APPROACH	OUTCOME	TYPE OF THE OBSERVED GREEN SPACE
1.	Sweden (Castell, 2010)	To study the occurrence and presence of involvement of tenants in open space management.	Strategic management of open spaces	• Identification of 28 formalized process of involvement • Involvement dependent on pre-conditions (physical, demographical, and organizational)	Yards in between rental housing areas. Size not mentioned.
2.	Sweden (Lindgren, 2010)	To find out how the management and maintenance of green spaces benefits the residents in residential units.	Park Management Model	• The experience of benefits is complex in terms of knowledge and context, and varies between individual groups and housing areas • Maintenance of space contributes to residents experience of well-kept space, safe housing areas, and just distribution of services	Yards in 3 different rental housing areas. Size not mentioned.
3.	Denmark, England (Molin, 2014)	To find out how involving users in operational management of green spaces enhances 'place attachment' for the urban dwellers.	Policy arrangement approach; Place keeping (Place based governance)	• User participation brings benefits closer to social and human aspects of 'place', rather than the overall quality of the green space	Municipal Parks. Size not mentioned.
4.	England (Mathers *et al.*, 2015)	To what extent do citizens have capacity in cross-sector partnerships for green space management?	Place keeping (Partnership capacity)	• Partnership capacity influenced by political/historical legacy of the place, and is context specific to the place keeping task.	7 Parks in two different cities. Size: Mixed, range from 0.1 ha to 22 ha.

S.NO.	PLACE	AIM/OBJECTIVE	CONCEPTUAL APPROACH	OUTCOME	TYPE OF THE OBSERVED GREEN SPACE
5.	Germany, Netherlands, Italy (Mattijssen *et al.*, 2017)	How citizens contribute to long term management of green spaces?	Place Keeping	Long term management possible if • There are established rules and procedures • Citizens adjusting to contextual changes • Supporting role of authorities is there	Three public green spaces with observed long term management practice of public participation Sizes: 5 ha, 13 ha, 120 ha.
6.	England (Dennis and James, 2017)	How site access and user participation in green space management affects the biodiversity potential of a space?	Civic ecological management practices	• There is a positive impact on urban biodiversity and generation of ecosystem services due to increased volunteer input (community involvement)	Different Community gardens, community allotments, and pocket parks. Sizes: Mixed, range from 2000 sq.mts. to 300 sq.mts[26].

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[26] Ha stands for Hectare. 2000 sq.mts is equal to 0.2 Ha, and 300 sq.mts is equal to 0.03 Ha. 1 Ha is equal to 2.4 acre.

2.4.2. Green Space Management in Delhi

In case of India, it has already been mentioned that parks are planned by the local development authority, but their maintenance most often falls under the remittance of the local municipalities. These activities may include gardening activities such as planting trees and shrubs, putting manure, irrigation and watering, changing vegetation according to the season, among other things.

In Delhi, these areas are managed by different agencies such as the Municipal department (MCD, NDMC), the public works department (PWD, CPWD), and the local planning authority (DDA). In addition to these agencies, there are other additional actors involved in management of urban green spaces. Below is a brief description of how green spaces in Delhi are managed and maintained at various levels. All this information is publicly available at DDA's and MCD's official website.

- *Federal level*: control via Delhi Development Authority (DDA), falls under the direct guidance of Ministry for Urban Development (See Section 2.3.1). It is responsible for maintenance of all regional and district parks. In addition to this it also looks after 255 neighbourhood parks in Delhi. Other agency at federal level is the Public Works Department; they mainly look after the green spaces in government offices and buildings, on road sides, and traffic signal corners.

- *State Level*: Delhi Parks and Garden Society, Government of NCT of Delhi. This was formulated in 2008 to oversee the management of parks in the capital region. The society aims at increasing the green cover of Delhi from 19 per cent to 25 per cent. It conducts a yearly survey of parks throughout the NCT, which is available on its website[27]. The society was formulated to coordinate management activities undertaken by other agencies responsible for park maintenance. Its basic function is that of a monitoring agency rather than implementing one.

- *Local level*: the Urban Local bodies (delegated power from federal and state level). The Municipal corporation of Delhi (MCD, in capacity of its trifurcated agencies), and New Delhi Municipal Corporation of Delhi (NDMC) are the agencies responsible here for maintenance of parks. The MCD currently looks after more than 15,000 parks in Delhi that includes ornamental parks, ordinary parks, and children's parks.

- *Resident Welfare Associations* (RWA's): citizens group working either in their individual capacity or sometimes in collaboration with the government agencies. In many

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[27] http://delhi.gov.in/wps/wcm/connect/doit_dpg/DoIT_DPG/Home/Parks/. Accessed on 13th January, 2018

neighborhoods, RWAs have been seen to take up on this initiative. There are also government devised schemes to financially assist these organizations in some parts of the capital under the PPP model[28]. Their working and organization has been described in detail in Section 4.2.

In East Delhi district, there are more than 1100 parks, as mentioned previously as well (Delhi Parks and Garden Society, 2016). They are managed collectively by DDA and East-MCD, although the exact distribution of number of parks under each agency is not clear. However, RWAs have been mentioned by the Delhi Parks and Garden Society and as well by DDA, to be given responsibility for managing few parks. According to a list mentioned by Delhi Parks and Garden Society (2015), RWAs were responsible for a total of 148 neighborhood parks in the area in year 2014. This list has not been updated since.

The general condition of these parks was recorded by the Delhi Parks and Garden society. They noted the condition of 1179 parks in East Delhi in a survey, and have rated them as "well-maintained", "satisfactory", and "poor". Information for few parks is also listed as not available (N/A). However, there is no clarification given as to how these categories were decided, and on what criteria do a park qualifies for one. This data was downloaded, compiled in MS-excel, and is represented graphically in Figure 13, Figure 14, and Figure 15. It was only available for three consecutive Years 2013-2014, 2014-2015, and 2015-2016.

Also, the above data in the survey report does not mention which agency is responsible for the maintenance of these parks. Traditionally speaking local authorities are responsible for the parks and their upkeep; however as can be seen from the numbers in the pie-charts this part has not been ensured very well. More than half of the parks (1179 recorded) for the year 2014-2015 (60%) and 2015-2016 (64%) have been rated "poor", for the year 2013-2014 this number was less than half (43 % only). This adds to the problem statement where the argument is made as to question the efficiency of the local authorities in taking care of these parks. This also highlights that the current legal mechanism or measures are not enough or implemented well in order to see the parks being maintained proper. In this case, some research must be done in order to find out what alternative mechanisms or ways can be adopted to ensure a continuous upkeep of these smaller parks in the area.

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[28] http://www.millenniumpost.in/north-mcd-hikes-maintenance-amount-for-parks-99148. Last accessed on 12th November, 2017
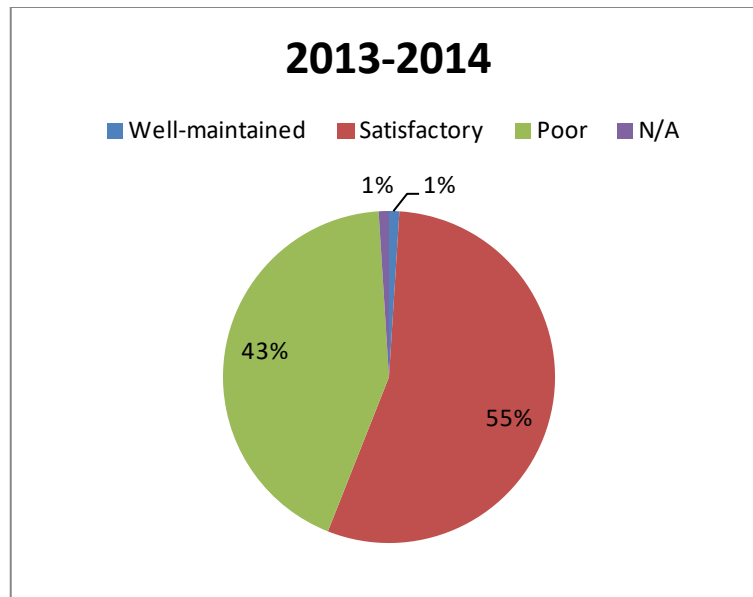
Figure 13: Park Survey for 2013-2014 in East Delhi. Source: Delhi Parks and Garden Society (2016)
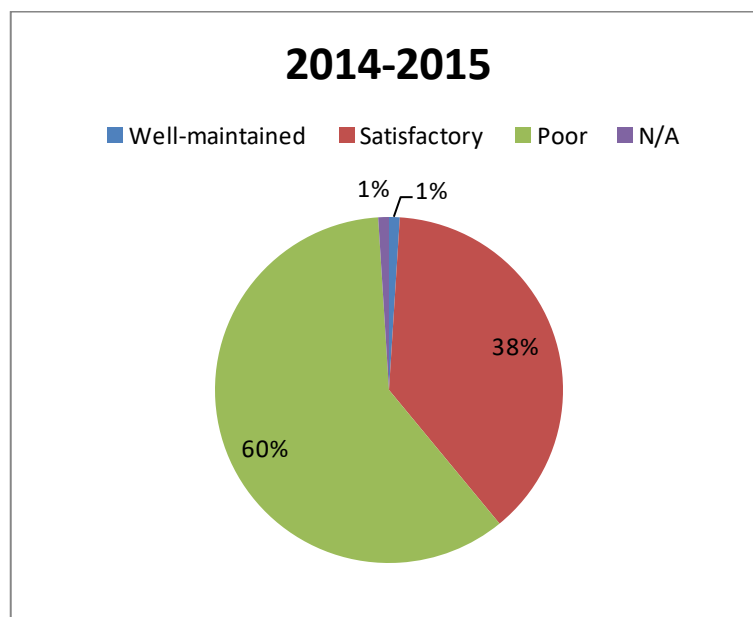
Figure 14: Park Survey for 2014-2015 in East Delhi. Source: Delhi Parks and Garden Society (2016)

2015-2016

■ Well-maintained ■ Satisfactory ■ Poor ■ N/A

0.5%   0.5%

35%

64%
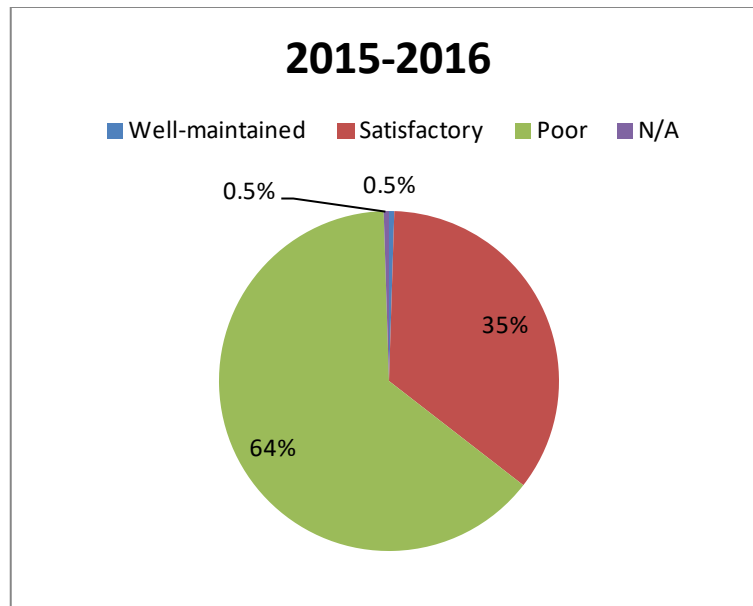
Figure 15: Park Survey for 2015-2016 in East Delhi. Source: Delhi Parks and Garden Society (2016)

2.5. Theoretical framework

As mentioned before, previous studies looking at the prospective role of citizens and citizen groups in management of urban green spaces have used the concepts borrowed from the field of strategic management of these spaces (Castell, 2010; Lindgren, 2010; Molin, 2014; Mathers *et al.,*2015) described in the previous sections. This study therefore, also adopts the conceptual approach of Open Space Strategic Management, which is described as a strategic process comprising three different levels of activity as a part of green space management (Gustavsson *et al.,* 2005; Randrup and Persson, 2009; See Table 10).

As described by Gustavsson *et al.,* (2005), strategic level involves identifying and initiating a decision making process in order to clearly formulate objectives and goals; tactical level involves creation of time bound plans for achievement of the objectives and goals; and last, operational level is where the plans are implemented on ground, important elements being arrangement and organisation of human and financial resources for maintenance process of green spaces. Usually in practice, these activities of management are supposed to be divided into different administrative departments of the local authority. However, here in the case study area, the information to differentiate between the actions and the respective departments of the local authorities was often found to be vague, unclear and at times completely missing.

Table 10: Levels of green space management (Gustavsson *et al.*, 2005; Randrup and Persson, 2009)

STRATEGIC LEVEL	TACTICAL LEVEL	OPERATIONAL LEVEL
• Policy, vision and long term strategies are framed • How to organize the overall maintenance process to achieve a certain goal? (Lindholst *et al.,* 2016)	• Intermediate level • Workable and time bound plans are created • What tasks to be done and/or prioritized? (Jansson and Lindgren, 2012)	• Day to day activities considered as maintenance • How the task is to be done? • Concrete activities such as cleaning, pruning etc. (Lindgren, 2010; Molin, 2014)

Due to the site specific context in this study, therefore, the main focus is only on the operational level. With a larger public green space, it is easier to identify and separate all three levels of management and look at them separately, for example in case of a district or a regional public park in Delhi, the roles of agencies or institutions responsible for strategic (Ministry of Urban Development MoUD; DDA), tactical (CPWD), and operational (DDA; NDMC; MCD) are a bit more distinct, however this study specifically looks at neighbourhood green spaces, that are way smaller in scale than district or regional parks, so here the difference between activities at strategic and tactical levels is not that pronounced as mentioned in the above paragraph. It is evident in Section 2.3 that not many provisions for neighbourhood parks are highlighted apart from the policy and planning level. Therefore, the study has to focus on the operational level alone. It is described here as the level consisting of any activity that deals with the maintenance: upkeep and development of all components of the green space (Jansson and Lindgren, 2012). The dimensions or activities under maintenance are further described in the next section.

2.5.1. Maintenance of green spaces

Maintenance has been described in varied ways in the literature (Gustavsson *et al.*, 2005; Jansson and Lindgren, 2012; Lindgren 2010; Burton *et al.*, 2014). What people perceive as a maintained space is perceived through the results of different activities that are undertaken for the upkeep of this space (Lindgren, 2010) and thereby maintaining a certain level of quality. Now quality of green spaces is a highly subjective term used in literature. Example: for geographers the quality of

greenspace can be measured in terms of perception of 'naturalness' and lack of litter (Groenewegen *et al.*, 2012), in another paper linking physical activity with green spaces, the quality was associated with good lighting around play and walk areas (Lachowycz *et al.*, 2012). A paper on urban cooling in China deigns quality greenspace as places comprising of vegetation (Kong *et al.*, 2014). Other studies referred to the quality and presence of 'green-ness' or 'green' (van Dillen *et al.*, 2012; de Vries *et al.*, 2013). Quality can also be seen in the way the place is kept. A well-kept space for example is a direct outcome of inputs like: cleaning, maintaining or replacing broken and worn equipment, and upkeep of vegetation (Lindgren, 2010). Functionality of equipment in the space is an important aspect of maintenance process, elements other than the vegetation, such as light posts, benches, pathways, playground equipment hold equal significance and contribute to the user experience (Burton and Mathers, 2014; Randrup and Persson, 2009) and thereby also contribute to creation of recreational opportunities in the space. Seaman *et al.*, (2010) mention the perception of green space also depends on the social groupings that visit the space, such as young adults wanting to hang out with their peers, or parents with young children looking for a safe place for them to play, and if the space meets their criteria, it can be perceived as a quality space. Safety is also an important concern, people often describe green spaces in terms of being 'scary or dangerous', and a well maintained space can therefore be seen as inviting and described as a safe place to visit, which make the people use these places more often (Lindgren and Nilsen, 2012). Improved visual appeal may also be the outcome of a maintained space as it can be an indicator of a quality green space (Jim and Chen, 2006). As mentioned before, quality of green spaces mean different depending on the context of the study, for this study it is described as perceived quality, less technical and more experienced (Lindgren, 2010) by measuring perceived changes in the visual appeal of the green space. Other way to look at a maintained space could be seen from the decision making perspective (Dempsey and Burton, 2012; Lindgren, 2010, See Table 12). These decisions pertain to what action should actually be undertaken in order to make the space well kept (Jansson, 2009). This would constitute to what makes the process of maintenance. For instance this would involve hiring and detailing the responsibility of a maintenance staff, a gardener to be specific, who will have more information on what, where, and how the vegetation in the green space should be like. In instances that it is not possible or may be missing due to lack of strict enforcement on the local authority's part, whether citizens' themselves get involved in the gardening process or not.

Table 11: Dimensions of a maintained green space (Outcome) (own compilation)

S.NO.	DIMENSION	DESCRIPTION	SOURCE/REFERENCE
1.	Functionality of the equipment for recreational opportunities	Elements other than the vegetation in the green space. Adequate seating place, proper paved pathways to take a walk around. Appropriate lighting and functioning lampposts to provide that. Playground equipment for kids in the green space.	Burton and Mathers (2014); Randrup and Persson (2009)
2.	Cleanliness	Absence of litter and garbage in the space can be the indicator of a clean green space. Also timely sweeping of leaves and debris from the walking and seating area contributes towards cleanliness.	Dempsey and Burton (2012); Lindgren (2010)
3.	Presence and upkeep of vegetation: enough 'green'	Would include timely cutting and pruning, to keep the height and intensity of vegetation that is perceived safe enough for people to walk and sit around. This will also include the amount of trees, or plants in the space, that are preferred by the users.	Lindgren (2010)
4.	Safety	It will involve activities that will create a safer green space, for instance building boundary walls, fence, gates, keeping a security guard to monitor entry, or even controlled visiting hours to the space	Lindgren and Nilsen (2012)
5.	Perceived quality	Here, it is can be seen in perceived change in visual appeal of the space, and creation of recreational opportunities as a direct outcome of maintenance activities	Jim and Chen (2006)

In addition to this, the financial resources, their arrangement, and their distribution with respect to activities in the space would also form the part of the process (Blomè, 2006 in Lindgren, 2010). This would involve organizing funds for the process of maintaining the local green space, either in terms of hiring a gardener, or buying saplings for plantations, or even making the space safe by creation of walls, security guard, or more lighting in the green space. Other ways would be to have a functional relationship between the local authority and the citizens making use of the green spaces. This would entail mechanisms for addressing their grievances, a platform for exchange of complaints and other information, and also timely resolution of their issues. In this study these aspects are covered under

the assumed actions undertaken by the people responsible for maintenance of local green spaces in the study area, and are considered to be independent variables, as these actions are to be undertaken irrespective of any other factor. These are part of the responsibilities and obligations of the people responsible for maintenance of the space.

Table 12: Dimensions of green space maintenance (Actions) (Own compilation)

S.NO.	DIMENSION	DESCRIPTION	SOURCE/REFERENCE
1.	Financial help	Involves arranging financial resources or funds for actions	Blomé, 2006 in Lindgren (2010)
2.	Partnership	When the maintenance is being undertaken by citizens, it will include their ways or measures to get in touch with the local authorities (legal providers of maintenance). It may involve the grievance redressal methods and how do they raise issues related to the green space. It would also entail personal suggestions or recommendations with respect to the local green space.	Dempsey and Burton, (2012); Burton and Mathers (2014); also self-observed parameter
3.	Maintenance staff	Presence of a gardener solely dedicated to the green space. Or if not possible, personal involvement in maintaining, getting involved in gardening or cleaning drive in the space	Jansson (2009); Dempsey and Burton (2012)

As mentioned previously, these are the aspects or dimensions related to the process of maintenance that have often been described and operationalised in various literatures. However, so far studies related to their measurement have majorly been recorded in the Nordic countries, and U.K. where perception of a well maintained green space and its subsequent use may differ from that in a developing country. The differences may arise due to rapidly changing land use patterns, demographic characteristics and cultural understanding of these spaces. This study here keeping the differences in mind, aims to adapt these framework aspects to a city in a developing country, and therefore may not be able to do complete justice to the measurement of these aspects, however a sincere attempt has been made. This could be considered both a unique point and a limitation for this research.

2.6. Summary of the chapter

Green spaces are an important aspect of an urban landscape, and are important for the overall quality of life of urban dwellers. Green spaces in the city can act as a reprieve for its citizens from their busy and stress full life, thereby contributing towards their long term wellbeing. Their presence and provision is therefore significant from the aspect of achieving sustainable and resilient urban environments. However, as mentioned in the chapter, their planning and implementation is not enough, they require constant maintenance and look after in order to keep providing the various services to their immediate environment.

In case of Delhi, the planning provisions for green spaces lie in the Master Plan, however the provisions or guidelines to maintain them are not very well defined beyond a certain level in the hierarchy of green spaces in urban areas. Perhaps the reason why the state based agencies or actors have been unable to ensure the quality green spaces in the area, due to which resident organisations have picked up the lag.

There are several approaches that discuss the role of active citizens involved in taking care of green spaces in urban areas. Conceptual approaches such as civic ecology practices (Tidball and Krasny, 2012), place-keeping (Dempsey and Burton, 2012), and open space strategic management have all described in various ways, how this role is defined and what are the specific motivations and outcomes of such voluntary efforts. For this particular research, the open space strategic management has been used as a framework, and the respective hypothesis, and various test variables have further been described in the light of this framework. In order to show how these aspects have been operationalised for this research project, the next chapter describes the main research goal of this study: that is the Hypothesis framed, and the various dependent and independent variables used in support of the main hypothesis.

3. Research Hypothesis

In the previous section, examples of places where citizen groups are proactive in taking up the responsibilities from the local authorities to look after their local green spaces have been listed. It has also been pointed out briefly that in the study area (East Delhi) this responsibility is taken up by the RWA. Hence the main hypothesis derived for this study is:

Resident Welfare Associations (RWA) maintain quality green spaces in East Delhi.

The above hypothesis carries the implication that the maintenance of the local park when undertaken by RWAs lead to a consistent creation of clean, safe, and quality green spaces. Here, maintaining the green space would mean any activity to be taken in relation with keeping and preserving the green space, so that it is being used by active users in any neighbourhood. It is measured using independent variables. The quality here is measured in terms of several dependent variables described further in the chapter.

Through this hypothesis, the study aims to find out what the level of RWA involvement is in maintaining these spaces; that is: what are their actions in relation to the maintenance process, and finally, what is the possible influence and outcome of these actions on the overall quality of neighborhood green spaces and parks. What constitutes maintenance of a park; the related actions and their outcomes are explicitly described and operationalised using the conceptual approach mentioned in section 2.5. They are also described below.

1. **Actions**: any activity or action that involves taking care of the local green space, and resulting in alteration of its quality. Here, maintenance can be measured in terms of actions that are undertaken by RWAs with respect to changing or enhancing the quality of the local green space. These actions in the study are recorded as: arranging money for the actions; raising up issues related to park maintenance within internal meetings and with relevant authority; providing advice and guidance; manually helping in the park activities; and any other action taken by the RWAs (See Table 13). These also act as independent variables for the hypothesis, as these actions are undertaken either as a part of their responsibility or as a conscious decision to contribute towards their local green space and therefore not dependent on the condition of the park. These actions are defined and answered by the target group (See 6.1.5).

2. **Outcomes**: Are the direct or indirect results of the actions undertaken. These are described as how the maintenance process results in creation of a space that is or can be perceived as

well-kept and quality green space. This can be indicated in terms of user experience in the green space and how well do they perceive this space to be maintained. Here RWA representatives are considered to be users of the green space and their perception is noted[29]. Thus maintenance here is measured not in technical terms, but as something that is experienced. The outcomes are measured in terms of: how clean the space is; how green the space is perceived to be; its safety; perceived visual appeal; and functionality of the equipment. These are the dependent variables for the hypothesis (See Table 14).

Both, the independent and dependent variables have been derived and described based on previous empirical studies, and on their ability to be tested in the field.

Table 13: Independent Variables used in support of the main hypothesis to describe maintenance actions (own compilation)

VARIABLES USED TO INDICATE ACTION BY RWAS (INDEPENDENT)

- **Arranging RWA funds**: in terms of collecting money from each household in the neighbourhood, completely voluntary, or business sponsers

- **Raising up park related issues**: within RWA meetings and also with concerned authorities

- **Providing guidance**: personal advice and recommendations with respect to the design of the local park

- **Manual help:** manually helping with cleaning and gardening in the park

- **Any other way**

In order to find a relationship between the actions and their outcome as described previously, several sub hypotheses were also derived. The next section discusses each sub hypothesis and elaborates on the assumptions behind each.

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[29] It has been shown that residents with local interests have stronger demands and views on the maintenance of green spaces, this suggests that when their demands are met, those of the other residents will be too (Liedholm, 1984 in Lindgren, 2010).

3.1. Working hypotheses

This section explains the rationale behind assumption of each working hypothesis, and how do they operationalize for this research.

1. **Actions taken by RWA lead to creation of recreational opportunity in the local green space**.

   This hypothesis assumes that various actions taken by the RWA presidents (as described in the previous section) lead to creation of recreational opportunity for the green space users. This recreational opportunity here is measured in terms of how the RWA presidents perceive it to be. If a place is perceived to be a good meeting place, a good place to go and relax, and also a good place to exercise for all group of individuals living in the vicinity of the park, it is assumed that their actions have led to a positive outcome on the quality of the green space. Public spaces, such as parks in high density areas (here East Delhi) are significant places that enable the residents to establish social ties and sense of community (Kazmierczak and James, 2007). And it is believed that if the space is perceived to be a place to meet and establish contact with neighbourhood people, it increases this sense of community. A large amount of literature also suggests how presence of parks aids in releasing stress and gain a fresh and positive perspective on life (CABE Space, 2005). Thus helping the green space users to be able to relax and wind down. The related question asked here was whether they consider that the equipment in their park such as seating benches, walking paths, and play equipment for kids were functional enough to provide them with opportunity for recreation and hence community interaction and relaxation.

2. **Actions taken by RWA lead to neat and clean local green spaces.**

   This hypothesis assumes that the result of the actions taken by RWA presidents with respect to the local parks leads to clean and litter free green spaces. Hence improving the quality and making it more attractive for neighbourhood users to visit and use the space. It has been observed that people are less prone to use a space if there is presence of rubbish, dog dirt, unclean walls, overflowing garbage bins in a public green space (Newcastle City Council, 2004). Therefore the actions taken by RWA presidents to make it a quality and lucrative place to visit must work in this direction to make it clean and neat. The actions here can be described as personal involvement in cleaning and picking up litter during their normal morning walks, or organising a weekly event to clean the space (providing guidance). The outcome is usually a

litter free space. The related question asked was whether they perceived their local green space to be free of litter and garbage, thereby giving it a clean look.

3. Actions taken by the RWA lead to greenery in the local green space.

This hypothesis assumes that certain actions taken by the RWA presidents leads to an increase in 'green-ness' of the local space, and hence making it lucrative for neighbourhood people to visit. Almanza *et al.*, (2012) discusses the relationship between presence of greenness and child activity in cities, similarly Ambrey and Fleming (2014) discuss the positive effect of presence of green spaces such as parks on the wellbeing of its users. This shows that people value presence of green areas, and greenness as such for physical health and mental development. Here, it is measured by their perception levels, as to what they consider is enough tree cover in the area. Trees provide dense shade for sitting in summers and also fruits and flowers depending on the species type. However the appropriate level or amount may differ from person to person, for example in some places tall and dense shrubs may be tolerated , however the same may not be valued in other places, and at different time of the day (Newcastle City Council, 2004) and may be perceived as unsafe. The related question asked here was whether the respondents perceive that there is enough tree cover in their local green space. By tree cover, it just did not mean the trees alone but also green shrubs and other vegetation, and the same was explained during the interview to the respondents.

4. Actions taken by RWA lead to safe and secure green spaces.

The hypothesis assumes that actions taken by RWA presidents lead to the local green space being perceived as safe and secure, so that more neighbourhood people can visit it, especially women, elderly, and children. It has been reported that many people do not use their local green spaces due to fear of crime or unsafe activities happening in the space. Some behaviour such as playing loud music, gathering in bigger groups inside the park, drinking or illegal betting activities can be considered as unpleasant or mildly threatening by the user groups of the local space (Newcastle City Council, 2004). The actions taken here can be in terms of giving money in order to ensure the safety of the park by constructing fences and such, and also by manual help such as being a neighbourhood watch or keeper of the keys for the park gates. The outcome of these actions are that no anti-social activity is perceived to be happening in the green space, it is well protected by constructing either walls or fence around it, and the entry of people from outside the neighbourhood is controlled in order to have trust in using the space without being bothered or worried about who is encroaching on their local space. The related questions asked

was how do the respondents rate their local space in terms of anti-social activity, fences and gates, and entry of people from outside their neighbourhood.

5. **Actions taken by RWA lead to beautification of the local green space.**

The above hypothesis assumes that the actions taken by RWA presidents lead to beautification of the place, thereby increasing the visual appeal, its scenic quality, and hence inviting more people to make use of the space. Actions here are again perceived as mentioned in the previous sections. They could be arranging funds for hiring a gardener who can look after the place, arranging to buy new plants, organising better lighting and seating in the area, or any other artefact that will enhance the visual appeal of the place. There are more technical indicators listed in literature to measure the quality of a green space (Yao *et al.*, 2014), in this study it is measured more in perceived terms, meaning as to how a green space is experienced by its users over time (Lindgren, 2010). An increase in aesthetic experience of the users to the space also indicates the quality of green space. The respondents were asked whether they would consider their local green space to be visually appealing or not.

The above mentioned Hypotheses concern with different aspects of maintenance as mentioned earlier in Section 2.5.1, that is creation of recreational opportunity via functionality of equipment in the space, clean and litter free space, presence and upkeep of vegetation, safety, and perceived quality of the green space. In order to give a summarising view as to what aspect pertains to what hypothesis and what are the respective dependent variables, they are mentioned in Table 14.

Table 14: Working Hypotheses with respect to various outcomes of maintenance and the dependent variables (own compilation)

S.NO.	ASPECT	HYPOTHESIS	DEPENDENT VARIABLES
1.	Functionality of the equipment for recreational opportunity	Actions taken by RWA lead to creation of recreational opportunity by local green space	Good meeting place Good place to relax Good place to exercise
2.	Cleanliness	Actions taken by RWA lead to neat and clean local green spaces	Litter free space

S.NO.	ASPECT	HYPOTHESIS	DEPENDENT VARIABLES
3.	Presence and upkeep of vegetation: enough 'green'	Actions taken by the RWA lead to greenery in the local green space.	Enough tree cover
4.	Safety	Actions taken by RWA lead to safe and secure green spaces	No anti-social activity Protection via fence and gates Controlled outside entry
5.	Perceived quality	Actions taken by RWA lead to beautification of the local green space	Perceived visual appeal

These above aspects are then explored with each test of the corresponding hypothesis in section 6.2. The maintenance aspects such as: availability or organisation of financial help, the partnership between RWAs and local authorities, and availability of a maintenance staff were recorded as a part of the actions that RWA presidents undertake with respect to green spaces, and are described under the section for independent variables and the subsequent results in section 6.1.5.

4. Study Area

This section here desrcibes the case study area that is East Delhi, India, the target population: Resident Welfare Association, and the respective reasons for their selection for this research study. According to Punch (1998), the method of employing case studies involves the basic idea that one case (or perhaps a small number of cases) will be studied in extensive detail using an appropriate method. The type of specific purpose and research questions may vary, the general objective however is to develop as full an understanding of that case as possible. The case to be studied is usually chosen using purposive sampling (Silverman, 2010) as it allows choosing a case that illustrates some features of process in which a researcher is specifically interested. Data for a case study is usually received from documentation, archival records, interviews, observations, and physical artefacts (Yin, 1994). This study takes an approach, where data was collected from various sources like government websites, scientific literature, field notes, and a survey style questionnaire to record the actions and perception of RWA presidents with regard to use and quality of their local green space.
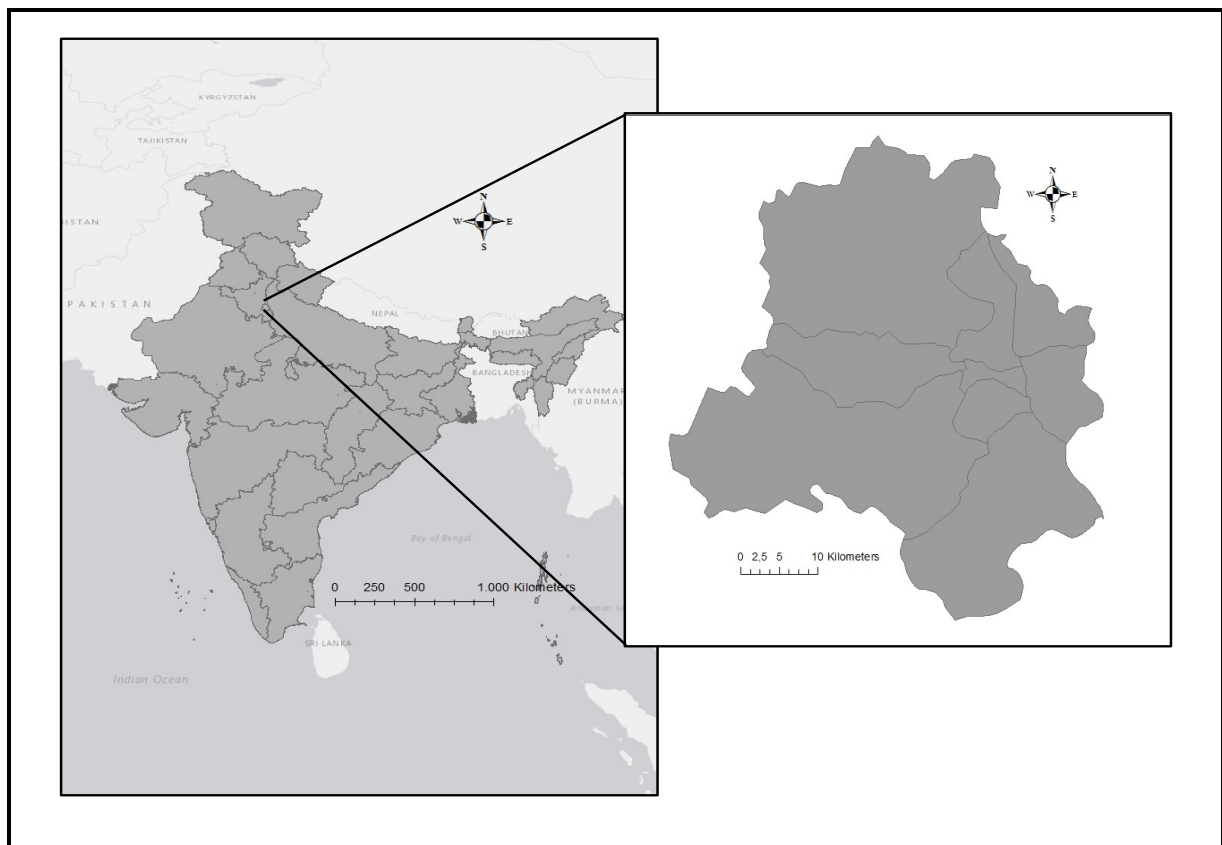
Figure 16: Maps showing India and Delhi. Maps created by author using ArcGIS, data from Esri, DeLorme, MapmyIndia, Open Street Map, and GIS user community.

The study has been conducted in one of the administrative districts of Delhi. The city of Delhi is located in the plains of Northern India, and has a metropolitan population of 16.9 million (Census, 2011a). It is one of oldest inhabited cities in the world, and hosts various government offices in the country, most importantly the Parliament of India. The city is an important political and commercial centre and provides key services like telecom, IT, hotels and tourism. It is one of the fastest growing regions in India, with an estimated growth rate of around 20% of population increase every year[30]. There are nine administrative districts in Delhi, and five municipal bodies (See Appendix C). Various urban services are provided by various agencies working at federal, state, and local level. Graphical representation of governance levels in Delhi with respect to these services can be seen in Figure 17.

FEDERAL LEVEL		STATE LEVEL	LOCAL LEVEL
Union Government of India		Government of NCT of Delhi	Municipal Bodies
Ministry of Home Affairs	Delhi Police		New Delhi Municipal Corporation (NDMC)
Ministry of Defence			Delhi Cantonment Board (DCB)
Ministry of Housing and Urban Affairs (Previously Ministry of Urban Development, MoUD)	Delhi Development Authority (DDA)	Delhi Jal Board (DJB, body responsible for water supply)	Municipal Corporation of Delhi North (North-MCD)
			Municipal Corporation of Delhi South (South-MCD)
		Electricity generation, transmission, and distribution companies (Discoms)	Municipal Corporation of Delhi East (East-MCD)

Figure 17: Urban Services provided by various agencies at different levels of governance (Own compilation)

As can be seen from the chart above, the significant agency involved in deciding land use/land use changes, DDA falls under the guidance of federal ministry, while the state is mostly ensured with providing services to the citizen, such as water and electricity. As mentioned previously the maintainence of parks is shared between DDA and the respective municipal organizations.

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[30] http://articles.economictimes.indiatimes.com/2013-06-11/news/39899448_1_population-literacy-rate-cent-growth

Conducting research in Delhi is important in the current times, because of the fact that the city has been facing a fast and uncurbed urbanization process, which has had a negative impact on the overall open and green spaces in the city. Gandhi (2013) and Jain *et al.*, (2016) has recorded a rapid urbanization process, and subsequent loss of green spaces in the inner city areas. Figure 18 shows a rapid increase in built-up area by almost 31% from 1977 to 2014 in the territory of Delhi. The results are displayed using false color composite images. Here, vegetation is shown in different shades of color red depending on its various types and conditions, clear water appears dark-bluish, turbid water cyan, bare soils, roads and buildings may appear in various shades of blue, yellow or grey, depending on their composition. In Figure 18 one can notice the blue colour in the outer areas of Delhi, which used to be just open land, has been converted red via use of this land for agricultural purposes. However, inner city areas have turned more and greener over the years, giving way to more built up areas, making the city turn dense and compact over time.
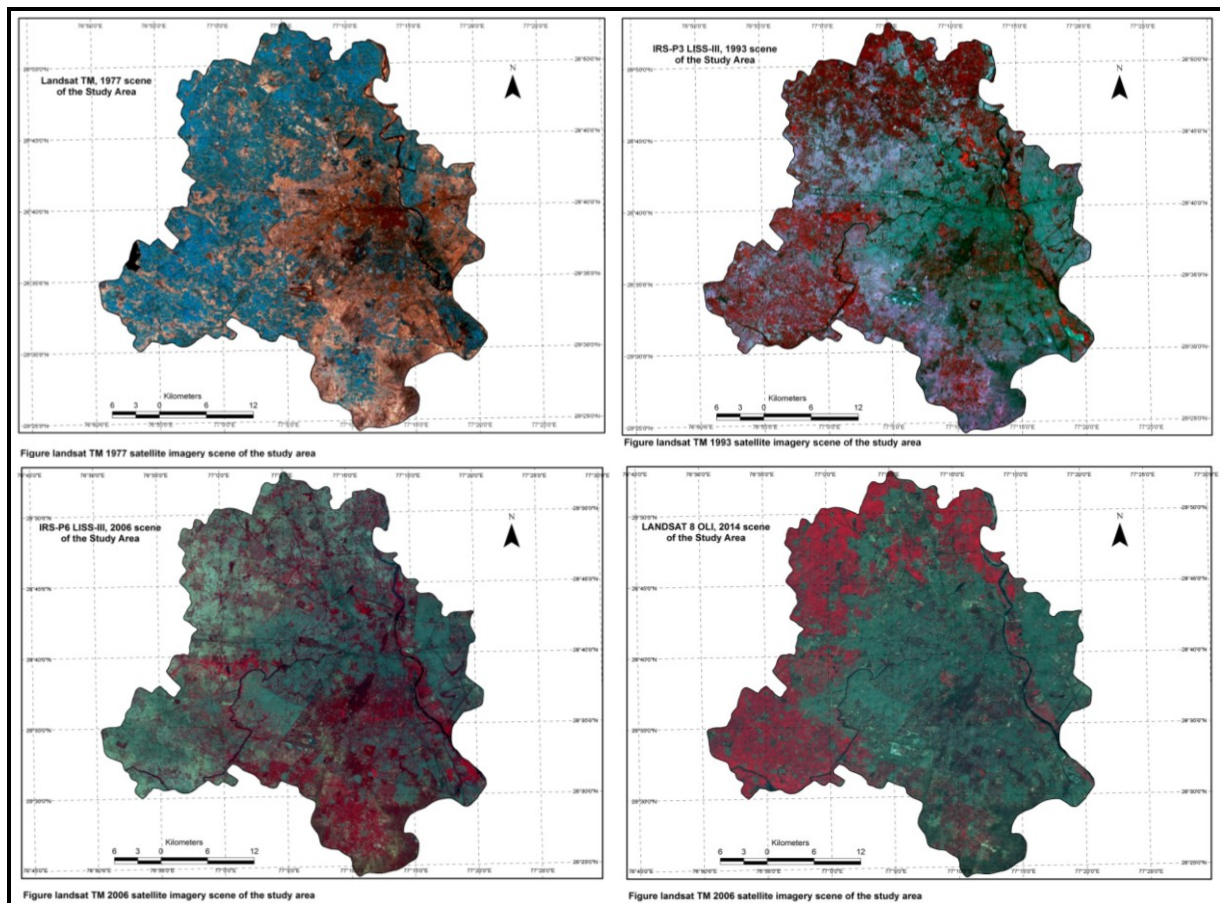
Figure 18: Figures showing increase in built up area in Delhi in the period 1977 to 2014. Source: Jain *et al*., 2016.

However it is also noted that it is practically impossible to be able to undertake research throughout whole Delhi, therefore it was decided to select one district of Delhi, where the research can be

conducted. For this particular study, the district of East Delhi is selected. The first reason to select the area has been mentioned before in the introduction section, on how the civic agencies in the area have been lagging behind in their duties to look after the green spaces, thereby paving way for the local RWAs to take over the responsibility. Another reason is a previous study conducted by Parashar *et al.*, (2013) on community action planning for the area, which found the district to be extremely bad in terms of land use planning, accessibility and availability of open public spaces. Hence, opening the door for need of a more specific study related to this issue.

4.1. East Delhi District

East Delhi has a population of 1.7 million (Census 2011b) and an area of 64 sq.kms, with an approx. population density of about 27,000 persons per sq.kms. The district has more than half of the population (58.19%) working with salaried jobs, out of which 7.27 % work with the government, 10.81% with the public sector, and 40.11% with private sector (SECC, 2011). Average literacy rate in the district is 89.31 % (Government of NCT of Delhi, 2018).

Characteristic of East Delhi District (Census 2011a)	
Actual Population	1,709,346
Density/sq.km.	27,132
Proportion to Delhi Population	10.18%
Average Literacy	89.31 %
Total Child Population (0-6 Age)	194,357
Total Area	64 sq.km.
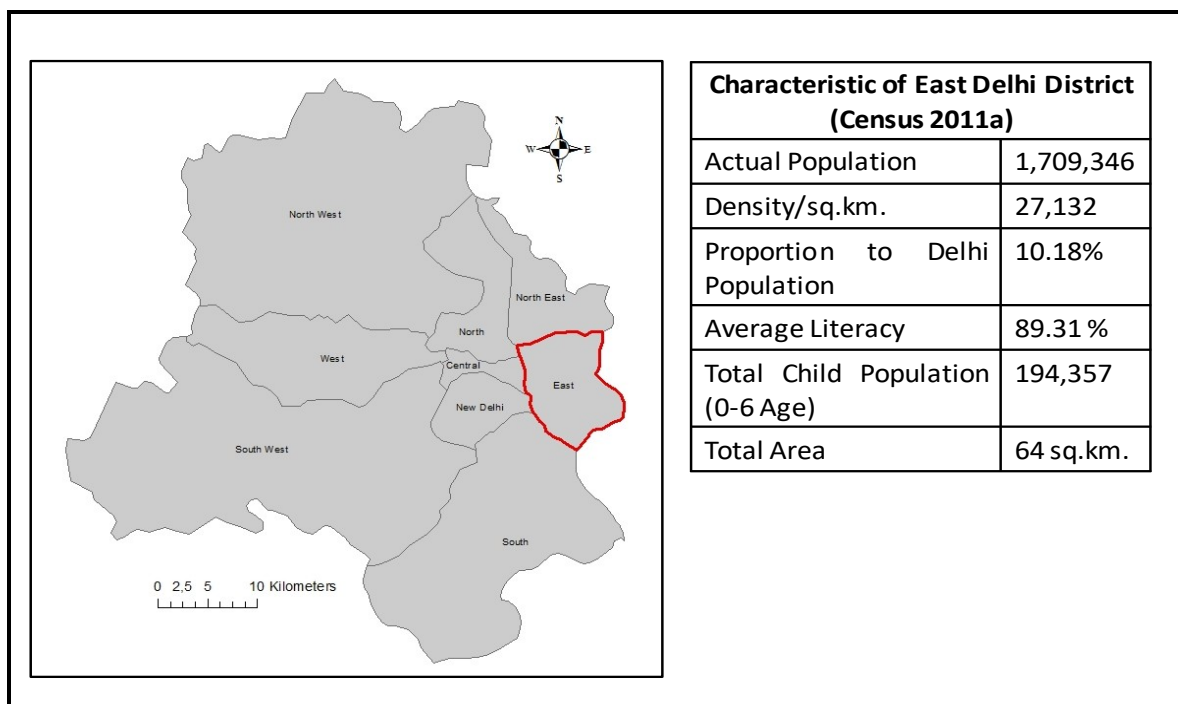
Figure 19: Figure showing east district location in Delhi. Map created by the author using ArcGIS, data from Esri, DeLorme, Mapmylndia, Open Street Map, and GIS user community.

4.1.1. Civic Boundaries

The district is divided into 3 sub divisions, shown in Figure 20. These are:

1. Preet Vihar

2. Mayur Vihar

3. Gandhi Nagar
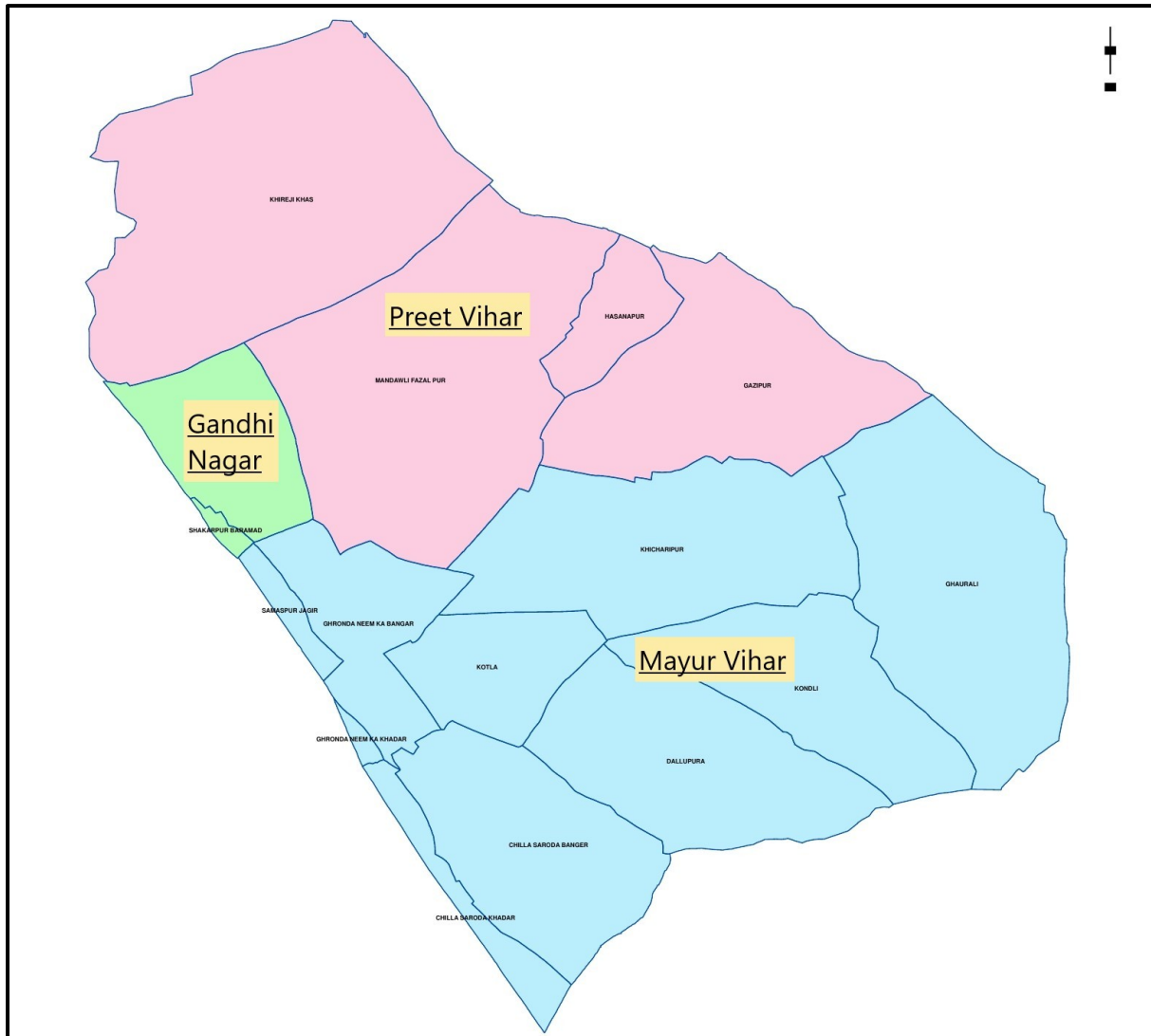
Figure 20: Map of Eastern district of Delhi. Scale 1:12000. Source: Government of NCT of Delhi, 2018.

The District is headed by the District Magistrate (DM-E) and by an Additional District Magistrate (ADM-E), in terms of revenue organisational structure. Each sub division is headed by a Sub Divisional Magistrate (SDM). These are appointed by the Government of India. The urban facilities are provided by the Municipal Corporation of Delhi (East MCD) headed by an elected Mayor. All the above information is publicly available at the online portal of Delhi Government (Government of NCT of Delhi, 2018). The Municipal Corporation of Delhi (East MCD) is further subidivided into 64 wards or ward committee, each has an elected local councillor responsible for the area. The heirarchy of administrative structure between District Magistrate, Municipal Corporation, and the local councillor in East Delhi is depicted in Figure 21.
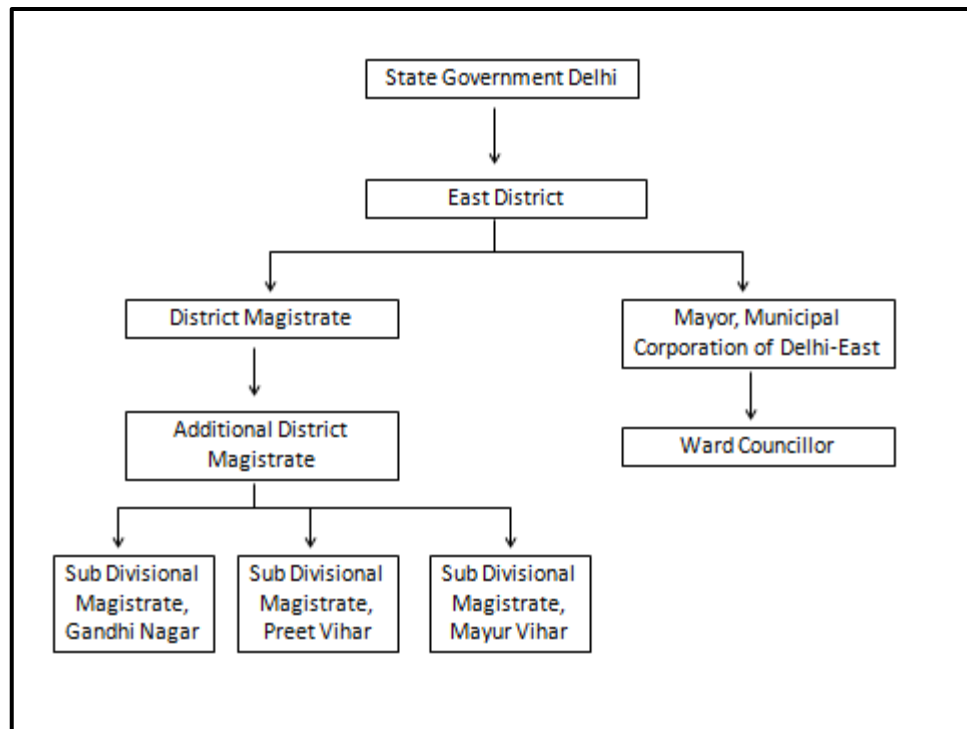
Figure 21: Administrative Structure in East Delhi District

4.1.2.Colony Structure

Residential neighbourhoods in Delhi and in India generally are referred to as colonies. For a better understanding, these areas can be compared to the term 'suburb' used in urban studies in general in many western countries; however urban planning policies and bylaws in India do not make use of the term 'suburb'. These colonies consist of residential neighbourhoods that range from economically poor to affluent, intermixed with small and large commercial areas, all spread over a municipal area. In Delhi, colonies, also known as locality and are categorised on a scale of A-H depending on the circle rate. Circle rate is the minimum value at which a plot, a built-up house, an apartment, or a commercial property can be sold or transferred to the next owner in a particular area (Sharma, 2014). These rates are set either by the state government, or the local development authority. These rates are usually reference rates at which the local authority perceives the property transfer can take place, however the actual market rates are usually much higher than this price (Sharma, 2014). In Delhi, these prices are set by the DDA. The last circle rates were revised in 2014 in Delhi, these are mentioned in Table 15 (The Delhi Gazette, 2014). In East Delhi, the localities are also categorised on the basis of the circle rate. This also is an indicator of the socio-economic status of the people living in these residential units, as only citizens who can afford to live there will hold the right to property. The major colony categories found in East Delhi, fall under the categories of D, E, F, and G (Pundhir, 2014). These are also listed in Table 15.

Table 15: Circle rates for residential land in Delhi (Own Compilation).

Category Of The Locality	Circle Rate (In Rupees[31] Per Square Metres)	Name Of The Locality In East Delhi
A	774000	
B	245520	
C	159840	
D	127680	Preet Vihar, Anand Vihar, Vishwas Nagar, Trilokpuri East End Apartments, Gitanjali Apartments, I.P. Extension, Karkardooma, Madhuban
E	70080	Geeta Colony Bank Enclave
F	56640	Mayur Vihar, Gandhi Nagar, Laxmi Nagar, Arjun Nagar, Krishna Nagar, Trilokpuri Khadar, Shakarpur, Kondli, Indra Park
G	46200	Geeta Colony, Mandawli, Trilokpuri Janta Flats, Ghazipur
H	23280	

The locality plan, or how a neighbourhood is to be established are often laid out in layout plans for the whole zone. Zonal Plan of East Delhi has already been shown in Figure 9, however it only shows a very basic plan, and more detailed plans are prepared for each smaller neighbourhood or area. Layout plan also depict the location of parks and other green spaces in the area. However, it was difficult to find out information on how layout plans are actually prepared, but they are often prepared for each block in the district. Usual Size of a block in an urban setting is an area with 100-150 households, and a population of 650-700 people (SECC, 2011). Few layout plans for Zone E (East Delhi) are mentioned on the website of DDA under the section of Planning: Layout Plans[32]. These files are scanned copies of older layout plans drawn on paper, and the images were found to be of poor quality.

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[31] 1 Euro≈75 Indian Rupees.
[32] DDA. Available at: https://dda.org.in/ddanew/Layoutplansdrawing.aspx. Accessed 8th August, 2018
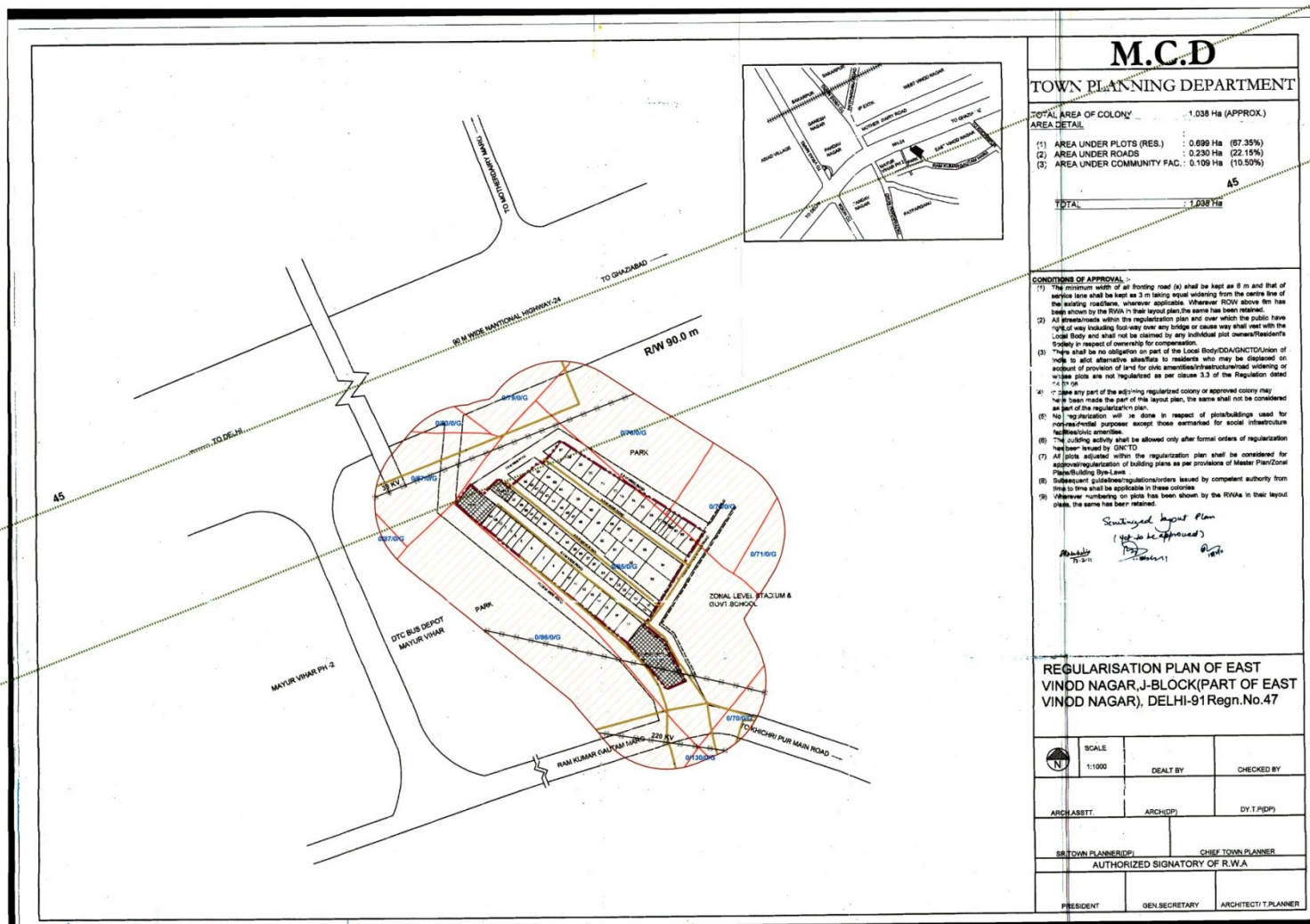
Figure 22: Layout Plan example from Zone E. Source: DDA Layout Plans.
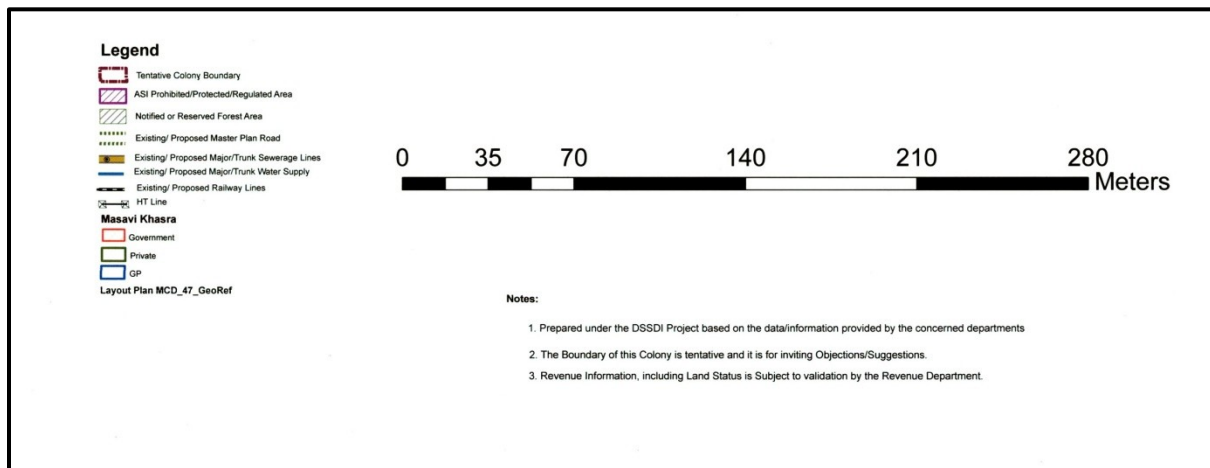
Figure 23: Legend for the Layout plan shown in previous figure.

Also the criterion to choose and display the layout plans is missing. It will take a lot of space to show layout plan for each small area in the district as mentioned on the website, but to show an example, one of the layout plans prepared by the planning department has been shown in Figure 22 (Legend in Figure 23). This figure here depicts the density and layout of a small block of neighborhood. It shows how close and dense the built environment is and how there is often less to little provisions for planning and allocation of green spaces in such dense urban environments.

4.1.3. Land Use Pattern

Neighborhoods and colonies in East Delhi are a mix of self-formed settlements, urban villages, and well-planned colonies. This mix-match manner of development gave rise to narrow and packed lanes, where distinction between adjacent buildings is impossible to make out. It also displays poor accessibility and availability of open spaces in the area, because the district rapidly grew post-independence period[33]. During the 90's, a more rapid growth in built environment was seen, which resulted in a mix of three different kind of settlements: (i) planned housing and society – well constructed as per city master plan and availing all basic amenities; (ii) colony – unauthorized, and resettlement colonies with a lack of access to basic amenities; and (iii) urban villages – traditional rural settlements merged with urban areas (Parashar *et al.*, 2013). This gave the area unique mix-match spatial characteristics, with little formal provision for green and open spaces, thereby making it an interesting case to explore with respect to green spaces in dense urban environments.

As mentioned previously, the district grew tremendously post independence of India. The growth pattern was significantly influenced by the implementation of the DDA's first Master Plan (1962-1982). The master plan clearly delineated industrial areas from residential and commercial units. The

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[33] India gained independence in 1947 and was declared a republic in 1950.

residential areas are of various kinds as mentioned previously depending on the circle rate for properties. This would include the tall apartment buildings in areas like Mayur Vihar, Patparganj, Surajmal Vihar and I.P. Extension. The resettlement colonies include areas such as Trilokpuri. Unplanned settlements are unauthorised colonies, and few *Jhuggi* clusters along the riverbed (Some of these areas can be seen in figures mentioned in Appendix D. In addition there are around 21 urban villages in the area as well.

Trilokpuri, is a resettlement colony, formed during the emergency period in India (1975-1977). The people living in slums in central district of Delhi were relocated to these state planned neighborhoods on the (then) outskirts of Delhi. The neighborhoods in the area were planned by the state developmental agency (DDA), and have narrow lanes and streets, with interspersed small open spaces and show an extremely dense built environment. Unauthorized colonies are residential colonies that have propped up in Delhi over the past years without authorization from DDA and in complete disregard to the Master Plan. From time to time initiatives are taken by the Government of NCT Delhi to authorize these colonies and give its residents ownership of the property. *Jhuggi* Clusters or The *jhuggi jhopri* cluster (JJC) are of temporary construction type (slum) and unplanned settlement designated by the Government of NCT of Delhi. These clusters are usually located on land owned by public authority and are constructed without permission, therefore sometimes even labelled as encroachments by the agencies in Delhi (Centre for Policy Research, 2014).

The map of East Delhi is shown in Figure 20. The map shows the three subdivisions in the district. Information about green spaces in East Delhi has been mentioned previously in section 2.3.1. To summarise again, the district has more than 1100 smaller green spaces classified for recreational function under neighbourhood parks category. These parks legally are managed by either DDA or MCD-East, however due to lack of attention from these agencies, in some places in the district, RWA's have voluntarily picked up this responsibility and they maintain their local parks. A survey done by Delhi Parks and Garden Society (2016) shows the condition of these parks as being well-maintained, satisfactory, or poor, where more than half of the parks were reported being in poor condition. In terms of planning, these parks have legal provision under the Master Plan of Delhi, however their exact location and size is only depicted in layout plans. An example of a proposed park in a layout plan can be seen in Figure 24.
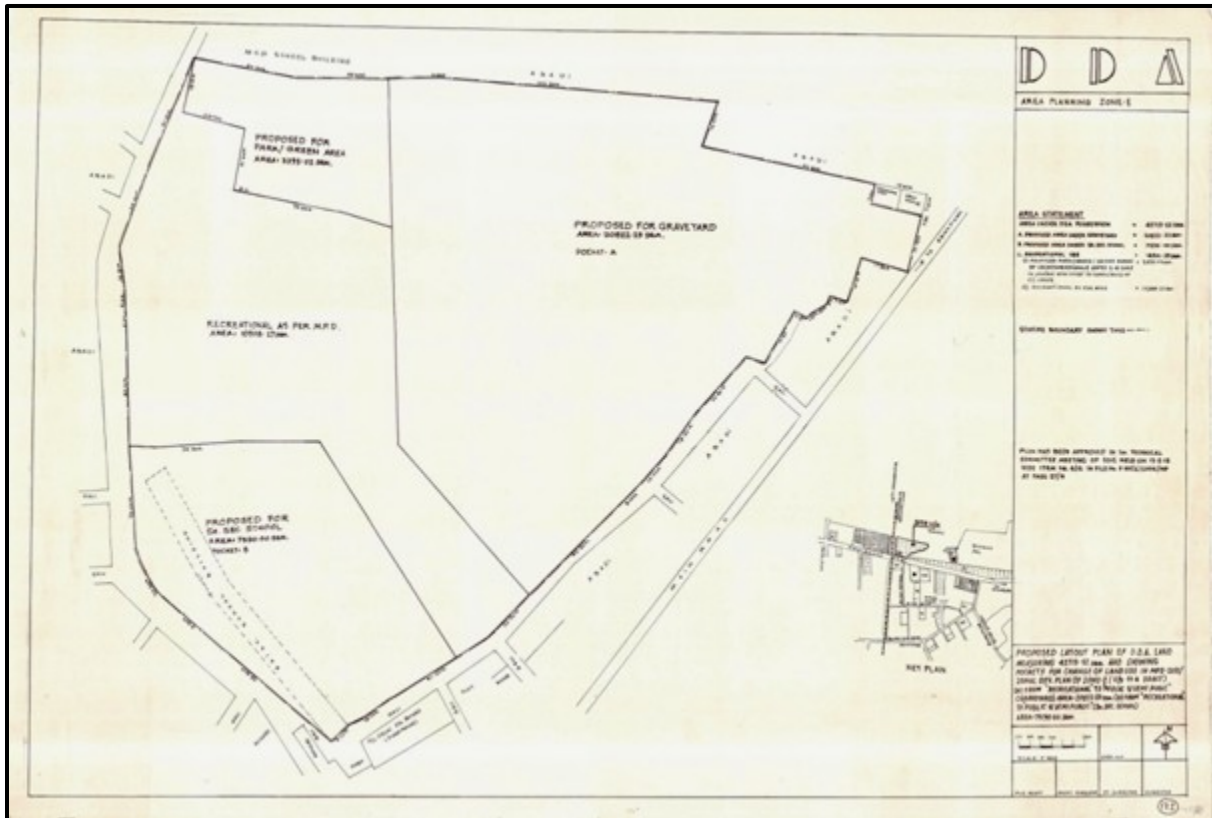
Figure 24: Layout plan for a neighborhood park development. Source: DDA Layout Plans.

4.2. Target group

In 2003, Delhi Government initiated the *Bhagidari* Scheme (now adjunct) which forced the civil society in Delhi to be efficient and engaged with the local government. This scheme gave the citizen groups and associations to be able to work in tandem with the government agencies for the welfare and development of their society and neighborhood. As mentioned briefly in the first chapter these groups are called Resident Welfare Associations (RWAs). RWAs are a voluntary organization, usually comprising of a committee of not less than 15 members from the locality. However, it is registered as a co-operative through Co-operative Societies Act[34], which dictates the membership rules and by-laws of the association. These associations do not hold any statutory power, and are completely voluntary in their responsibilities and functioning, and offer a strong example of active citizenship when it comes to ensuring urban amenities. Usually the name and contact details of the members in an RWA are open for public, so the concerned citizens can easily make contact with these people for voicing their issues. Such sign boards with their displayed names can be either found outside the RWA office in the neighborhood, or at the entry point of the colony, depending on the convenience of displaying.

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[34] Available at: http://delhi.gov.in/wps/wcm/connect/doit_rcs/RCS/Home/Acts+and+Rules/The+Delhi+Co-Operative+Societies+Rules,+2007. Last accessed on 14th July, 2016

Figure 25: An example of a notice board outside RWA office. (Picture taken by author 21st of July, 2016).

RWA's are responsible for management of several urban services like contributing to supervision of work by low level municipal employees, allowance for management and maintenance of local infrastructure such as parks and drains (CUE, 2014). Usually they communicate amongst the neighborhood via circulars and notice boards (Figure 25).

RWAs are significant in the sense that they promote a partnership with the local government to provide and avail basic civil amenities in urban areas. In order to do so, they interact and address concerns with various departments in the local government responsible for each urban service, see Table 16. Park related issues are often addressed with either DDA, or MCD. Since these associations are involved with managing civic duties, there are several ways in which they engage with the responsible government agencies as well. These groups often try to communicate with the government in a democratic fashion and address their problems (CUE, 2014) through ways which can be either a direct complaint to a mix of other indirect approaches. These have been further described in section 6.1. Their way of communication and interaction may differ from one RWA to another.

Table 16: Interaction of RWAs with respective government department (Government of NCT of Delhi, 2014)

S.NO.	GOVERNMENT DEPARTMENT	URBAN SERVICE
1.	Delhi Jal Board (DJB)	• Water supply and Sewage
2.	Discoms	• Electricity supply and billing
		• Street lighting
3.	Municipal Corporation of Delhi (MCD)	• Sanitation, collection of waste and garbage
		• Maintenance of community parks
		• House tax collection and payment
		• Maintenance of roads and streets in the colony
4.	Delhi Development Authority (DDA)	• Prevention of encroachment
		• Parking inside colony
		• Maintenance of community parks
5.	Delhi Police	• Crime prevention
		• Regulation of Traffic inside colony
		• Verification of servants and tenants
		• Implementation of neighbourhood watch scheme

However, despite all its positive characteristics, the concept of RWAs has not escaped criticism. RWA's are based in DDA approved residential colonies, and membership is open only to property owners, due to which residents of slums and unauthorized colonies are usually excluded from the representative process (Ghertner, 2011). This means that only propert owners in approved colonies can form an RWA. This limits the chances of lowest income classes to engage in a dialogue with the state and lose out on the opportunity to be a part of a participatory governance mechanism. Other states in India too have established a functioning resident associations and other groups, that have managed to create an opportunity for local citizens to directly engage with city officials and work for both availing and improvement of basic infrastructure in the city. Examples can be found in Appendix E. Thus findings from this research by using East Delhi context, may give some information

and impulses about the maintenance and management responsibilities of RWA elsewhere in India too.

4.3. Summary of the chapter

To briefly summarize, this chapter began with describing the study area of this research project. It begins with a broader view on the city of Delhi, and then narrows it down to one district which is of interest for this particular study. East Delhi district offers an interesting case study in terms of it being spatially dense and unique and displaying characteristics of under threat green spaces. The chapter adds on to the reasons behind selection of this area, so that it is easier for the reader to understand the rationale why the study is being conducted in this particular area of the city. Further it describes in detail the target population for the work, which was selected for interviews. The population under research provides a working example of active citizenship that fills up the vacuum created by the local authorities in their responsibility for provision of certain urban amenities. The chapter tries to explain as much in detail as to what is the constitution and responsibilities of this target group.

In the next chapter, detailed methods that were followed during this study have been described.

5. Methodological Approach

Methods in social sciences are often less pronounced and a mix of several approaches in order to reach a valid conclusion. Social scientists are burdened with the responsibility to analyze data which is rather crudely measured than their natural science counterparts. They have to rely on rough and general category classes, rather than well-defined and rationally measured variables. This was also observed in this research. The study here follows an approach where survey style interviews were conducted with a randomly selected sample to collect data pertaining to the aspects defined in the theoretical framework, which was then analyzed using appropriate statistical methods. The methodology adapted and the various steps followed in conducting this research have been described in the next few sections.

5.1. Survey Interviews

Research with the help of survey style interviews was popular in Victorian England, when public officials needed information on poverty and life of working class, or similar social problems (Kelley *et al.*, 2003). More recent disciplines involving survey would be psychological and social sciences. Survey is considered to be one of the most important research tools in applied social research. It involves measurement procedures that ask variety of questions from respondents in the population of interest. The measures under survey involve selecting a sample, administering a questionnaire to this sample, collecting the necessary data and then using appropriate methods to analyse this data. The purpose behind conducting surveys is that they provide a systematic method for gathering this information from a smaller number of entities and help identify and quantify the attributes of a larger population of which these entities are members (Groves *et al.*, 2009). In addition to this, a survey research is regarded as easy to administer in a large population, in a way that it enables the researcher to collect large amount of information from a large number of people in a relatively short time, hence being cost effective at the same time. It also provides the researcher a certain level of flexibility with the type of data collected, as a variety of questions can be asked in a single survey alone.

The interviews in this study were conducted during the months of July-August, 2016. The researcher had the opportunity to go visit the study area personally, and conduct face-to-face interviews with the target group. The questionnaire was made available in both English and Hindi languages, as these are the two most spoken language in the area. However, during the work it was found that people would always opt for English questionnaire, but often were unable to understand and answer

the question in the right manner, and the researcher had to translate the questions, ending up investing more time than required on each interview. The reason assumed behind this could be the sense of higher social status attached to people who can speak English language, and the interviewees wanted to make a good impression on the researcher even before the start of the interview.

It must also be mentioned that these were only conducted with the Presidents of the randomly selected RWA sample. This was purposely done to obtain same level of answers from each respondent in the survey, as it is assumed that every president of the RWA has the same responsibility towards the working of their organisation. On the other hand, if the sample survey would have substituted other members of the RWA, in case that the presidents were unavailable, it would have brought in an inherent bias in the responses, as each member would have had different answer based on their role and responsibility in the RWA. Also, as a rule, points in a random sample selection must not be substituted. This has also been explained more in the coming sections.

5.2. Sampling

Sampling is the procedure of selection of a limited number of people (respondents) from the whole population (referred to as sampling frame) to answer the designed questionnaire survey. The primary reason behind selection of a sample is that it is practically impossible to conduct survey on the whole population due to time and cost limitations and therefore a short sample is collected which is assumed to essentially represent the characteristics of the population.

Described previously the target group are the Resident Welfare Associations (RWA), so the president of these RWAs were selected for interviews. As described previously, the reason being that the President is the representative of the association and must be the responsible person behind the working and decision making in the association. He is also the last and final point of decision making in the association. This makes his role and answers important for the interviews as he would be knowledgeable about every way in which the association is involved in the maintenance of local green spaces.

There are several ways in which a representative sample can be selected from the source population. The sampling must be probability based in order to be able to generalize characteristics from the sample to the whole population. Simple random sampling is considered to be one of the best methods to select a sample, since the individuals are selected on the basis of chance alone, which removes the possibility of selection bias.

Steps followed to extract sample from the population:

1. List of all RWAs in the east district was downloaded from the Government of Delhi's website.

2. Each RWA was considered as one individual, since sometimes RWA's only listed one person as their president, and sometimes two or more people as president, secretary and/or treasurer respectively.

3. This list was then put into an excel file with column headings: Address of the RWA, Name of the members and their Telephone details.

4. Three separate excel sheets were created for sub areas within the district: Gandhi Nagar (GN), Mayur Vihar (MV), and Preet Vihar (PV).

5. Each list was checked for redundancies and repeated values were removed.

6. After this process, the size of sample was calculated.

     Population size: 303

     Sample size: 170

     With 95% confidence level, and 5% confidence interval

7. These sheets were then compiled in a single list and a random sample was drawn using the "=RAND" formula in excel program.

Further, each selected RWA point (the registered address for the association with Delhi government) was then plotted on a map of the area (separate for each subarea: Gandhi Nagar, Mayur Vihar, and Preet Vihar) using the GoogleMaps Application. The maps can be found in Appendix D: Maps of sub areas under East district. However during the field work it was found that few of the selected RWAs were defunct, and did not exist anymore, which reduced the sample size further to 117. Selected RWAs can be seen in Figure 26. The figure was created using GoogleMaps: My Maps application, where the address points were added onto the map to denote where the location address is in the study area. This map was then used during the field visit to locate the RWA points.
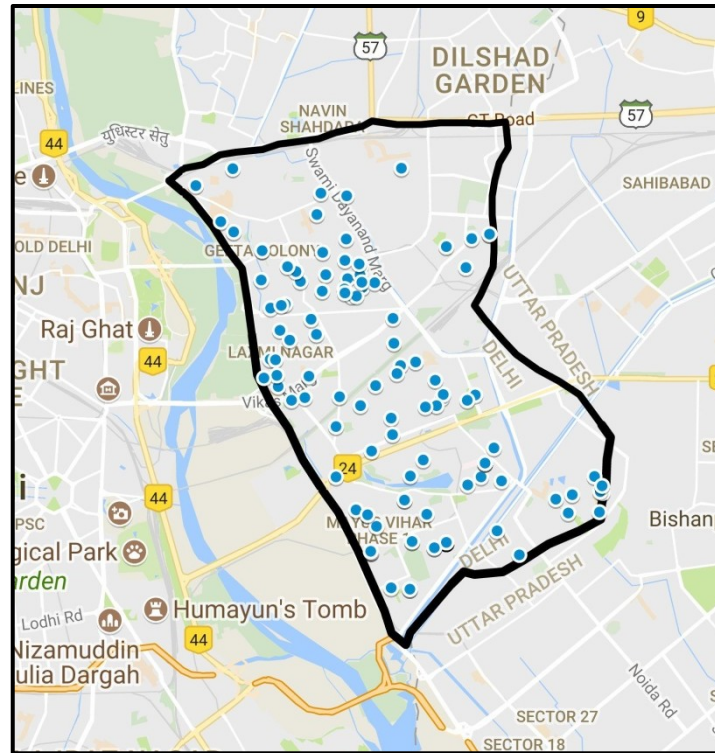
Figure 26: Selected RWA points in East Delhi district. Source: base map from GoogleMaps.

5.3. Questionnaire Design

A questionnaire, when written adequately and administered in a proper manner, yields a wide variety of information within a short period of time. The questions usually pertain to general demographic variables to begin with and move on to provide measure about the attitude, behavior, and perception of the population in interest. Questions in a survey can be divided into two types: unstructured, as in a qualitative interview, or structured, as in a quantitative survey. Also, while designing the questions it is important to focus on the wording, placement and response type in order to be able to make sure that the question provides the right answer that the researcher is seeking.

The type of questions used in this study can be described in ways below, on the basis of wording and response generated:

1. Dichotomous questions: when the respondent has the ability to choose one of the two options provided as an answer. These usually involve Yes/No or True/False types of questions.

2. Questions pertaining to level of measurement

a. Nominal type: the answer to these questions generally generates nominal data. For example asking the occupation type or level of education. The respondents are often provided with a class or a number which denotes their category of answer.

b. Ordinal type: these questions use an ordinal scale (usually Likert Scale) for procuring answers. The options involve a kind of ranking and are an indication of the opinion of the respondent regarding a certain situation or fact.

3. Filter questions: these are usually put in a questionnaire to determine if the respondent is able to or have the capacity to answer a subsequent question, if not, then they are allowed to skip to a new question/section of the questionnaire

4. Open ended questions: related to answer questions describing the time and nature of involvement with the topic of interest

The questionnaire used in this research can be found in Appendix A. The main sections of the questionnaire are:

1. Description of welfare association: involves questions related to the kind and nature of people involved and how the association works. Consists of both open ended and close ended questions.

2. Involvement in maintenance of local green spaces: involves questions on their actions with respect to maintenance of local parks and green spaces, and their motivations and beliefs behind the process. It includes few open and closed ended questions.

3. Outcomes of RWA actions: this involves questions that measure the perceived effect of certain actions undertaken by RWAs on the upkeep and quality of their local green spaces. This consists only of close ended questions, where response is measured in one or few words answer.

5.4. Data collection

As mentioned previously, the data was collected using questionnaire interviews (Response rate: approx. 29%; N=117), and was conducted with the RWA presidents of the randomly selected sample.

5.4.1. Field work preparation

Before going to the field to conduct interviews, few RWA presidents were contacted via telephone, amongst whom some already agreed for the interviews. Date and time were set later on, in the field. And more RWAs were also contacted once the field work started, however not everyone was agreeable to participate in the study for various reasons. An invitation letter was also prepared

along with a supporting letter from the PhD supervisor, to be given to the participating RWAs, in order to show the legitimacy of the research study, and also to persuade more people to participate (See Appendix B).

5.4.2.In the Field

The main field work involved administering personal face-to-face interview, as it ensured that the questionnaire was indeed filled by the selected respondent and enough time and consideration was given to answer each question on the questionnaire. However, not every time the interview went as planned. Most of the people were interested in telling their own, personal opinion about the failure of state and government support, rather than actual facts. Also, people tend to deviate from the interview and start discussing other topics, especially asking personal questions from the researcher perhaps out of general curiosity or as a manner of leading the conversation.

In survey literature normal response rate is considered to be in the range of 7% to 70% for interviews (Friedrichs, 1990). In this study, the total number of people interviewed was 34 (response rate: 29%, N=117). The reason for this low response rate were various. The researcher assumes that the main one was that there was no personal advantage felt by the interviewees for participating in the study. Although, they were at times implored by the statement that the end results of the study would possibly shed light into the kind of work they are doing and may bring attention from the necessary state authorities. It worked few times, but not always, as people boasted about their personal connections within various government agencies, although the extent of their claims could not be verified in this research, but some responses were garnered in the questionnaire along the same line. This leaves one open to assume that this informal setting may exist where influential connections and back door set-ups can help people access to certain urban services which further raises the question of urban inequality. In addition to this, a gender bias towards the researcher (female) was also experienced. There were certain times, where the selected individuals (all male), instead of replying to the questionnaire, would instead delve into asking personal questions (for example the marital status and age) with the researcher. They would give personal advices and recommendations to the researcher on how she should focus on her personal life rather than advancing her career. It is assumed that this behaviour could be due to an inherent patriarchy prevalent in the Indian society, where working women are often considered at a personal disadvantage and lagging towards their societal and familial duties. It is researcher's belief, although not proved, that few rejections to the interview could have been due to this reason as well. Also lack of time was cited as a personal reason by many respondents to deny interview requests. A certain share of selected individuals were full time working individuals, who by their own admission had

little to no free time available, and therefore many times the researcher was discouraged to contact them again.

5.5. Data Analysis

Response collected from the survey questionnaire produced the data for analysis. The response data is both in string and numerical format, resulting in both nominal and ordinal data (categorical data), as mentioned previously (To know types of data: categorical or non-categorical, see SPSS, 2018). To analyze the data Chi-Square test of Independence was applied, and cross tabs were generated to see a possible association between independent and dependent variables. Further to measure the association, Kendall's Tau b correlation coefficient is calculated.

Crosstabs: The Chi-Square test of independence is used to determine if there is a significant relationship between two categorical variables. The frequencies of each category for both variables are compared across a table. The data is then displayed in a contingency table where each row represents a category for one variable and each column represents a category for the other variable. The tables contain observed frequencies that are the count for each variable as observed in the field. It may also contain expected frequencies sometimes (frequencies calculated for each cell in the table using probability theory), however to show them in the contingency table or not entirely depends on the kind and need of test applied.

Hypothesis testing: Hypothesis testing for the chi-square test of independence involves computation of a test statistic and its comparison to a critical value. The critical value for the chi-square statistic is determined by the level of significance ($p < 0.05$ or 0.01). If the observed chi-square test statistic is greater than the critical value, the null hypothesis can be rejected, and it is safe to assume that there is a relationship between the testing variables (Casella and Berger, 2002). For this research test the level of significance, $p < 0.05$ is assumed.

Null hypothesis: Assumes that there is no association between the two variables.

Alternative hypothesis: Assumes that there is an association between the two variables.

Measure of Association: Chi square test for Independence only proves if there is an association between the variables, however it does not indicate the direction or strength of this association. In order to know that, a certain measure of association can be applied, which in turn depends on the types of variables being analysed. Here, the nature of data is categorical; therefore Kendall's tau-b (τ_b) correlation coefficient is used. Kendall's tau-b is a nonparametric measure of the strength and

direction of association that exists between two variables measured on at least an ordinal scale (SPSS, 2018). The test values are calculated using the appropriate formula. These values range from −1 (100 % negative association) to +1 (100 % positive association), and value of zero indicates the absence of association. An indication of what is the strength of the association corresponding to the test values is shown in Table 17.

Table 17: Interpretation of correlation coefficient values (Bögeholz, 1999)

CO-RELATION CO-EFFICIENT VALUE	INTERPRETATION
Upto 0.2	Very low correlation
Upto 0.3	Low correlation
Upto 0.7	Intermediate correlation
Upto 0.9	High correlation
Above 0.9	Very high correlation

5.6. Validity, Reliability and Objectivity of results

Validity here refers to the truthfulness or correctness of the measurement taken during the research study. It depends on various factors such as the testing, instrumentation of the experiment, and the selection of the sample. The study was planned over a long period of time, and underwent evaluation; but the field work was conducted during a short period of six weeks. The questionnaire designed was tested on few colleagues from the DLGS[35] graduate school and was found to be clear and understandable in its wording and line of questioning. The sample was selected using random sample method, and as mentioned before, rules out possibility of selection bias in the study.

In addition to the validity, the reliability of results is also an important aspect of the research. It relates to the ability of the study to be repeated under similar conditions and the consistency of delivered output. Apart from the method of designing survey, sampling technique, and the

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[35] Dresden Leibniz Graduate School. http://www.dlgs-dresden.de/

application of statistical tests which can be repeated in other settings, the study is unique to the study area in the sense that the administrative structure, the community group settings, and the socio-spatial structure of the study area are characteristics of East Delhi. The possibility of generalising the results without improvisation in the research design, for any area other than the districts of Delhi is quite low. Therefore it is suggested to look at both the socio-economic and the spatial structure of the study areas before assuming the outcomes of this study to be true for others.

Objectivity in research is significant, because the researcher should not be informed or influenced in any way before conducting the study. This is to ensure that the findings depend entirely on the nature of the subject rather that the personal beliefs and values of the researcher. Here, the researcher has tended to be as objective as possible; the study area was selected without any previous relationship to the researcher, and on the basis of desk-based study, where rational reasons are provided for study area selection (See Chapter 4). The selected individuals were not known in any manner, and also randomly selected to remove any bias. In the field, no selected individual was replaced or substituted with other population members, which was co-incidentally also a major reason for low response rate.

5.7. Limitations

Like every other research method, the study has its fair share of limitations too. The main ones were:

1. <u>The vastness of the study area</u>. As mentioned previously the district has a population of around 1.7 million spread over an area of 64 sq.km. This makes it the second densest districts of Delhi. So conducting a household survey using random sampling method would have been a huge task for the researcher requiring more time and resources, which was not possible due to the structured programme of the research.

2. <u>Data collection setting</u>. Not all selected interviewees were available and agreeable for interviews due to various reasons such as: dissolution of the RWA so the committee does not exist anymore; and or personal reasons of shortage of time for something that they did not deem to be of value to their daily lives. It was often found during the process of seeking interview appointments that the interviewees did not consider the process important as they did not see any advantage for themselves. Despite the hindrances, a response rate of 29 % was achieved. Also, the fact that there was only one person finding out each RWA address, seeking out respondents, handing out the questionnaire, and conducting interview, implied that there was natural limit on to what was physically possible in terms of seeking a

greater number of interviews. In addition to this, as mentioned previously too, the gender of the researcher was also assumed as a probable reason for rejection of interview requests.

Collection of secondary data was also difficult, as it was found during the course of this study. Information regarding parks in general was available; however site specific, and area specific information was rather difficult to get hold of. Usually the author had to collect information from various sources (both government websites and research articles), compile them in tables and then deduce an inference. It was a time consuming process. Also, guidelines on creation, building, and maintenance of park were not available at all. Phone calls to the local municipal corporation were also met with no information being collected.

3. <u>Target group selection</u>. The people selected to interview were the Presidents of these associations. As mentioned previously, this was done under the assumption the President is the first representative of the association and must be the responsible person behind the working and decision making in the association. And therefore only Presidents of each association must be interviewed in order to remove response bias from the respondents, as each President will respond to the questions in a similar fashion keeping their similar responsibilities in mind. It has been shown that residents with local interests have stronger demands and views on the maintenance of green spaces, this suggests that when their demands are met, those of the other residents will be too (Liedholm, 1984 in Lindgren, 2010). This was also assumed here while selecting the presidents of the RWAs, these actors have the strongest interest in maintaining the space as they are responsible for it. However, the researcher also keeps in mind the bias it may bring, as residents with other interests may have a different type of desire and demands with their local green space that may not be the same as the representatives of RWAs.

4. <u>Interview setting</u>. Most often the respondents agreed for an interview in English despite being offered a chance for an interview in the local language. However it was quickly observed that their knowledge of English language was limited. In addition to this, they also tend to delve into monologues discussing their issues and problems, which although was valuable information but also increased interview time with each respondent. Also, it was observed at the beginning of the interview that the researcher was confused with being a government official, though this confusion was always cleared before starting the interview. The interviews reflected different people's experience towards the maintenance process, however it must be assumed that it is not possible for all the respondents to verbalize and record all aspects of their experience. This also brings in the fact that some respondents may have not felt completely comfortable in what they could say or what they could not, and

hence have been biased in giving their positive or critical responses to the questions asked. It has already been mentioned how the gender of the researcher may have had an impact on the interviews; it is stressed here again, that the social position of the researcher versus the interviewee must have had an impact on the responses. As the researcher is a young woman, she probably was not regarded as a person with authority, which may have had an impact on the critical openness of the responses.

5. <u>Data analysis setting</u>. Chi square statistics, although a perfect method to find relations between non-parametric variables sometimes leaves a certain sense of ambiguity if it is used on a small sample size. This was observed in the sample here, as during generating cross tabs for the test, some columns and rows did not have the required frequency for the matching test conditions. Therefore, few categories for some variables were collated together without losing the true meaning of the data, and thereby increasing the frequencies in columns and meeting the required test conditions. The recoded values are: 1, 2, (strongly agree, agree) >> 1 (agree); 3 (neither agree nor disagree) >> 3 (neither agree nor disagree); 4, 5, (disagree, strongly disagree) >> 5 (disagree).

Another limitation with the test analysis was the small expected frequencies within each cell of the contingency tables. Although it is more of a tradition to imply that a satisfactory approximation of the test is achieved only if expected frequencies are more than 5, however *r x c* tables (as is the case in this study) can be tested by the chi square criterion even if the expected frequency is 0.5 in the smallest cell (Everitt, 1992, pg 39). Still, test results with low expected frequencies must be treated with caution.

5.8. Summary of the chapter

The chapter began with describing the research approach that this study adopted, and further delved into describing it in detail with respect to how the interviews were designed, scheduled and undertaken. It also described how the sample was selected and the rationale behind the sampling methodology. It further explains the analysis method that has been applied onto the data collected via the interviews. Finally it discusses the validity, reliability and objectivity of the results obtained from using these methods, and the limitations which were incurred during the research.

The next chapter includes the results of this study and describes in detail what the findings show.

6. Results

This chapter is divided into two sections; first part contains descriptive results, and gives a general idea about the target population, that is the RWA presidents and their reasoning, motivation behind taking actions with respect to the local green spaces. It also gives a cumulative idea about the general perceptions about these green spaces among the interviewees. The second part constitutes results from test statistics applied using SPSS program. Here, results from chi square test of Independence have been recorded, and give an insight into probable actions taken and their effect on the local green spaces.

6.1. Descriptive results

6.1.1. Age Category

The profile of the respondents interviewed is as follows. All respondents were male, and above the age of 18. They were categorized into 4 age classes of 18-29 years, 30-49 years, 50-64 years, 65 years and above (See Figure 27). As can be noted from the figure below, the respondents were found to be majorly in the category of age 50 and above.
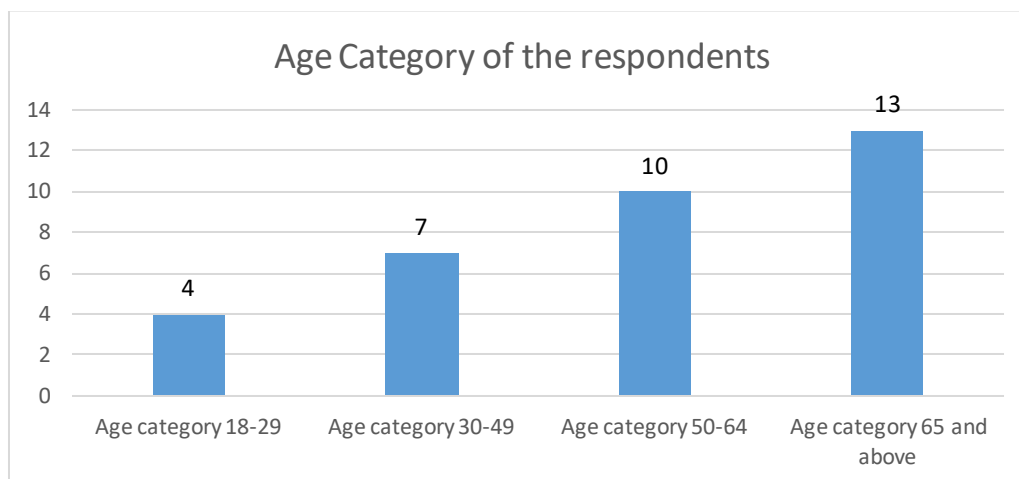
Figure 27: Age category of the respondents

It was noted that most of them were either businessmen, with their venues closer to their residences, or they were retired personnel, thereby having some time to spare to take up on a voluntary duty like being RWA president. These respondents were also more patient and careful in answering to the questions in the questionnaire. They even provided detailed account of how their association functions, similar to what has already been described in Section 4.2, what obstacles do they face sometimes in terms of logistics and resources, and also some other responsibilities that

they take up on for the development of their neighbourhood such as water, sewage, and garbage management among others.

6.1.2. Work Situation

As mentioned previously, the members of RWA committee are on a voluntary basis, which means that most often they have their own day jobs, and the responsibilities of RWA are their secondary work, except in some cases where the responsibility was taken up by retired professionals (See Age Category). The Figure 28 gives a brief idea of what their situation regarding work is. Most respondents were working in one way or another. Their work situation was categorized in 7 categories: business owners, people who owned and ran a business nearby, or were entrepreneurial in nature, running their offices from home; private employee; government employee; military; teacher or a professor at the local school, university; senior citizens or retired personnel; or any other occupation.

It was noted that majority of them were either businessmen (11), and/or retired personnel (7). Also, there were government employees (7). These people were easy to get hold of for interviews as they have more relaxed working hours as compared to private employees, who are expected to work beyond regular hours and also weekends sometimes[36]. No person of military was found and interviewed for the study.
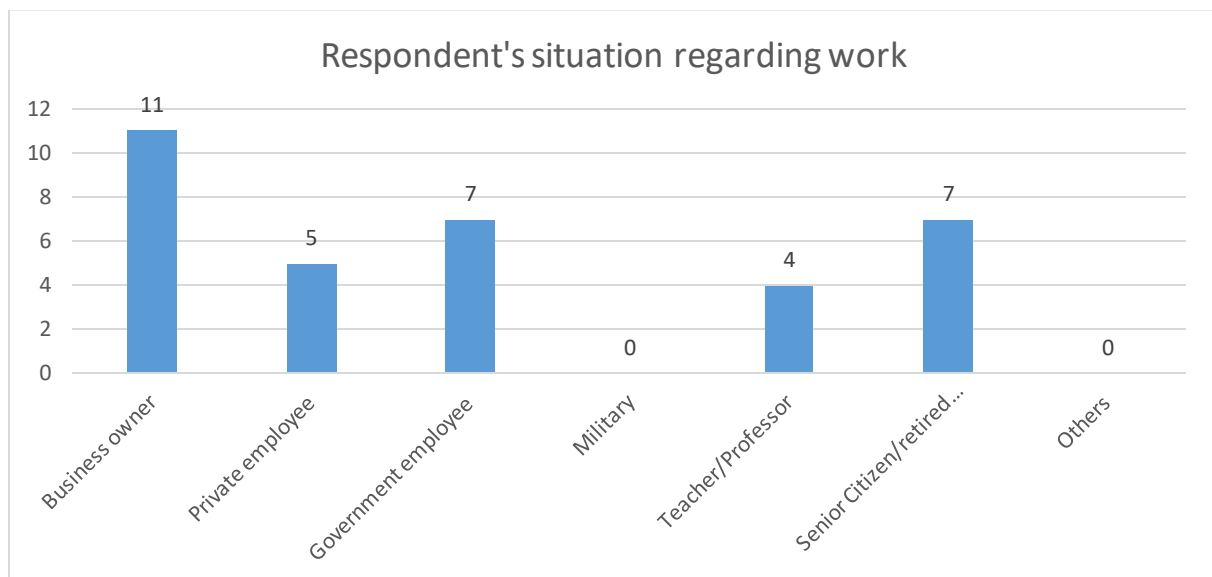
Figure 28: Respondent's situation regarding work

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[36] See more on: https://en.wikipedia.org/wiki/Workweek_and_weekend#India

6.1.3.Highest level of education received

The respondents were also asked up to what level they received formal education. The options given were primary school: which is up to grade five; high school: grade tenth; intermediate: grade twelfth, or the final year of schooling; undergraduate degree; post graduate degree; a PhD, or any other qualification that involves receiving a professional or vocational degree.
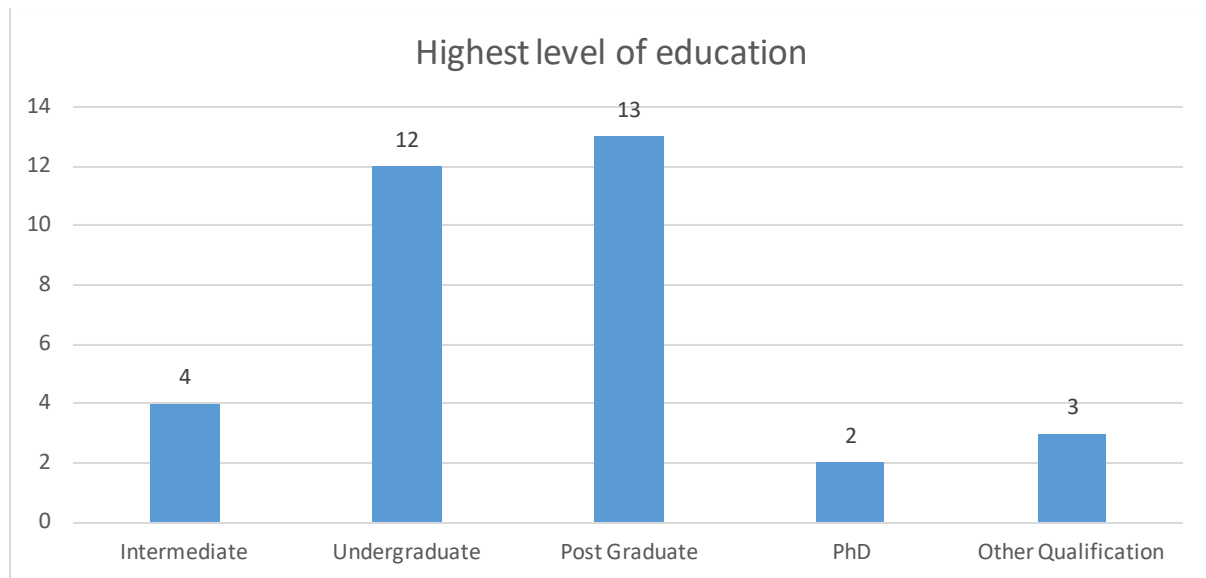
Figure 29: The highest level of education received by the respondents

As is evident from the figure above, majority of people have received some form of college education either in the form of an undergraduate degree (12) or a post graduate (13). There were two respondents who held a PhD degree, one each in the subjects of physics and economics. In addition to this there were 3 respondents who received professional qualifications of Chartered Accountancy (2) and Company Secretary (1). Chartered accountants are people who work in the field of business and finance, and usually undertake work responsibilities such as audit, taxation, and financial management. Company Secretary or a corporate secretary is high level job in a public or a private organization and the person is responsible for administration of the organization with regards to compliance with statutory and regulatory requirements. Also, there were 4 people who received education only up until the final year of the school.

6.1.4.RWA functioning

This section discusses how the RWA functions as an association in terms of access to various information regarding the city and related activities, how do they organise themselves to arrange a meeting, and how often do these meetings occur.

1.   Access to information
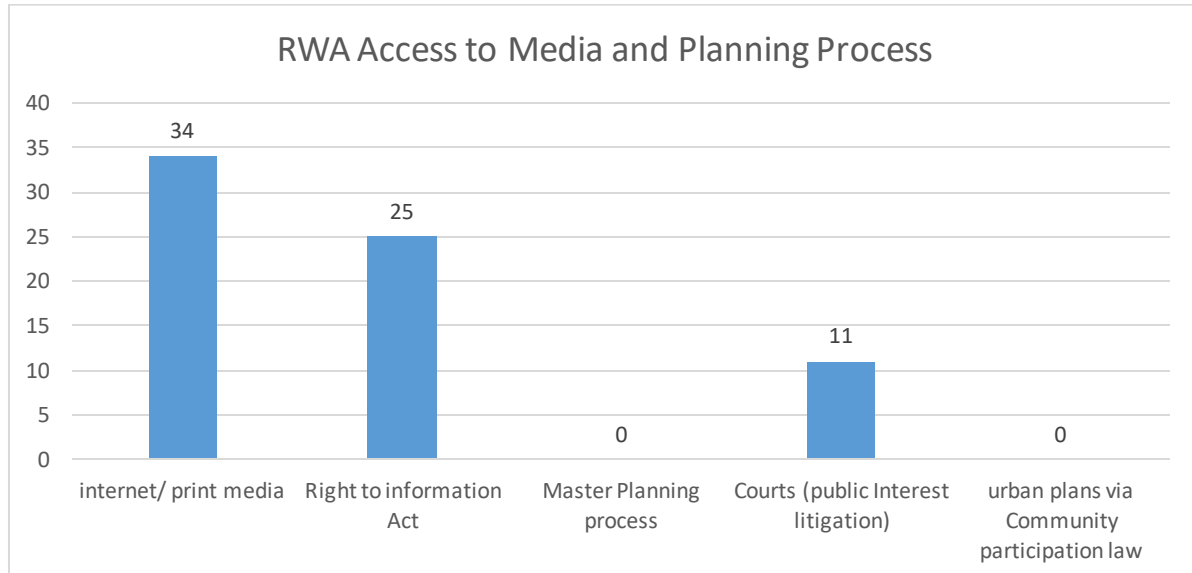
Figure 30: Access of RWA to information

The RWA presidents were also asked whether as an association do they have access to informational processes such as media and planning documents in order to not just highlight their plight sometimes, but also be able to contribute to the planning process of their area. All the respondents agreed that they have access to internet and print media (both in English and Hindi). 25 respondents out of 34 also agreed to have access and information about the Right to Information Act, however admitted to have never felt the need to use it. Right to Information Act 2005[37] gives the opportunity for any citizen of India to request information from any public authority (a government body or institution) in India, and the government is required to reply within 30 days. Similarly, 11 respondents knew about the function of Public Interest Litigations but have never used this way to access information. They also knew about the open feedback and suggestions to the Master Plan of Delhi, but they could not remember or did not know if they contributed towards the current plan in any way. Unfortunately, none of the respondents knew that they can contribute to the planning and design process through the Community Participation law (CPL). CPL aims to involve citizens in their local municipal functions such as deciding priorities, budgeting, and creating accountability for compliance with existing regulations (TERI, 2010).

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[37] http://rti.gov.in/

2.   Arrangement of RWA meetings
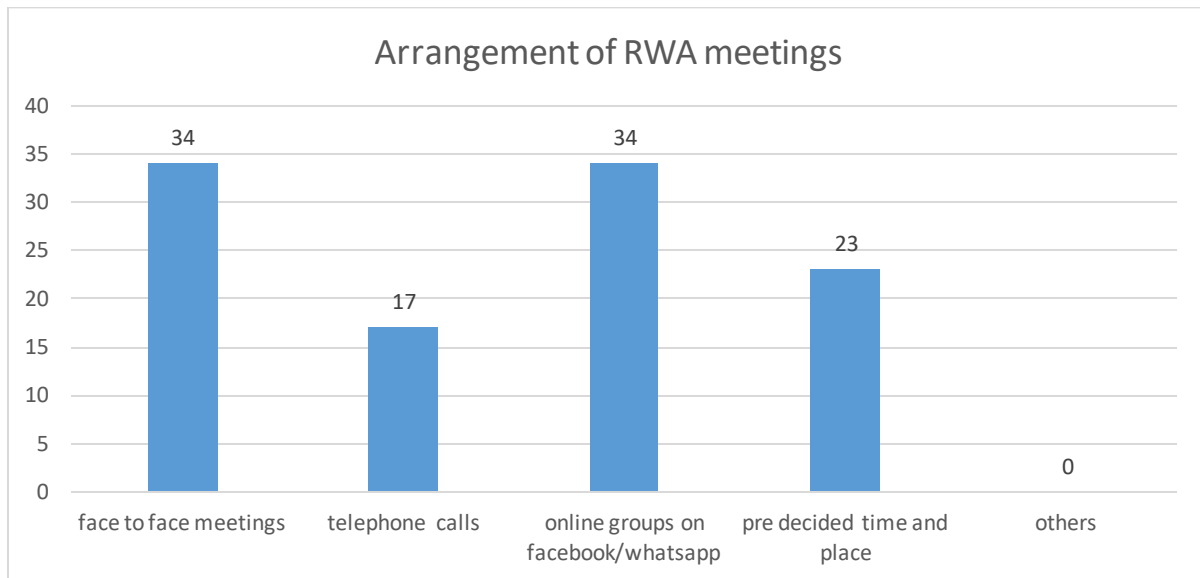
Figure 31: Arrangement of RWA meetings

When the respondents were asked how they organize Association meetings, all respondents replied that Face to Face meetings are the most common mode of organisation. 17 out of 34 respondents also admitted to sometimes just making a phone call with other members of the Association committee to discuss an issue if it is something small or not of significant importance.

Figure 32: Circular of an RWA meeting in East Delhi

All respondents also agreed to use online groups on Facebook or WhatsApp (majorly) to organize these meetings for discussing issues. Sometimes (23 respondents) a pre-arranged time and place was also a mode for arranging meetings. No other mode of arrangement was mentioned during the interviews. Usually the decisions taken in these meetings or issues discussed were disseminated to other people using online messages (WhatsApp or Facebook), or circulars such as shown in Figure 32.

3.   Frequency of RWA meetings
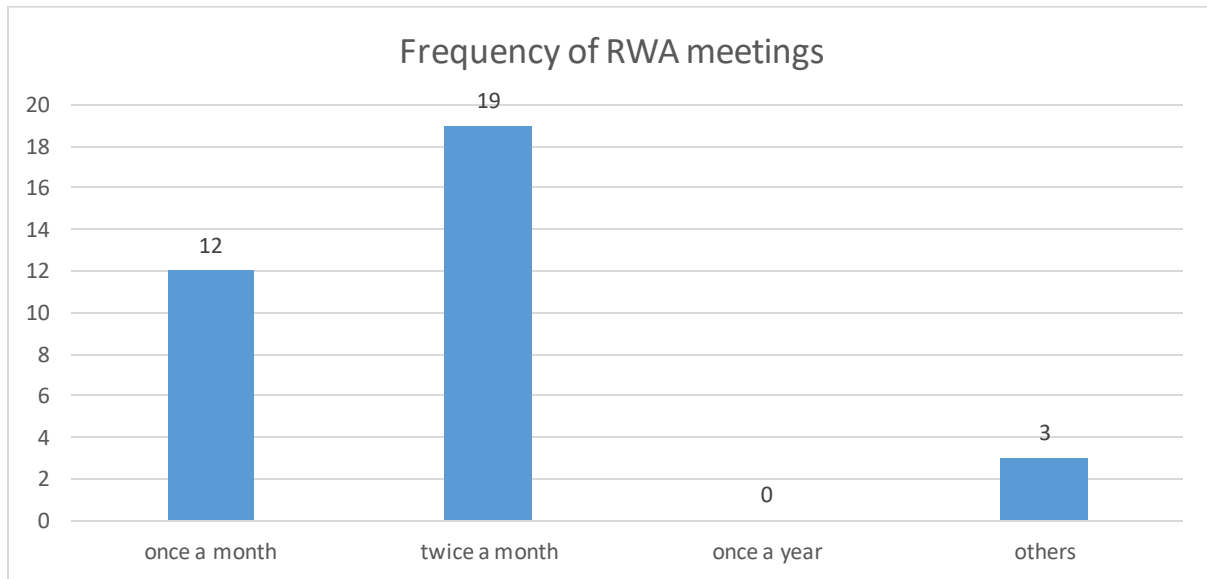
Figure 33: Frequency of RWA meetings

Majority of respondents (19) mentioned that the association meets twice a month to discuss different issues and take decisions on significant matters. Few respondents (12) mentioned that they only meet once a month, and 3 respondents claimed they meet whenever they feel the issue requires a meeting, sometimes there is a pre decided schedule or frequency of meetings arranged, sometimes not.

However, all the respondents agreed on the severity of issues discussed in these meetings. They described how seriously each issue and complaint is taken, and a solution is sought in the most empathetic manner.

6.1.5. Preferred way of contribution to the maintenance process

Ways of participation
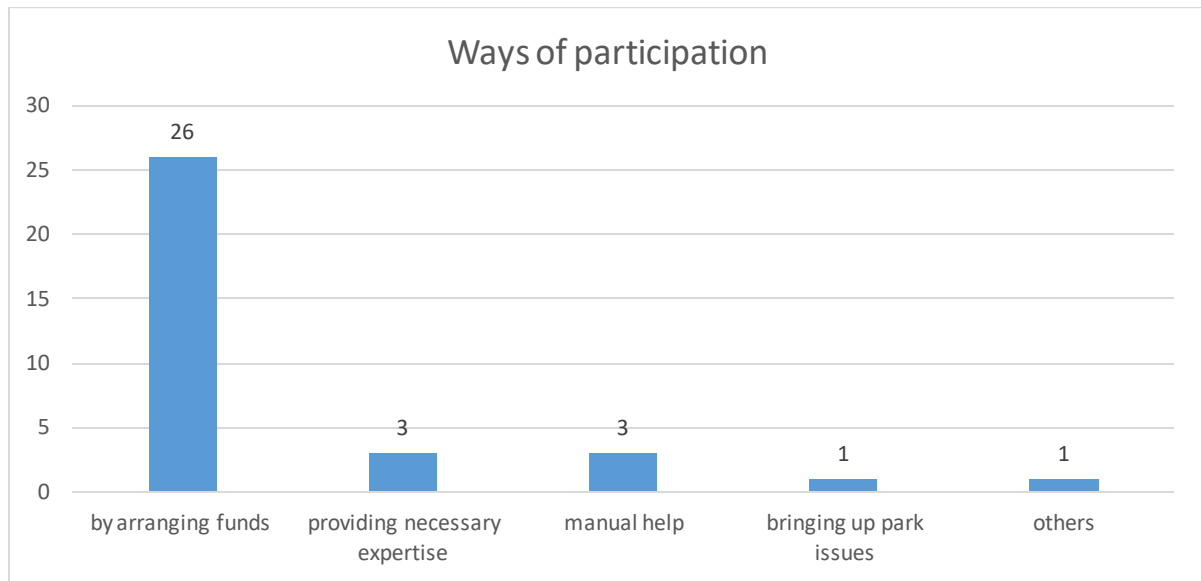
Figure 34: Contribution to the maintenance process

The RWA presidents interviewed were asked to give their choice of way in which they think they contribute specifically to the maintenance and management of the local green space. Maintenance here was explained to them as it is defined in the Section 2.5. Any action or activity that is taken with the intention of contributing positively to the image of their local green space, is considered to be maintenance. The ways in which RWAs contribute could be arranging money, providing necessary suggestions, bringing up complaints with the concerned authority, or manually helping in the park. The respondents were asked to choose the one, which they consider the most used or most important way of contribution. The results are mentioned in Figure 34. Majority of the respondents (26) replied that they contribute via arranging funds (See Figure 35), which has been known to come from either the RWA fund (a meagre amount of money collected from each household in the neighbourhood, it is voluntary) however when given the choice of selecting where do they organise money for the RWA fund, all the respondents chose to tick the option of community funds. Other way involves local business sponsors (9) (see Figure 36). In few cases it was also known to have been received from the local councillor's office (15) (see Figure 36).
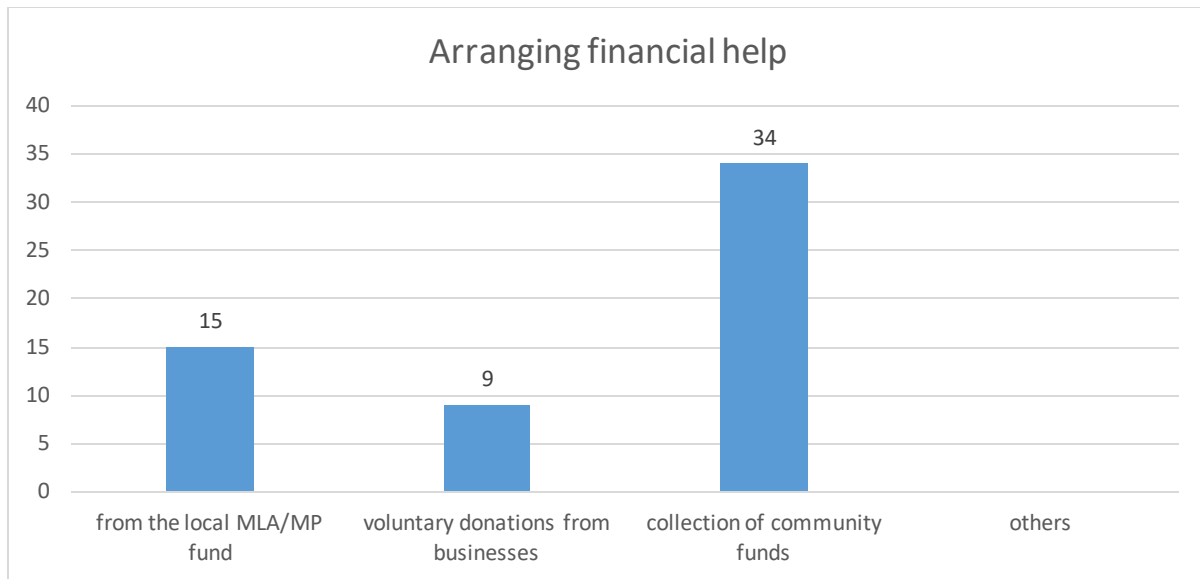
Figure 35: Arrangement of financial help or funds for the process

It was also mentioned by some of the respondents that they were part of the 'Adopt a park scheme' from DDA, however it was undear whether it enabled them with any monetary gains or not. One of the interviewees also mentioned:

"..collect small sum of money from each home to hire a gardener...of course entirely voluntary..." (excerpt translated from an interview conducted on 20th July, 2016)

Figure 36: Sponsor advertisement on an RWA signboard (blue textbox) and declaration of funds from the local councilors office used for the light mast (yellow arrow) (Pictures taken by author, 22nd July, 2016, Delhi)

Other ways in which they contribute are by providing some guidance towards the planting schedule or types of plants to be planted, or giving advice on how to make the parks more likeable in terms of safety and security for the people from the neighbourhood; manually helping in gardening, cleaning or even looking after the local space like watch-guarding; and also by bringing up park related issues with both internal meetings, and with the relevant authorities (interviewed excerpt below).

> *"...do not necessarily need to write a complaint...we often make a call..." (*Excerpt translated from interview conducted on 4th Aug, 2016)

Others included lending or leasing the park for community events such as birthday parties or marriage ceremonies, as is mentioned in the interview excerpt:

> *"...the park is a community park and is available for holding marriage functions or any other get-together...a small donation of 15,000-20,000[38] rupees..."* (Excerpt translated from an interview conducted on 6th August, 2016)

In order to address their grievances and complaints majority of respondents replied that they take direct approach to make complaints with the concerned departments (27), however few of them also responded that they also use other ways to address complaints (See Figure 37). *Bhagidari,* a public participation scheme started by Delhi Government in 2003, was also given as a choice of answer, however since the scheme has been adjunct, there were no replies recorded for these options. More about *Bhagidari* can be found in Appendix C.
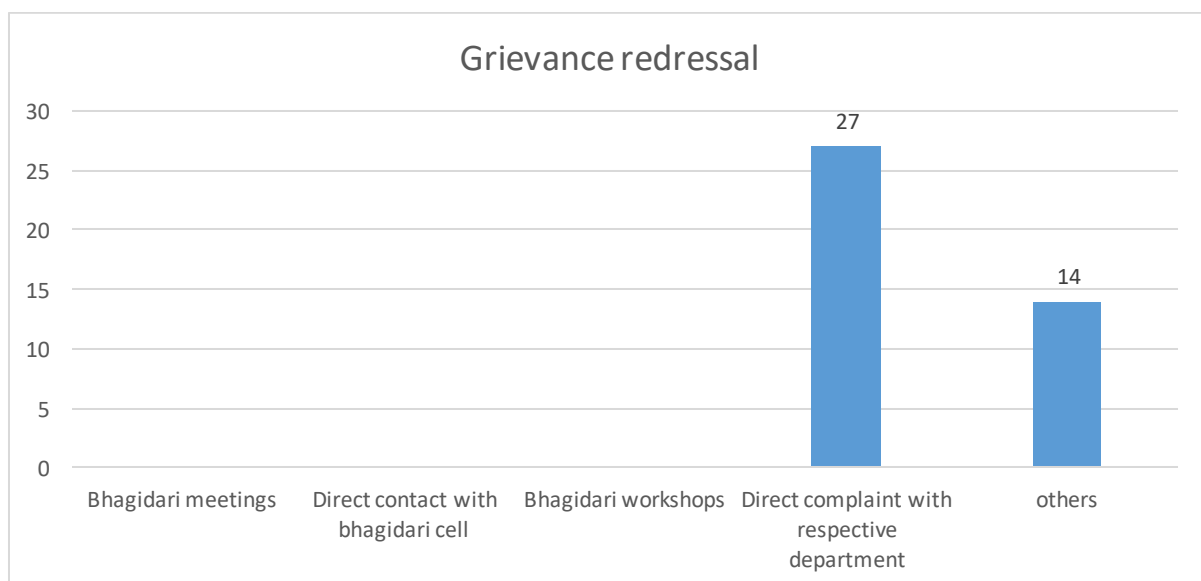
Figure 37: Ways to address complaints with the authorities

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[38] Equivalent to a sum between 150-200 Euros.

Below are few approaches that were mentioned during the interviews with RWA presidents on ways to address complaints:

1. Influential RWA members may arrange meetings (informal) with low level bureaucrats through their own social contacts.
2. Direct line of communication with the authority via telephone or office visits, seeking official appointments.
3. Submit written complaints via the official grievance redressal mechanism set up by the respective public office.
4. Organising a silent or a verbal protest march outside the civic agency office if their written complaints are not acknowledged.

6.1.6.Preferred reason for involvement in the maintenance process

The main theme of the whole study is to see how the green spaces in the city are looked after; their maintenance forms a major part of this "look-after" process. For different people, their motivations and reasons to be involved in this process can differ on the basis of their personal situation and opinions. The related question to gauge these particular reasons was asked:

"*What will you state is the preferred reason for involvement in the process, state the level of importance?*"

The options given were:

a) Their technical qualification, like their professional knowledge on handling issues related to green spaces, maybe their profession or knowledge about horticulture/gardening, etc.
b) Their educational qualification, for instance their studies in subject like botany and/or forestry
c) Their level of influence or importance in the society, like how much weight does their word or personality carries in the society, and whether that pushed them take up responsibility and leadership roles
d) Their personal belief in benefits of green spaces, whether they consider these spaces important enough to be able to motivate them to participate in the process

The results can be seen in Figure 38. The replies were charted on a 5-point Likert scale, ranging between 'extremely important' to 'not important at all'.
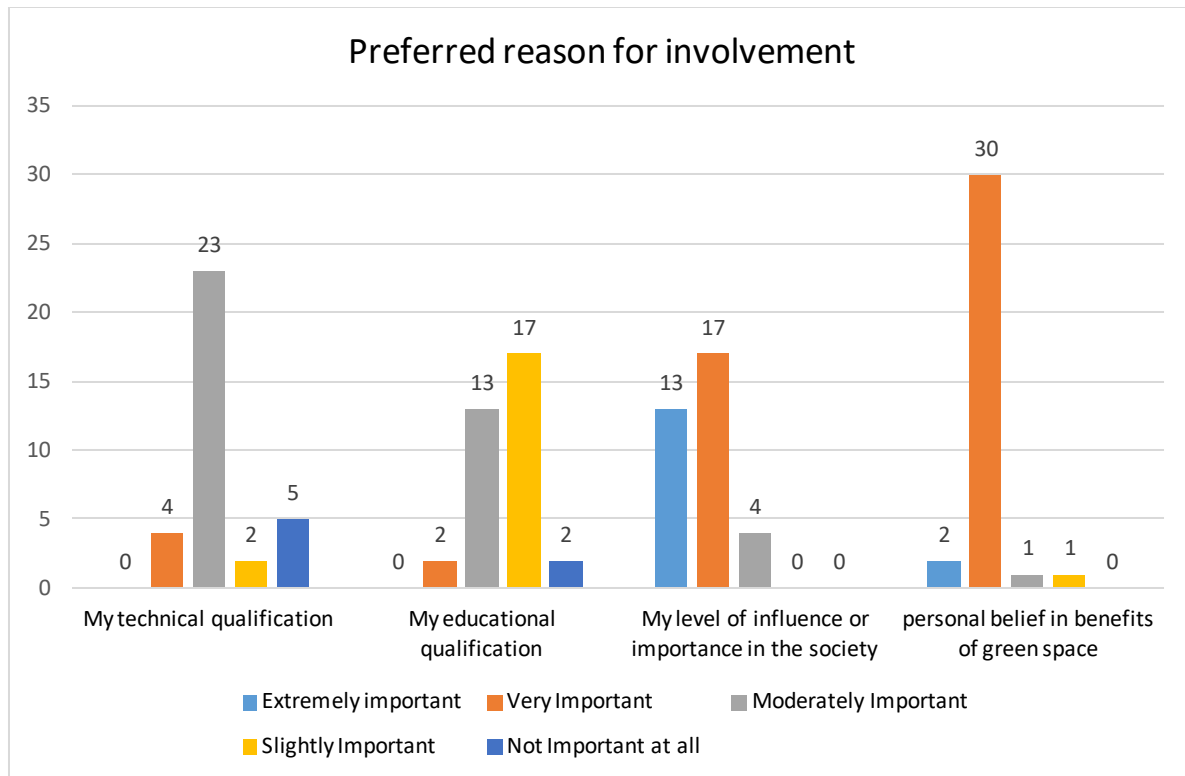
Figure 38: Response from the interviewees when asked about their preferred reason for involvement in the maintenance process

As you can see from the graph, 23 people consider their technical qualifications to be a moderate reason for involvement, 5 people do not consider it important at all, while only 4 out of 34 deemed it to be very important. It could be because their qualification do not relate to the issue in any direct manner. They could be qualified to be engineers, doctors, or even accountants working in various sectors of the city, but it does not reflect any direct impact on their responsibility to look after the green spaces in particular as a president of RWA. Sometimes their qualifications can be better suited to other responsibilities. Educational qualification however was considered to be moderately or slightly important in terms that someone may have undertaken a study of botany or horticulture that may help them with the park's vegetation component (13 and 17 respectively), still two people did not consider it important at all. However, the respondents did give significant weight to their position and influence on the neighborhood. 13 and 17 people chose their position on society to be extremely important and very important (respectively) factor for being involved in the maintenance process. This could be due to the fact that they considered themselves as a responsible person, who can get things done because of their political or social clout in the society. One example in the field was also seen where an ex-RWA president was the current local councilor. The RWA in question however was not functional anymore, and no previous representative showed availability to be interviewed for finding out reasons for the dissolution of the RWA.

The most notable was their personal belief in the importance of green spaces which was given significant weight in the responses. 30 people out of the whole sample rated it as a very important and extremely important (2 person) reason behind their decision to take part in activities related to maintenance of the park. This is also evident in the interview excerpts mentioned next. It indicates how significant a place they consider their local park to be and hence would like to be involved in taking care of this space.

> *"..our park is an important place for us to gather and sit around on festivals like lohri....every morning there is group that is doing yoga, you see children playing in the evening. It is fresh air that is the most important because the whole city is polluted...."* (Excerpt translated from an interview on 20th of July, 2016)

> *"....my wife likes to go to the park to meet other women from the neighborhood, it gives them a chance to go outside in the fresh air and also gives them a change of scenery..."* (Excerpt translated from an interview on 3rd of August, 2016)

> *"....I go every morning for yoga and for a walk in the evening before dinner...."* (excerpt translated from an interview on 3rd of August, 2016)

This could indicate towards a collective conscious on importance of green spaces for neighborhood people, as is most often noted in surveys regarding attitude and perception of people with respect to green spaces (see section 2.5). These people consider the green space not just as a medium for health benefits but also for social activities.

6.1.7. Perceived condition of the local green space

Keeping in accordance with the main theme of the study, the respondents were asked how they perceive the condition of their local green space. This question was asked keeping in mind that if they perceive their local green space as good, or of better quality, this will indicate towards an active participation already happening or that they will be more motivated to participate in future to maintain the space as they like. So the purpose of the replies received was to provide a cross check between their perception of the green space, and the perceived actions that they take as a member of the RWA towards these spaces. The question asked was:

> *"How strongly do you agree or disagree with these statements regarding the above mentioned green space?"*

The statements being:

S.NO.	STATEMENT
1.	It is a good place to meet other people from the community
2.	It is a good place to relax
3.	It is visually appealing to the eyes
4.	It is a good place to exercise
5.	It has the right amount of plants and trees
6.	It appears very dean and free from litter

Again the responses were recorded on a 5-point Likert scale, ranging from 'strongly agree' to 'do not agree at all'. The results are showed in Figure 39.
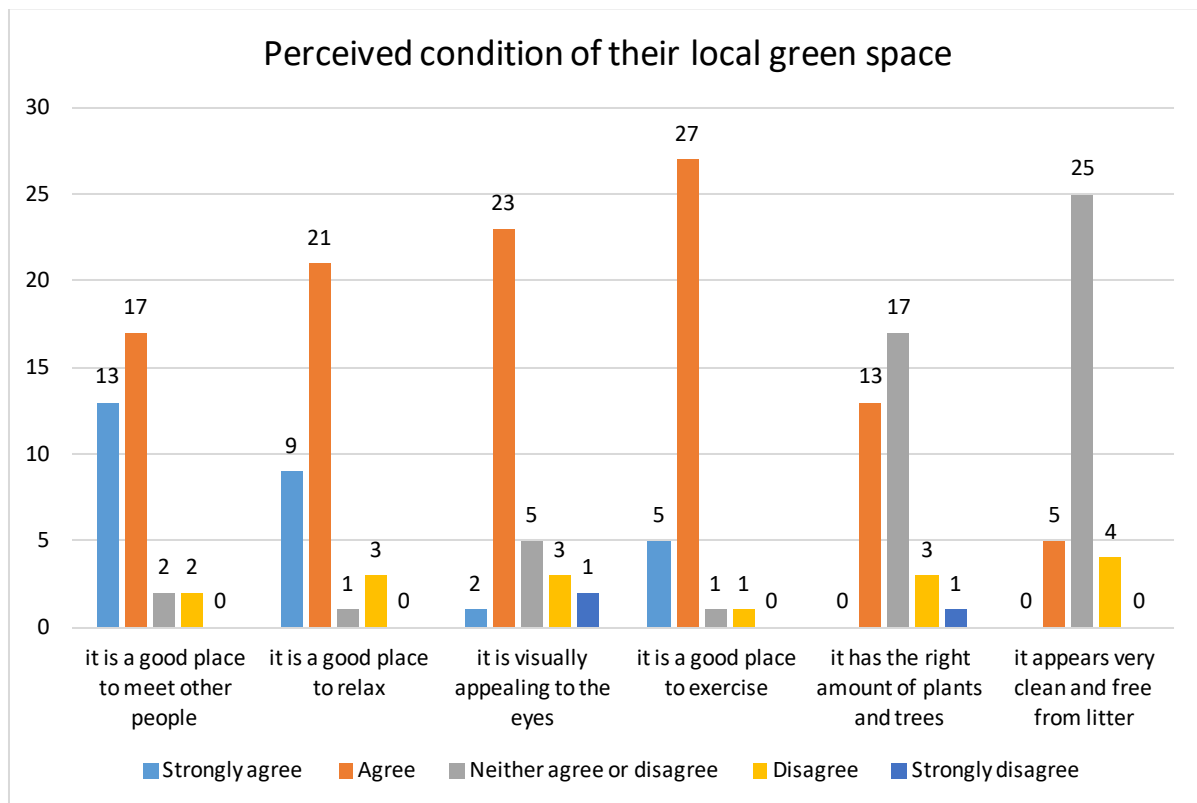
Figure 39: Response to question asking the perceived condition of their local green space

As can be seen in the figure above, majority of the people gave response in terms of strongly agreeing, or simply agreeing with the options given, except when asked if they considered their local green space to have enough amount of trees and plants, and whether the space appears dean and free from litter, where most of them tended to neither agree nor disagree (17 and 25 respectively). They personally believe in that their local space is in a good condition in terms of it being a nice and good place to relax and meet other people (see Figure 40). 9 and 21 people respectively agree and

strongly agree to the statement that they believe their neighborhood park to be a place where people can visit and relax, while only 3 people interviewed disagreed on this statement. There were areas, where some of the local parks were not in the best of conditions (see Figure 41 and Figure 42) but overall feeling was of satisfaction with the good conditions of the park. Similarly when it came to agree on the statement that their local green space was a good place to meet other people from the neighborhood: 17 and 13 people agreed and strongly agreed respectively, as compared to 2 people disagreeing. The local green spaces were also considered to be a good place to exercise, as majority of respondents either agreed or strongly agreed with this statement (27+5 people). However, it can also be seen that sometime respondents answered where they neither agreed nor disagreed with the statements (right amount of plants and trees: 17; clean and free from litter: 25), this could be due to the fact that the respondents were the presidents of these organizations and were somehow self-evaluating of their own performance and for these specific instances wanted to be ambiguous in their responses. However, as mentioned before, most of the replies were rated on the strongly agree to neutral stance as can be seen in Figure 39 (Good place to meet: 30 people in total strongly agree and agree; good place to relax: 30 people in total strongly agree and agree; visually appealing: 24 people total; good place to exercise: 32 people total). This to a certain extent indicates agreement with several studies where general perception of green space users can be used as a measure of quality.

Figure 40: Condition of a local park in the area perceived as good by the interviewee (picture taken by author; 4th of August 2016, Delhi)

Figure 41: Conditions of a local park in the study area perceived as not a good place to relax, meet other people, or exercise (pictures taken by author; 23rd July, 2016, Delhi)

Figure 42: Conditions of a local park in the study area perceived as not a good place to relax, meet other people, or exercise (pictures taken by author; 23rd July, 2016, Delhi)

6.1.8.Perceived condition of their local green space in terms of safety

One of the major issues cited in the literature associated with green and open spaces in developing countries was the problem of illegal squatting, encroachment, and presence of elements that make the users feel unsafe and insecure. And at the same time, major international goals like the SDG 11, and the new urban agenda aim at making these spaces more inclusive and accessible to all, which raises the question of safe access and access to all of paramount importance especially in developing countries where open spaces often grapple with these issues. Another purpose for asking this question was to see how the participants perceive their space to be, because any disagreement on the quality and access of space in terms of being secure, should push them consciously towards improving the situation. So the related question asked here was:

"*How will you rate the condition of this space in terms of:*"

The options given are:

S.NO   STATEMENT

S.NO	STATEMENT
I	Absence of anti-social activity
II	Well protected via fencing and gates
III	Presence of security guard
IV	Banned entry of people from outside the neighborhood

The responses were recorded on a 5-point Likert scale, ranging from 'very good to 'very poor'. Additionally the option to choose 'do not know' was also provided. However none of the respondents chose to answer that, it assumed this could be due to the fact that it was part of their responsibility to know the on goings with their local green space and no one could claim ignorance by choosing that option. The responses can be seen in Figure 43.

Majority of respondents felt the condition of their local green space was fairly adequate and satisfactory in terms of safety and security; of course the reason behind it could be that they felt answering in poor light will be an indicator of their in-efficiency as presidents. More than half the people said there is little to no anti-social activity in their neighborhood park (26), in few cases it was self-confessed due to the fact that park entry was controlled by designating time for usage, and locking the park gates for people to enter (See Figure 43 Figure 44), at the same time few people (7 for poor and 1 for very poor) disagreed that they local green space was a safe place to visit. It can be seen in the interview excerpt mentioned below.
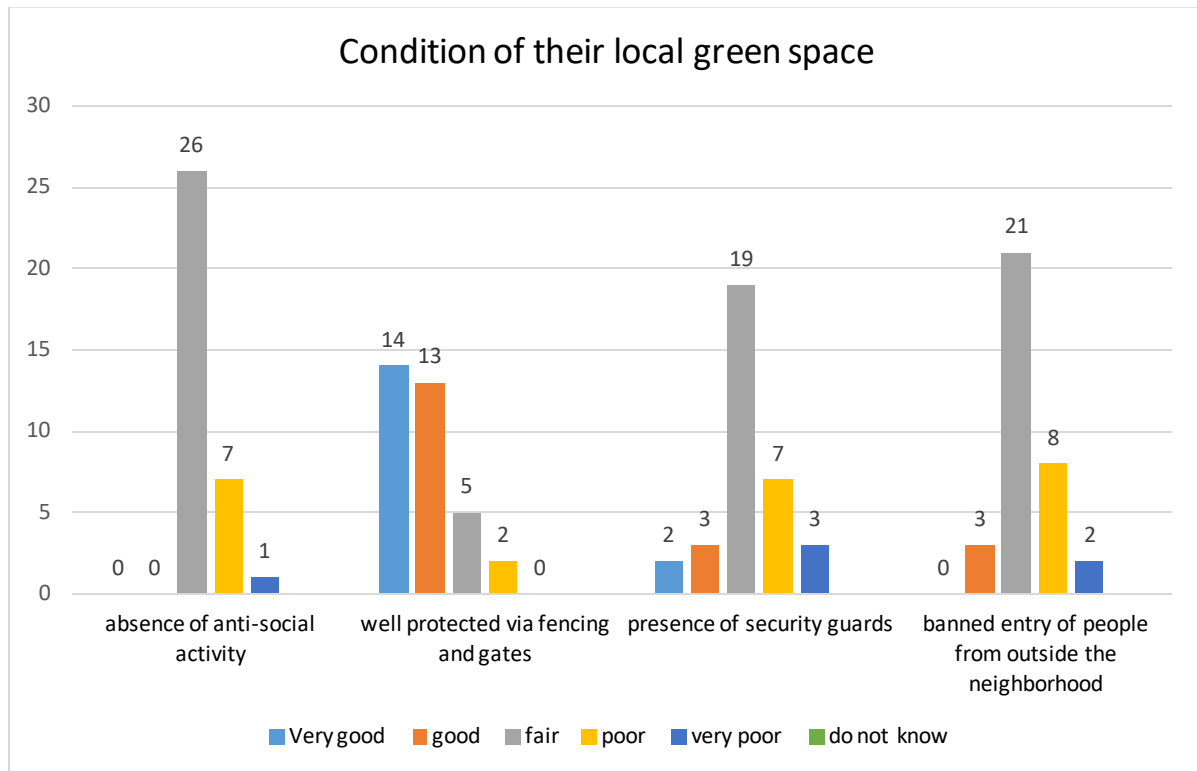
Figure 43: Response to the question related to the perceived safety of the local green space

> *"...have a problem of unwanted elements coming and sitting in our parks during the day...opening times had to be (made) limited..."* (Excerpt translated from interview conducted on 2nd of August, 2016)

> *"...lamps get stolen...there is no light in the park after sunset...we feel unsafe"* (excerpt translated from interview conducted on 2nd of August, 2016)

14 people reported their park's condition to be very good, and good (13) when it came to having a fence and gate around the space as compared to 5 people deeming it fair and 2 people as poor. It should be mentioned here that although the presence of fences and gates do provide a certain sense of safety to the visitors, it inherently excludes out certain people who may view it as a restriction, thereby introducing a nature of non-inclusiveness to a space that must be welcoming and open to all.

Figure 44: Locked gate and restricted times for entry into park (Picture taken by the author; 2nd August 2016, Delhi). Signboard in the picture states the entry timings into the park- 05:00 to 10:00 a.m. and 16:00 to 22:00 p.m.

Also, it was noticed that majority of people who viewed their parks as fairly safe were in middle, and high-income neighborhoods. 5 people (2 for very good and 3 for good) rated their park good in terms of having security guards, this could be due to the fact that these spaces existed in posh gated societies, where having a security guard is considered to be a norm. However at the same time 19 people termed their park as fair, while 7 termed it as poor with respect to presence of security guards. 21 people rated their park as fair when it came to controlling the entry of people outside their neighborhood into the park, only 3 people rated it as good, while 8 people rated it poor (See Figure 44). In a similar fashion few people felt the need to rate the condition of their parks very poor in terms of presence of security guards (3), and in terms of entry of people from outside their neighborhood (2) especially in low income neighborhoods. This could be due to the reason that these neighborhoods lack the necessary infrastructure and money to organize a security guard in their neighborhood. This was also observed in one of the interviews, excerpt mentioned below. Here the situation was that a local park was illegally encroached upon by a butcher, who set shop in this

park, however, the residents lacked the necessary means to either evict him or to stop it from happening in the first place.

"…made so many complaints, both verbal and written, even organized a protest march, nothing ever happens to remove the butcher (here the encroacher)…" (Excerpt translated from an interview conducted on 23rd July, 2016)

Discussing these results in light of SDG Goal 11 of creating inclusive cities holds certain significance. In order to create more safe places as seen in Figure 44 and thus preferred access by all groups of the neighborhood, they set out to exclude certain sections of the society and deem them to be unwanted. This issue has again been raised in the next chapter and discussed in detail.

6.1.9. Desired Improvements to the local park

Previous sections mention how the RWA presidents perceive their local parks in terms of its quality and its safety. Although majority of the responses deemed their local green space to be in good conditions, there were still few responses which reflected the sad reality where much needs to be done in order to make these places accessible and visited by the users in the neighborhood. This section introduces responses from the questionnaire where the RWA presidents were asked to suggest improvements to their local green spaces in various ways, which they think will make their local parks attractive for users. They were given the option to choose more than one answer.
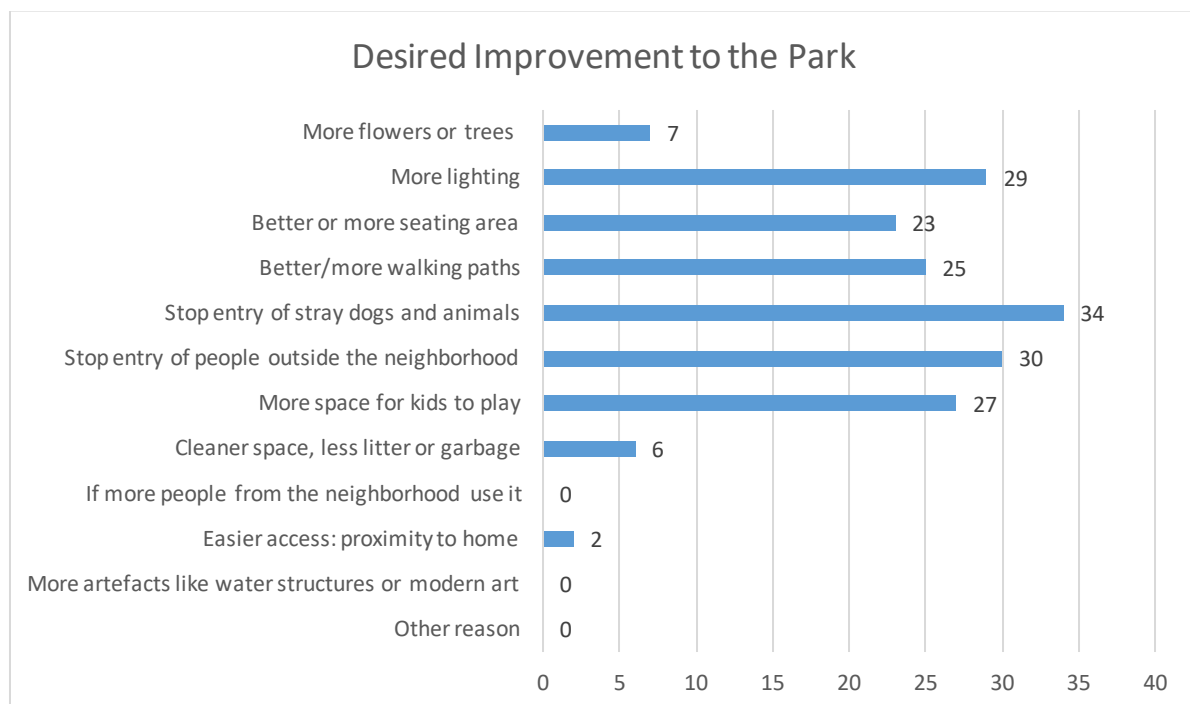
Figure 45: Desired improvement to the local green space

As can be seen from Figure 45, almost all respondents reported major improvements in what they thought is needed for their local green space, despite all their efforts already in place to maintain the quality of the space. All the respondents (34) felt a strong need to be able to stop entry of stray animals and dogs in the park. There were also places, where entry of even pet dogs was restricted (See Figure 46). People also demanded more lighting (29) and banned entry of people from outside the neighborhood (30), this could be the reflection of their thoughts where they would like to create the parks as more safe and secure for people from neighborhood to visit and use. More opportunities for recreation were also desired in terms of more walkways (25), more seating area (23), and more area for play activities for children (27). Few people also demanded more flowers and trees in the park (7), and less litter (6); probably the two most important factors for the place to look more visually appealing.

Figure 46: Signboard in the park warning users to not bring in their pet dogs in the park. Picture taken by author, 24th **of July, 2016, Delhi.**

However not many people (only 2) stressed on the proximity issue, maybe due to the fact that all these green spaces were in their neighborhood already, and they did not feel the need to walk greater distances in order to access them. The responses to the above measures gave an indication that no matter what and how good certain respondents rated their local parks to be, they all desired

certain improvements to the space, thereby belying their very intention to make themselves look efficient in maintaining these spaces.

6.2. Hypothesis Testing and Measure of Association

This section will give more analytical details about the relationship between the variables, for each dimension of the maintenance process identified in the previous chapters. It will also discuss about what this relationship signify for the whole study and whether it manages to provide support for the main hypothesis.

6.2.1. Functionality of the equipment for creation of recreational opportunity

A well maintained park can be seen through the actions that result in the equipment and the function it serves to the park users. This could include play equipment's, seats, benches, walking area, and space to exercise thereby leading to creation of opportunities for recreation of park users. So the dependent variables here are measured as perception of the space in terms of

- Good meeting place: where park users can meet other people from the neighbourhood and socialize. Through this process they will make use of the walkways, benches to sit on, or playground for kids

- Good place to relax: where park users can go, sit in calm and just enjoy the place. Literature often mentions mental and stress relieving benefits of green spaces for its users.

- Good place to exercise: where park users can utilise the place to go for walk, jog or even yoga. Kids can also use the space to play.

The hypothesis assumed here is: **Actions taken by RWA lead to creation of recreational opportunity by local green space**

Out of all statistical test values, significant results were found when action taken was in term of arranging money for park maintenance, which resulted in perceiving the space as a good place to meet other people (7.323; p=0.026). So the green space served its functionality in providing place for people to stay and meet and talk with other people from the neighbourhood. If money was arranged and utilised for specific purpose in the park, say for example to plant more grass or organise community events (see Section 6.1.7) it could be considered as a good meeting place, similarly when they raised up park issues related to this outcome, they felt that their voices were heard and the issues were addressed in a way that lead to these places becoming more welcoming to the users in the neighborhood. However, the results were found insignificant when the action was providing guidance (0.439; p=0.803), manual help (4.582; p=0.101), and any other way (0.137; p=0.934). This could be due to the small number of values for each action under these categories; therefore the

test could not stand valid for such small values. The significant test values can be seen in the Table 19. Before that, Table 18 shows the frequency of response given according to each action undertaken and their respective perception about the space for a better understanding of the data collected in support of this hypothesis. It shows for each action taken (independent variable), how these people perceived the space to be a good meeting place, good place to relax, and a good place to exercise (dependent variable).

Table 18: Frequency of response between actions and the place perceived to be functional for recreation (own compilation)

		Arranging money	Raise up park related issues	Providing guidance	Manual help	Other ways
Good meeting place	Agree	24	0	3	2	1
	Neither agree nor disagree	0	1	0	1	0
	Disagree	2	0	0	0	0
Good place to relax	Agree	24	0	3	2	1
	Neither agree nor disagree	1	0	0	0	0
	Disagree	1	1	0	1	0
Good place to exercise	Agree	24	1	3	3	1
	Neither agree nor disagree	1	0	0	0	0
	Disagree	1	0	0	0	0

Here, the categories of responses had to be reduced from five to three in order to increase the frequency in the cross-tabulation for Chi square test. Explanation for this has been previously given in section 5.7 on Limitations of data analysis setting.

Table 19: Chi square test values for arranging money vs. the green space being a good place to meet

Chi-Square Tests: arrange money*good meeting place

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7,323[a]	2	,026
Likelihood Ratio	7,076	2	,029
N of Valid Cases	34		

With respect to the space being a good place to relax: significant result found was when people made efforts to raise issues related to park maintenance, which resulted in the space being perceived as a good place to relax (10.646; p=0.005). Here also results were insignificant when it came to actions such as arranging money (3.168; p=0.164), providing guidance (0439; p=0.803), manual help in the park (2.510; p=0.285), and any other way (0.137; p=0.934). This could be due the small sample size, as was the case with the previous variable (Also see Limitations in Section 5.7). However the results must be treated with caution as expected counts are less than one (See explanation in section 5.7). The table below shows test values for raising up park issues vs. good place to relax. No significant results were found when it came to actions leading to creation of the local space as a good place to exercise. Again, the small sample size can be the cited as a reason for insignificant values (For Chi square test values, see Appendix F: Statistical Test Values).

Table 20: Chi square test values for raising park issues vs. the green space being a good place to relax

Chi-Square Tests: raise up park issues*good place to relax

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10,646[a]	2	,005
Likelihood Ratio	5,204	2	,074
N of Valid Cases	34		

To summarise the previous results, it must be stated that arranging money, and raising up park related issues are perceived to be the most important actions that influence the local green space to be a good place to meet, relax and exercise, implying the space and its components can be termed functional in terms of creating opportunity for recreation.

6.2.2. Cleanliness

A well-kept space is also perceived as clean and free from garbage. When the space is perceived as litter free, it is also seen as well maintained and inviting for the users to visit the space again and again. The hypothesis assumed here was:

Hypothesis: **Actions taken by RWA lead to neat and clean local green spaces**

Significant results (Table 22) were found in terms of actions like arranging money for the process (7.101; p=0.029), raising up park issues (7.727; p=0.021), and providing personal guidance for the maintenance process (7.151; p=0.028). The results indicate that when people take actions in terms of either arranging funds to get the park cleaned, or raising up garbage issues with the local authority, or providing suggestions or guidance to organise cleaning drive in their local park, they usually perceive that these actions are resulting in the intending outcome, and therefore the space is perceived to be clean and free of litter. However the results were insignificant when it came to actions such as manual helping in the park (2.800; p=0.247), and any other way (0.371; p= 0.831). This again can be attributed to the small sample size and low frequency in the columns for these variables (See Table 21).

Table 21: Frequency of response for each action versus how the space is perceived in terms of cleanliness (own compilation)

		Arranging money	Raise up park related issues	Providing guidance	Manual help	Other ways
Litter free space	Agree	2	0	2	1	0
	Neither agree nor disagree	22	0	1	1	1
	Disagree	2	1	0	1	0

Table 22: Chi square values for significant test of actions vs. clean green space

Chi-Square Tests arrange money vs. litter free space

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7,101[a]	2	,029
Likelihood Ratio	6,479	2	,039
N of Valid Cases	34		

Chi-Square Tests raise up park issues vs. litter free space

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7,727[a]	2	,021
Likelihood Ratio	4,524	2	,104
N of Valid Cases	34		

Chi-Square Tests providing guidance vs. litter free space

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7,151[a]	2	,028
Likelihood Ratio	5,166	2	,076
N of Valid Cases	34		

When further the Kendall's coefficient was calculated in order to measure the strength of the association between the variables, it showed an intermediate positive association between providing guidance and the space being litter free (0.378; p=0.025). This indicates that all the times that the RWA presidents provided personal guidance, suggestions or recommendations for actions that may have led to the cleanliness of the space, it lead to the outcome of the space being clean and free from litter. However, it must also be mentioned here, that this is a simple co relation, and does not imply causation that the green space was litter free as a direct outcome of providing guidance by the RWA presidents alone. The space could also be litter free due to other reasons such as the common sense of its users not throwing garbage in the place they like to visit. This could also be seen in their replies noted in Figure 39. However few contradictory cases were also seen in the field study as shown in Figure 41.

> " although people from the society try to take care not to throw garbage in the field, but there are some exceptions who do not care to walk a few metres and throw it in the municipal bin, rather are too lazy and just throw it here…" (Translated excerpt from the interview taken on 22nd of July, 2016).

> "….people are educated enough to know not to throw things on the ground, but nobody takes the pain to walk a few metres and use the bin to throw away….one person starts with this kind of bad behaviour and everybody follows…" (Translated excerpt from an interview taken on 23rd of July, 2016)

This can also be seen in Figure 47 which shows the condition of a local playground in one of the neighbourhoods as the thrown garbage gets rotten mixed with monsoon waters, and also becomes a breeding ground for mosquitoes.

Figure 47: Garbage strewn in and around the playground (Picture taken by author on 22nd of July, 2016, Delhi)

6.2.3. Upkeep of vegetation

As mentioned in the previous sections, vegetation, especially that is visibly well kept contribute towards the perception of a well maintained space. This is measured here, by asking if they perceive the tree cover in the area as satisfactory and whether the space looks 'green' enough. Because often enough the perception, or the visual of a park having enough tree, and hence enough shade and the color 'green' makes it look well-kept and inviting to use. The assumed hypothesis here was:

Hypothesis**: Actions taken by the RWA lead to greenery in the local green space**

Greenery, here as mentioned previously is assumed as having enough trees or vegetation in the park that make the space look green. Table 23 shows the response for how the space is perceived to be green enough, by having enough number of trees with respect to each action undertaken.

Table 23: Frequency response for actions versus space perceived to be green enough (own compilation)

		Arranging money	Raise up park related issues	Providing guidance	Manual help	Other ways
Upkeep of Vegetation (enough tree cover)	Agree	9	0	2	1	1
	Neither agree nor disagree	15	0	1	1	0
	Disagree	2	1	0	1	0

Table 24: Chi square test values for raising park issues vs. enough tree cover in the green space

Chi-Square Tests: raising up park issue*tree cover

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7,727[a]	2	,021
Likelihood Ratio	4,524	2	,104
N of Valid Cases	34		

The significant result as can be seen in Table 24 here, was found only in terms of action where the RWA president took upon the issue of park maintenance both in their internal meetings, and/or also with the local authority (7.727; p=0.021). The probable reason why this is significant could be that RWA presidents often used their personal connections sometimes in the municipal department and getting their issues resolved, which was also reported in one of the interviews (See interview excerpts in section 6.1.5). However, again the results must be treated with caution as expected frequency for few cells is less than 1.

Specific action related to planting of saplings in the park was reported by one of the respondents, here is an excerpt of the interview:

" I am very good friends with the local councillor…also have good relations with the people at the local nursery…just ask the gardener to come around and plant before the monsoon starts.." (Excerpt from an interview conducted on 30th of July, 2016)

Actions such as arranging money (3.244; p=0.197), providing guidance (1.266; p=0.531), manual help (1.505; p=0.471), and any other way (1.664; p=0.435) were found to be insignificant when it came to perceived tree cover in the park. Brief summary of all the result values can be found in Appendix F: Statistical Test Values.

6.2.4.Safety

Urban green spaces are seen as places of leisure and reprieve. However, in developing countries, any open public space is seen as an invitation to either encroach upon or just loiter around, which causes discomfort to its everyday users (see Figure 48). There have been surveys in UK (CABE Space, 2005) where people mentioned how they felt unsafe in their local green space not only at a certain time of the day (for example late in the evening when it is dark), but also due to presence of a loud and boisterous group of youngsters. Therefore, safety with respect to park is more about what and how each individual that uses the place perceive it to be. Safety here is described in terms of having fences, absence of anti-social activity, and controlled entry of people outside the neighbourhood.

The assumed hypothesis here is: **Actions taken by RWA lead to safe and secure green spaces**

The results of the Chi square test analysis which were found to be significant are mentioned in Table 25, and are underlined bold.

Table 25: Significant Chi square test values for actions vs. safe and secure green space (own compilation)

S.no.	Variables tested	No anti-social activity	Protection via fence and gates	Controlled outside entry
1.	Arrange money			
	Chi Square value (df)	8.830 (1)	10.61 (2)	12.272 (2)
	P value	**.003**	**.005**	**.002**
2.	Raising up park issues			
	Chi Square value (df)	3.348 (1)	5.976 (2)	2.472 (2)
	P value	.065	**.050**	.290
3.	Manual help			
	Chi Square value (df)	3.403 (1)	7.114 (2)	13.875 (2)
	P value	.065	**.029**	**.001**

Here, majority of results were found to be significant with three actions that are undertaken with respect to the green space. It was perceived that whenever the action was arranging money for the purpose of enhancing safety, all results were found to be significant, that is, it lead to absence of anti-social activity (8.830; p=0.003), protection of park with a fence and gate (10.617; p= 0.005), and controlled the entry of people from outside the neighbourhood (12.272; p=0.002) in the park. Similarly, when the action was raising up safety related issues, it was found that the significant result were with respect to protection via fence and gates (5.976; p=0.50). However the results may have been insignificant when it came to absence of anti-social activity (3.348; p=0.065) it did resemble a trend towards significance; had the sample size been large enough it may have shown positive results. Frequency of various responses for both types of variables can be seen in Table 26.

Table 26: Frequency response of actions versus how safe the space is perceived to be (own compilation)

		Arranging money	Raise up park related issues	Providing guidance	Manual help	Other ways
No anti-social activity	Good	0	0	0	0	0
	Fair	23	0	1	1	1
	Poor	3	1	2	2	0
Protection via fences and gates	Good	23	0	2	1	1
	Fair	1	1	1	2	0
	Poor	2	0	0	0	0
Controlled entry of people from outside the neighbourhood	Good	0	0	1	2	0
	Fair	19	0	1	1	0
	Poor	7	1	1	0	1

Other significant results were found with manually helping in the park with protection via fence and gates (7.114; p=0.029), and controlled entry of people from outside the neighbourhood (13.875; p=0.001). Here also, the result with no anti-social activity although is insignificant (3.403; p=0.065), it still shows a tendency towards significant results, if the sample size has been bigger.

Further Kendall's coefficient revealed a positive relationship between manually helping with the park and controlled entry of people from outside the neighbourhood (0.411; p=0.015). This co-relation could exist because of some people actually taking care with the neighbourhood watch themselves, and ensuring whether there are people who sit in the park that do not belong to their neighbourhood. This was also evident in one of the interview excerpts:

> "...few person from Mandawli come into our neighbourhood during the middle of the day, scale the park walls...waste time playing cards..." (Translated excerpt from an interview taken on 5th of August, 2016)

Mandawali is one of the constituencies in East Delhi that used to be an unauthorised colony up until 2012, thereby inherently having a reputation of a low-income neighbourhood. Similarly in another neighbourhood of *Trilokpuri*, it was observed that a local park was slowly and gradually overtaken by a butcher and his family. According to the local people the butcher first started a small make-shift tent outside the park wall, under the shade of the big tree, and gradually moved into the park to keep his livestock, and eventually formed a makeshift home for his family as well (See Figure 48).

Figure 48: Encroachment of a local park by a butcher (Picture taken by author, 20th of July, 2016, Delhi)

Therefore it can be said, that although actions such as personal involvement and manual help to ensure the safety of their local green spaces were undertaken, there wasn't enough done. Also, the threat of feeling unsafe was not observed with anti-social activity in the space alone, but with illegal and unwanted encroachment of these spaces too.

6.2.5.Perceived quality

A well maintained space is a space that is perceived to be of quality. In literature there are several ways listed to measure quality depending on the site and context of the study. Most popular are technical indicators, however, equally acceptable are measures of perception by the users. Here, the quality is measured in terms of perceived visual appeal. It is assumed that the space must be visually appealing in its nature and form to its users, thereby making them want to visit the space again and again. The hypothesis framed here was:

Hypothesis: **Actions taken by RWA lead to beautification of the local green space**

The significant results are compiled in Table 27**.**

Table 27: Significant Chi square test values for actions vs. perceived visual appeal of the green space

Test Results S.no.			
1. **Chi-Square Tests arrange money vs. visual appeal**			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12,936[a]	2	,002
Likelihood Ratio	11,933	2	,003
N of Valid Cases	34		
2. **Chi-Square Tests raise up park related issues vs. visual appeal**			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7,727[a]	2	,021
Likelihood Ratio	4,524	2	,104
N of Valid Cases	34		

Test Results

S.no.

3. **Chi-Square Tests providing guidance vs. visual appeal**

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7,151[a]	2	,028
Likelihood Ratio	5,166	2	,076
N of Valid Cases	34		

4. **Chi-Square Tests manual help vs. visual appeal**

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9,637[a]	2	,008
Likelihood Ratio	6,351	2	,042
N of Valid Cases	34		

5. **Chi-Square Tests other ways vs. visual appeal**

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5,976[a]	2	,050
Likelihood Ratio	4,019	2	,134
N of Valid Cases	34		

Here, all test values were found to be significant (see Table 27), since the people who contributed towards the maintenance of green spaces in one way or another, truly perceived the space to be visually appealing, and hence of better quality. This is also in coherence with their replies from

Section 6.1.7, where the respondents majorly said that their local green space is visually appealing to them. 23 persons agreed (out of 34) to the statement that their local green space is visually appealing to the eyes.

Table 28: Frequency response of actions versus visual appeal of the space (own compilation)

		Arranging money	Raise up park related issues	Providing guidance	Manual help	Other ways
Visual Appeal	Agree	23	0	1	1	0
	Neither agree nor disagree	2	0	2	0	1
	Disagree	1	1	0	2	0

This indicate towards the fact that most often respondents perceived their local green space to be of good quality (with some contradicting cases), and therefore believed in their own ability to maintain these spaces in absence of support from the local authority.

6.3. Summary of the results

The chapter is divided into two main sections. The first section consists of descriptive results in terms of what constitutes the RWAs, especially what was the situation with respect to the sample selected, what is their perception of local green spaces in terms of quality, and safety, and how they function and organise themselves accordingly. The second section is more analytical and records relationship between their actions and the respective outcome on the local green spaces being maintained.

The major portion of the respondents interviewed in sample population were of age 50 and above, and were either local businessmen or senior citizens/retired personnel, which also explains the age bracket, and also that they had ample time on their hands to voluntarily be part of the RWAs. Their preferred choice of actions in contributing to the maintenance of their local green spaces was arranging financial funds, either in form of RWA donations from the neighbourhood or local business sponsors, or by providing personal recommendations, suggestions and sometimes even manual help in the park. Although the reasons such as their educational qualifications, and their position of significance in the society were big enough to be a contributing factor for being the part of RWA, and

hence contribution to the maintenance, the biggest reason were their personal belief in the benefits of these spaces that motivated them to work for these spaces. Most often during the interviews, respondents claimed how they utilise these spaces for exercise and health reasons. Also, social events which bring together people from the community were briefly mentioned. Their perception of the local green space in terms of it being a good place to relax and meet other people, and being clean and litter free was often good. Similarly in terms of being safe it was rated as fair, with few poor and very poor conditions of certain parks. Despite rating their spaces as good, people still desired improvements in terms of safety, and better seating places and lighting.

Through the hypothesis testing, it is safe to assume, that RWAs are explicitly involved in the management and maintenance process of the green spaces via varied actions: such as arranging financial help, providing guidance, sometimes even contributing manually, and also by raising up relevant issues related to the green space. It was observed that wherever financial support was arranged, and some guidance was provided, a relationship between the action taken and its intended outcome on the green spaces was found. Thereby, indicating that the quality of the green space was perceived to be of adequate standards and properly maintained.

A tabular summary of each hypothesis, its result and inference is summarised in Table 29.

Table 29: Summary of results of Hypothesis testing (own compilation)

S.NO.	HYPOTHESIS TESTED	RESULT	INFERENCE
1.	Actions taken by RWA lead to creation of recreational opportunity in local green space	Hypothesis partially accepted	It is accepted in cases where actions undertaken by RWA pertains to arrangement of money, led them to perceive that their local green space was a good place to meet other people and relax. This proved the space functional to create opportunities for recreation.
2.	Actions taken by RWA lead to neat and clean local green spaces	Hypothesis partially accepted	Hypothesis is accepted only in cases where actions taken by RWA pertain to arranging money, raising up park issues, and providing personal guidance in the process led them to believe that their local green space was clean and free from litter. Other actions did not offer significant results, one of the reason could be the small sample size.
3.	Actions taken by the RWA lead to greenery in the local green space.	Hypothesis partially accepted	It is accepted in case where action undertaken by RWA is to raise up park related issues either within internal meetings, or addressing them with relevant authorities. Here they perceived their local green space to be "green" enough in terms of having appropriate tree cover.

S.NO.	HYPOTHESIS TESTED	RESULT	INFERENCE
4.	Actions taken by RWA lead to safe and secure green spaces	Hypothesis partially accepted	It is accepted in cases where actions taken pertain to arranging money, raising up park related issues, and providing manual help with the park leads them to perceive their local green space to be safe and secure.
5.	Actions taken by RWA lead to beautification of the local green space	Hypothesis accepted.	It is accepted in all cases where any action undertaken by RWA leads to believe that their local green space is visually appealing.

7. Discussion

From the previous chapter, it is evidently clear that RWAs are involved in maintaining their local green spaces, due to various reasons, primarily being the belief in the benefits of such spaces. And due to their involvement a certain impact is also seen in these spaces, in terms of safety and their perceived visual appeal. Their actions have somehow partially or completely lead to the creation and continuation of these spaces as being perceived of better quality, and thereby contributing towards the idea of providing a decent quality of life for its users. In light of the previous results, this chapter will discuss and describe how these associations can be seen as the caretakers of these spaces thereby ensuring a long term continuation of services provided by such spaces to the urban dwellers. In addition to this, the chapter will also discuss the results keeping in mind the background of how green spaces can contribute to the bigger concept of urban sustainability by being safe, inclusive, and resilient spaces for its users.

7.2. Resident Welfare Association an example of active citizenship

It was clearly outlined in section 4.2 that Resident Welfare Associations (RWAs) are a voluntary effort taken up by few responsible and conscious citizens of the society in order to provide and maintain continuous urban services to the neighborhood they live in. They do not have statutory powers as they are voluntary organizations created only to manage residents' interest. However to give them an equal basis and some rules and regulations on how to run, they are obliged to register themselves under the Societies Registration Act, and are governed by constitutional documents such as a Memorandum of Association, which contains their objectives and functions in order to perform their duties effectively. Usual functions of a RWA will be to take up issues with concerned authorities for the common interest of the residents for providing or improving common facilities in the neighborhood such as – park, drainage, roads, streetlights, water and electricity supplies, bus services facilities, community hall, milk booth, health center, etc. They are also responsible for creating a sense of neighborhood and community amongst people by organizing cultural events. In addition to this they also make sure to share information via circulars and notices about the changes in Government rules, policies, and notifications to make the neighborhood aware of them.

In this research, 117 RWAs were selected using random sampling method, and final interviews were conducted with 34 Presidents of these association. All the RWA presidents interviewed (N=34) were male. This was more because of the population composition rather than the sampling bias. It was observed in the list of RWAs obtained from the government website, that the majority of positions

such as the President, Vice-president, General Secretary, and Treasurer of these associations were held by men (only two women names were noted, for the position of General Secretary). It can also be assumed that majorly these leadership positions are only taken by men as they feel more encouraged to do so. While women on the other hand, with their regular employment, and house care duties feel the effect of time poverty and generally feel discouraged to take up on any other responsibility (Reichlin and Shaw, 2015) such as being the member of RWA here. Also, to note was that majority of them were older people, retired or senior citizens, who had time on their hands to take up on this responsibility, and also more sympathy for parks as a place to take a walk, relax, and meet other people. Occupation wise, majority of them were local businessmen and entrepreneurs, proximity of their workplace to their homes, and hence the neighborhood gave them an adavantage over people who travelled further from their homes for work. It can be assumed that being closer to the neighborhood gave them a bit of an extra time apart from their work time to devote towards RWA functions. To organize themselves as an association, they regularly hold meetings where several issues of the neighborhood are discussed. These meetings are often Face to Face meetings, and most often the time and place of the next meeting is also decided along with the discussion. Sometimes if the issue is of small significance, it can also be resolved on their WhatsApp or Facebook group, and a personal meeting is not required. This shows the acceptance and integration of current world communication methods to resolve issues and also the sincerity in completion of their responsibility. The results also show that majority of them are aware of informational processes such as media and planning documents in order to not just highlight their plight, but also be able to contribute to the planning process of their area, however they often do not actively participate in the process. Now it must be mentioned that the sample size is small (N=34), and therefore cannot be used to generalize with this particular aspect. The access, awareness, and active use of such processes often depends on various factors such as the level of consciousness, level of voluntary participation, previous work and educational background, among other things. However it must be said that they are aware of such process is a step enough in the right direction for their active citizenship. Probably a more formal set-up, a sympathetic environment and/or encouragement from right authorities will push these associations to be more recognized, active and participate in the planning and design process of their neighborhoods. Participatory design methods have always been encouraged in urban planning process, and this active involvement and their recognition can be seen as fulfilling the participatory criteria amongst the commonly observed design principles (Hwang *et al.*, 2018).

7.3. RWA as a care taker of the local green spaces

All the respondents admitted that they contribute to the maintenance of their local green space in one way or another. The most usual approach was to organize and arrange financial support to fund the activities in the parks that can be considered as maintaining it. As mentioned previously in the Introduction chapter, the problem in the area is the lack of empathy from the municipal body towards these smaller parks, due to which several RWAs had to take over this responsibility. The results in this study completely support the fact that these RWAs have undertaken this responsibility and more or less are successful in keeping their local parks and green spaces in satisafctory conditions.

Major examples so far of groups or actors outside the state authority have been reported in the developed world (Wolf *et al.*, 2011; Hawkins *et al.*, 2011; Krasny *et al.*, 2014), for example: community and allotment gardening in the cities of Leipzig, Lisbon (Cabral and Weiland, 2016) and New York (Conolly *et al.*, 2013), private contracting for green space management in Scandinavia (Jansson and Lindgren, 2012; Leiren *et al.*, 2016) and other measures in other places. However most of these examples either explore more hands on approaches where the local community involves in activities of utilizing these spaces to grow food, plant native trees, remove invasive species and restore natural habitats, or, that the local authority due to increased economic incentives contracts out the services to private companies. It has also been mentioned that if approaches are followed that specifically focus on management of urban green spaces, these spaces can be maintained to continuously provide the various benefits and services they offer to the urban citizens. However, in the developing world the actors responsible for such management often fail, and the responsibility is taken up by actors outside the state mechanism. One such example has been described in this study, using RWAs which took over the responsibility to look after their neighborhood parks. The style of involvement is managerial in the sense that they take up leadership roles by organizing funds, and also arranging grievance addressal with the local authority, which bears similarity to processes described by Dempsey and Burton (2012) as forming partnerships and community engagement for place keeping. It can be described as an association between partners that agree on shared responsibility, here one of the partners being RWAs (stewardship efforts), and the other the local authority on whom usually falls the onus to resolve their issues. RWAs can also contribute towards the local planning process and design by offering feedback and comment on the Master Plans designed by the local authority. They also have access to information via the Right to Information Act 2005, and also to legal complaints via PILs. However, during the research it was found that although they were aware of these processes, but have not yet used any of it to address their

problems or resolve their issues. Instead they prefer a more direct approach where they either file direct complaints, or use personal relations with members of the local authority to ask for favors.

RWAs way of contribution to the process of maintaining the local parks: by arranging funds, providing guidance or expertise, and also sometimes manual help. But the major portion of their effort involves organizing funds either from the neighborhood, or from the local councilor, or even arranging business sponsors for their activities. Financial resources are important to up-keep the place, and hence play a bigger role in involvement of these associations with the maintenance process. Their main reasons or motivation behind this involvement is majorly their personal belief in benefits of the green spaces. This is in line with the literature on local efforts in urban gardening or community gardens where people are usually involved because they are consciously moved by the benefits of the space and what service it can provide them, example leisure, relaxation, or food (Tidball and Krasny, 2012; Mathers *et al.*, 2015). Dunnett *et al.*, (2002), also mention that proximity to green spaces can act as an encouragement to participate in planning and design of these spaces, for this case study it is the upkeep that these groups participate in.

As mentioned before that their preference for involvement is majorly based on their belief in benefits of the place, RWA presidents were also asked during the study as to how do they perceive the condition of their local green space in terms of both the benefits, and its quality as an outcome of their actions. Self-reported surveys regarding the perception and attitude of people towards the green spaces have been used before (Jim and Chen, 2006). Here also, we discuss the results on the basis of this self-reporting by the RWA presidents. Majority of respondents reported they find their local green space to be a good place in terms of meeting other people, to relax, and to exercise. Social and recreational aspects of green spaces have been recorded extensively in literature (James *et al.*, 2009; Tyrväinen *et al.*, 2014; Kazmierczak, 2013). A comparable study could be the green space user survey in the city of Karachi (Pakistan) where it was also indicated that majority preferred green spaces to take a walk, being together with other people and their children (Schetke *et al.*, 2016). This was also evident during the interviews where people during the conversation mentioned how they and their neighbors use the park space to walk, do some exercise, and also consider it a social space in terms that they often meet their neighbors while out there (see interview excerpt below). Another reason for utilizing these spaces for social activities can be seen in the cultural history of south-Asian countries. This was stressed in the study done by Schetke *et al.*, (2016) who mention that the use of parks for social gathering, picnicking, and relaxing is more seen in the non-western society, particularly because of their family-oriented leisure behavior. This behavior was also seen with groups of Hispanic and Asian origin in a US case study (Gobster, 2005, 1998).

"..our park is an important place for us to gather and sit around on festivals like lohri....every morning there is group that doing yoga, you see children playing in the evening. It is fresh air that is the most important because the whole city is polluted...." (translated excerpt from an interview on 20th of July, 2016)

Green spaces when offer these services to its users in urban centers raise the quality of life for these users, in terms that they instill a sense of community belonging amongst them, and also provide them with health benefits such as fresh air, and stress free environment. This contribution towards human health and wellbeing is what is mentioned in UN sustainability goals, and the New Urban agenda as well, when they discuss green spaces to be a contributor towards urban sustainability. Green spaces maintain the cultural and the natural aspects in the city by realizing community development as a way of urban transformations (Vargas-Moreno 2014). They bring 'nature into the cities' by providing vegetated surfaces for its users, as well as for the biodiversity inhabiting the urban regions. Hence contributing to the bigger agenda of urban sustainability by providing quality natural spaces. The literature also indicates that green spaces are considered to be of quality when they are perceived as clean, litter free and/ or "green" (Groenewegen *et al.*, 2012; Kong *et al.*, 2014). Again, in the user survey in Karachi, respondents stressed on the provision of clean areas, and that they genuinely appreciate natural elements such as trees, or grass lawns for spaces to sit and lie down (Schetke *et al.*, 2016). In this study the results were reported to be a bit mixed when it came to these aspects. Majority of people although agreed that their local green space has enough amount of trees and plants (hence enough "green"), and is also visually appealing, however, they often reported a neutral stance on considering their space to be free of litter (25 people out of 34 said they neither agree nor disagree that their local green space appears clean). This may be seen as an indication of their own needs and preferences towards the condition of their local green space, in terms that this may be one of the areas where one might consider improvements in order to make the parks more attractive to the users. This was also reported during the interviews, on how the respondents would consider improvements to their neighborhood parks in terms of lighting (29 people), better seating area (23 people), better walkways (25 people), and more space for kids to play (27 people). Literature has also indicated that having better lighting around the play areas and foot paths can significantly increase the reported quality of the green space (Lachowycz *et al.*, 2012). In addition to the aspect of sustainability there is also the discussion for creation of safe green spaces in the city to enhance the quality of life of its users. Well-maintained parks located in nicer neighborhoods provide a sense of being safe, however the same park near a slum or a squatter settlement gives an impression of being unsafe (Schetke *et al.*, 2016). For this study, self-reported safety of the space also received mixed responses. Although the respondents reported good and

very good on the space being enclosed by fences and gates, they were either neutral or rated the space poor in terms of presence of anti-social activity and entry of people outside their close neighborhood. User safety in green spaces has been a topic of long discussion in literature, and also in sustainable development goals. People have reported feeling unsafe in countries like U.K. due to presence of certain loud and boisterous groups in these spaces (Newcastle City Council, 2004). The fear of crime, disorder and anti-social behaviour in green spaces also deters most people from using it (Newcastle City Council, 2004; CABE Space, 2005). This was also evident in this study, read the interview excerpt below.

> *"...have a problem of unwanted elements coming and sitting in our parks during the day...opening times had to be (made) limited..."* (translated from interview conducted on 2nd of August, 2016)

Suggestions to make these spaces safer for users have come in the form of increased security, and also engagement of local community to design these spaces according to their preferences and needs. This may also be the reason why several respondents in this study suggested improvements to the space in terms of stopping people from outside the neighborhood to enter the park (30 out of 34 persons). This was majorly evident in parks located in middle-income or high-income neighborhoods. This is in line with the traditional picture of squares and gardens in London, where traditionally people who overlooked the care of these spaces paid for their maintenance and hence reserved rights for usage (Longstaffe-Gowan, 2012). Banning such use of space by a certain group of people may be incorporating the user needs of that particular neighborhood making it synonymous with privilege and prosperous urban living, but at the same time it is inherently excluding certain sections of the society from accessing quality green spaces, thus contradicting the UN principle for creation of inclusive green spaces. Therefore it must be mentioned here that although the strategies employed to provide quality green spaces that focus on only on one section of society are well intentioned, but somehow they miss on the opportunity to transform the city in a positive manner and trigger new threats to the region (UN Habitat, 2015c), here bringing social exclusion by barring people outside the neighbourhood from using these green spaces.

It is safe to assume from the previous results and the above discussion, that majority of the respondents although contributing in one way or another to the maintenance process, and perceiving a good outcome of the space as a result of their actions, still leaves some space for un-satisfaction and improvements with the local green space quality and safety. Another important point to note is the general perception of quality green space. Rather than accepting that maintenance is a technical performance, RWA presidents perceive it more in terms of visual appeal

and experienced safety. A well-kept space is again, measured in terms of experiences. Usually when RWA presidents took an action in relation to making the green space look more appealing, they believed it to be true and hence perceived the space as visually appealing, despite of few contradictory instances, as mentioned previously.

It must be mentioned that a well maintained space depends majorly on availability and arrangement of finances. Most often it was cited during the interview responses, how the RWA president arranges financial help for the maintenance green spaces. And often the significant results were also seen when the action was related to arranging money for the maintenance of green space. It can be assumed that this is because of their position as a leader of the association that the responsibility to organize funds anyway lies on their shoulder. The funds or resources are in general organized to pay for repair services in the neighborhood, for example for faulty drains, or faulty street lights, and parks whenever required. Therefore most often in the interviews, stress was given on this action as compared to any other. Further discussion on their actions and the perceived outcomes with regards to the green space has been discussed in the next section.

7.4. Influence of RWA actions on the local green space

1. *Creation of recreational opportunity*: Recreational opportunity in the park can be seen as any activity that makes its users perceive it as a good meeting place, a good place to go and relax, and also a good place to exercise for all group of individuals living in the vicinity of the park. In this study it can be seen in the results where many of the respondents consider the place to be a good place to relax and meet other people. The results also indicated a significant relationship to exist between the actions taken and as a result the place considered being good for creation of recreational opportunity. It was particularly observed that when the action was organizing financial funds, it led the RWA presidents to believe that their action had some impact on the space. Therefore, this action must be considered significant when it comes to participation of RWA in maintaining the local green spaces, and the creation of recreational opportunity in these spaces. Several studies discuss the importance of green spaces on the human wellbeing, both physical and mental. So in this way, their actions are directly contributing towards the greater aim of enhancing the quality of life of the people around these spaces.

2. *Creation of clean green spaces*: A cleaner looking green space not only attracts more visitors, but also makes them feel safer. So any action that will ultimately lead to clean green spaces will contribute towards increasing the overall quality of the space, and the lives of its users. The results in this study indicated that when RWA organized funds, raised up issues related to

cleanliness in the park, and provided personal guidance towards the goal of creating cleaner parks, they perceived that it worked, and often lead to creation of clean green spaces. These spaces were perceived to be clean and litter free as a consequence of their action.

3. ***Creation of 'green' spaces***: Literature has often indicated the significance of perceived 'greenness' as a measure of creation of quality green spaces. Therefore any action that ensures the space is green enough with trees and plants must contribute towards enhancing the quality of life of its users. It has also been reported in literature that the color green does contribute to the positive effects of a green space on its users (Akers *et al.*, 2012). In this study results suggested a significant relationship between the actions raising up park related issues and perceived enough greenery in the local space.

4. ***Creation of safe spaces***: Several studies cite the participation of local actors as a cause to address and improve the safety of the local green spaces, as they would understand and incorporate the local needs and preferences. In this study, in order to make the spaces safe for neighborhood users, RWA actions contribute to create fences and control timings of entry, and actively control or discourage certain groups outside of their neighborhood to use these spaces. Again the most significant relation was found with the actions of organizing funds, raising up park related issues, and manual help with the park.

It must also be mentioned that, though similar methods have been suggested in literature to enhance the feeling of safety and security amongst user groups, this also at the same time leads to segregating people (from low income neighborhoods, or people not from their neighborhood), and creating social exclusion.

5. ***Creation of beautiful spaces***: The green spaces which are perceived to be beautiful and visually appealing in nature have been reported as quality green spaces. If a green space looks appealing to its users, it increases the possibility of their visit to the space. Quality green space is also perceived to enhance user experience, which improves quality of life, thereby creating resilient and sustainable communities around these green spaces. The results in this study indicated that no matter what action the RWA took in terms of creating visually appealing green spaces, they always perceived that it lead to positive outcomes.

8.   Conclusion

This research study starts with the basic question of finding out how local green spaces such as neighborhood parks and playgrounds are looked after in case of absence of initiative from the local authority. It applies a place based strategic management approach to green space maintenance and provides information about the involved actors (the RWAs), their resources, rules, and motivations that guide them into maintaining the local parks. Further, the thesis provides insight into possible implications of such actors and their processes on the quality of these local green spaces.

In the next few sections, the researcher tries to conclude the study by listing the main points that are raised during the results and discussion chapters of this research work. Further it also mentions the implications of this study on the green space development in the study area and what recommendations does the study suggests in the area for more efficient green space maintenance. In addition to this, theoretical implications and suggestions for future research are also mentioned. The chapter ends with concluding in brief the implied contribution of this thesis.

8.1. RWA perspective to maintenance

The RWAs bring in resources complementary to those of local authority in terms of organizing funds for themselves, although not at the scale as of what the local authority receives, but comparable enough to support their own activities. However, they lack a direct support from the authority which is seen in cases where their grievances are not heard or addressed in a responsible manner, and they take matters into their own hands with respect to park safety. This indicates that a mutual commitment and understanding is needed between the RWAs and the urban authority, and that these associations need to be formally recognized in the wider urban governance process. These associations need skills in facilitating and coordinating activities for the park users on behalf of whom they acquire their responsibilities. They have an important role to play in terms of ensuring that their local parks stay inclusive, and also enable a sense of community and a common identity amongst its users. In order to do so, they have their own informal rules about how they should take care of the up-keep of green spaces to impact its user's quality of life and wellbeing. And to see whether they can manage to achieve this in a competent manner compared to what actually should have been the case if the local authority has been diligent in its responsibility.

Though the literature is full of examples where citizen participation has had a positive influence on the quality of green space, there is extremely little evidence from any place in the developing world. The findings from this thesis contribute to this gap in evidence, where they indicate towards the

various motivations, action taken with regards to the local space, and the consequent outcome of these actions on the maintenance and quality of the green space. The main motivations behind taking up the care of these green spaces is the inherent assumed responsibility of these associations to provide basic urban amenities to their neighborhood users. They take up this role when the concerned local authority fails to deliver on its legal promises. Other motivations are more social and human in nature as to assumed health benefits and sense of community attachment to the place. These motivations lead to certain actions such as organizing activities and funds in specific relation to upkeep and maintenance of the local parks. This further lead to various social benefits such as: safer, cleaner, and visually appealing green space for its users. It also has contributed towards increased use of these spaces for recreation, health benefits, and community engagement, thereby increasing the sense of belonging and ownership associated with the local space. This in turn leads to enhanced quality of life of park users and thereby contributes towards the wider context of urban sustainability. Figure 49 captures in brief the underlying motivations that direct the actions of RWA and their subsequent outcomes on the green space. This figure should also be seen as the main essence of the empirical work carried out in this study, as it lists the main aspect or questions which the research has been based upon.
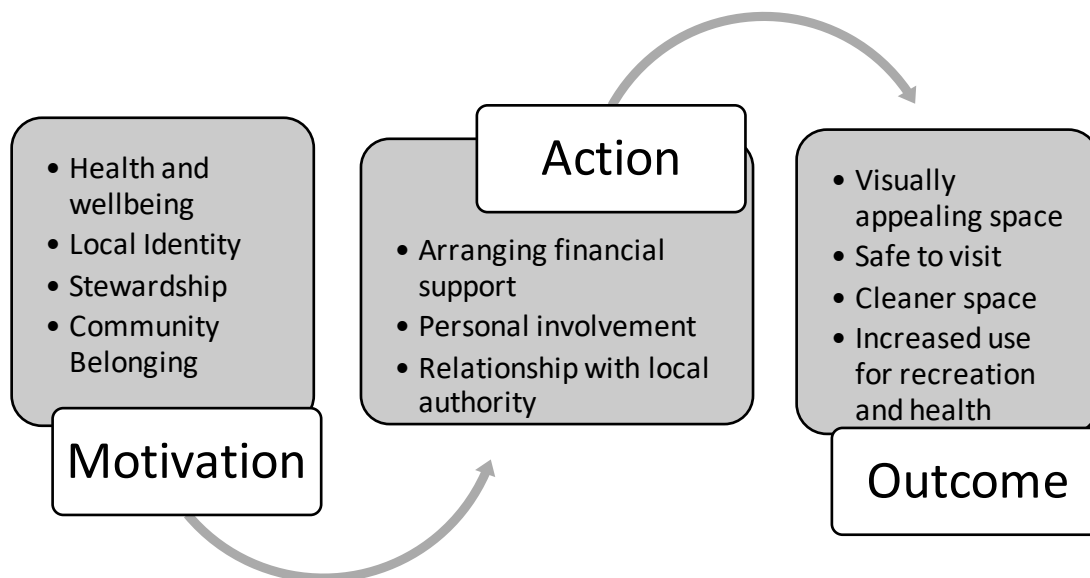
Figure 49: RWA Perspective to green space maintenance

8.2. Implications for Green Space Development

The findings from this study can be utilized to reach implications in the bigger picture of park design and management. Neighborhood parks provide a social identity to its users by making them connect with each other through a common activity and a shared space (Tan *et al.*, 2018). This stresses on a moral obligation for designers and planners to provide space and conditions for such identities to emerge. Usually urban planning theories stress the importance of stakeholder involvement in planning and designing parks, however it is noted that has not been the case most often, and involving users or other stakeholders in the design phase has not been followed through. Therefore it can be said that the conclusions from this study can be used for recommending suggestions that can be taken up for designing parks, and related policies, especially in developing countries to create sustainable and inclusive urban green spaces. The recommendations are listed below.

1. Provision of green spaces to socio-economically secluded groups

   Decision makers and urban planners need to be aware of open spaces and inclusive designs in line with the New Urban Agenda and UN SDG 11. A strong reform and research informed strategy is required to recognize these differences and to overcome them. Most often socio-economic inequalities are a result of planned green spaces. For example in case of Delhi, poor areas are often un-authorized neighborhoods or slum clusters with highly dense built structure and no open spaces to plan a park. There residents are also not involved in the usual RWA-local authority nexus, as RWAs can only be registered in DDA authorized localities. Hence they also miss out on the democratic process. On the other hand local authority planned neighborhoods are less dense and have the provision for parks and playgrounds. However, these neighborhoods restrict entry of people who do not live closer to these parks, thereby creating an environment of seclusion for people who do not have the facility for parks in their immediate vicinity. They showcase a privileged and elitist attitude where access to higher quality of life is only entitled to them. To counter this and create functional green spaces that are inclusive and open, they have to be located and designed in such a way that they are accessible to a diverse set of population. Although empirical evidence in support of this is not very clear, but this should give an incentive to provide more focus towards this area of research, and address the consequential impacts. Perhaps, an urban greens policy or a greening strategy can be framed that tackles this point and incorporate the social, natural, and infrastructural elements addressed by a wide range of culturally and economically diverse people. A suggestion here would be to try to include people from less socio-economic background into urban gardening, or urban agriculture. Inspiration can

be derived from EU funded Interreg Danube Transnational program for cities situated on the Danube river in Eastern Europe (Danube Transnational Program, 2018). The project provides guidelines for increasing urban agriculture activities through various measures, especially participatory planning, in urban areas struck with social inequalities and poverty. Also, examples from other European cities such as Groningen, and Berlin can also be looked at where projects about 'edible city' are to be found.

2. Inclusion of user groups in design and maintenance of neighborhood parks.

Recognizing the user needs and patterns are also important in designing parks and maintaining their continuous preservation. Big city parks are often under the limelight and therefore enjoy a constant maintaining process. However, smaller neighborhood parks often receive the shorter end of the stick when it comes to maintenance. Even though the park must have been designed using the current best practices, the need and demands of the user group will evolve with time and therefore the maintenance process needs to catch up with these demands and make changes accordingly. The smaller parks provision in Delhi has been the same since the second master plan in 1991, however the city has experienced vast economic and demographic changes since then, and still there was found no indication of including these changes in design and provision of smaller parks. In addition to this, there is not one view, or opinion regarding the functionality and benefit of the park, therefore contrasting views and community knowledge must be included in greening strategies when it comes to these smaller parks. Inclusiveness just does not mean access to all but also recognition of all kinds of demands and needs in order to provide better experience. There must be a push towards more studies to identify the type of users of these smaller parks in the study area, and then their needs must be recognized in order to include them in the design phase. Inspiration for design guidelines with participatory methods can be taken from Tan *et al.*, (2018). Lessons can also be derived from the city of Tokyo, where populations of older residents (primary users after kids) are involved in management of smaller parks because of their experience, skills and knowledge (Carmona *et al.*, 2004). TThey are employed in smaller jobs related to parks, which basically provides a way for them to connect back with the society and not get isolated once they retire and live solely on their pension. It also gives them an opportunity to be involved in the process and a space for recreation. As was observed in the study area that majority of respondents (RWA presidents) were senior citizens or retired professionals, their time, skills, and knowledge can also complement the design and maintenance process very well. Perhaps a similar model of post-retirement employment can be looked into as well.

3. Inclusion of a park design standard for maintenance

As is mentioned previously and is also evident in the study area, usually bigger parks receive more notice, and resources in terms of maintenance. Whereas, smaller green spaces such as neighborhood parks are not on the priority list. The study area depicts an interesting case where resident organizations have taken up the responsibility to look after these spaces. Therefore, it can be said that these organizations are effective in maintaining spaces if they are of smaller sizes, because more attention and focus to detail can be given, also their own needs and preferences will be reflected in the process. An example that can be looked at is the garden squares of London, in terms of size, design and access they bear a striking similarity to the parks in the study area. These spaces are usually less than an acre in size, have a fenced and defined boundary with access via one or two gates, and are intensively used by people living around them. Similar case was observed in the study area, where only people from neighborhood use and visit these smaller spaces and entry of people outside the neighborhood is restricted via gates, fences, and other measures, and the average size of parks is usually around 0.2 acres. Perhaps, assumption can be made so as to point out that nearby residents are usually successful in maintaining smaller recreational spaces if they are given the sole responsibility to look after it. Probably policy makers and planners can include this clause in the provisions for neighborhood parks as a next revision, and provide a platform for their inclusion in the process. Lessons can also be learned from Hwang *et al.* (2018), they discuss few points that must be kept in mind while designing neighborhood green spaces. They lay stress on the site-specificity of the place; here for example would be the spaces in between different socio-economic neighborhoods. The diversity of user population and the place where the space is being designed must be taken into account. Thus a standard design of the park and design practices can pave the way for well maintained parks.

4. Management platform for interaction of various groups

Instead of having just a top-down or a bottom-up approach for managing the neighborhood parks, a joint way must be proposed, under which the government agencies legally responsible for park management must co-ordinate with the local groups who voluntarily and conscientiously look after these spaces. For example in case of East Delhi, few lessons can be incorporated from the now defunct *Bhagidari* (See Appendix C: Civil Society in Delhi) in order to showcase a working platform where a partnership can exist between civil servants and the civil society. Certain steps can be taken to support and encourage RWAs in order to improve their

activities for park management. A common and joint discussion can be held between the local authority and the RWAs to discuss issues, goals, and visions for development of these smaller parks. There can be a time bound creation of plan and activities to be achieved for continuous management of parks. For this the RWAs can be provided with personnel and financial incentives, and be given a certain level of autonomy to take decisions with regards to their local spaces. This may also encourage other neighborhood RWAs to pro-actively seek part in maintaining their local green spaces. Moreover, provisions under the New Urban Agenda can also be explored, where it mentions to provide financial support to urban authorities to support participatory mechanisms. Delhi Parks and Garden Society can be seen as a central point for co-ordinating all these activities, as it already monitors all parks in Delhi irrespective of under whose jurisdiction the space lies.

5. Creation of a well-defined green space standard for the area

The encouragement, motivation, and availability of resources to participate in the maintenance process maybe a good start, however the outcome of these three must also be looked after. Therefore a minimum standard for what constitutes a quality and well maintained green space must also be defined, set and implemented. Lessons can be learned from the Nordic Green Space Award (Lindholst *et al.*, 2016). This scheme incorporates three main themes: 'structure and general aspects' such as size, location of the space, its accessibility; 'functionality and experience' such as recreational, social, biodiversity aspects; and 'management and organisation' that includes the maintenance and communication of information like aspects. A standard scheme like that can not only set guidelines and indicators for what shall a quality green space look like, but can also create an atmosphere of competitiveness amongst user groups maintaining these spaces in order to get ahead of each other and have their spaces granted these awards. In this particular study area, this can give the RWAs an additional motivation to participate in the maintenance of their local parks, because everyone would compete to be on top of each other, and it will attach a sense of pride to their work. This in return will also ensure a basic standard of green space availability in the area.

6. Recognition of green spaces as a part of sustainable urban spaces

As the study points out, there is a certain role that citizen groups play in maintaining their local spaces and ensuring that a continuous supply of services and benefits from these green spaces can be maintained. These benefits and services include ecosystem services such as air and water purification, habitat for urban biodiversity, natural environment or urban dwellers for their

health and wellbeing, and many others. In being capable of offering such benefits, these spaces contribute towards the overall urban sustainability too. Therefore, the discussion on preservation and planning of these spaces should not be limited to local urban planning agendas, but must also be raised at more global level where discussions about achieving sustainability generally happen. Creation of these sustainable spaces can contribute towards the country's goal to reach the 11th Sustainable Development Goal.

The above mentioned suggestions and issues consciously address a strong need for an organized system where not just best practices for urban green development are adopted in planning of parks by the local authority but also constantly changing needs and demands on the basis of culturally, socio-economically different people are incorporated as well. Citizen groups such as RWAs here can fulfill the part of integrating user demands by representing them in a more formal way. There can be a governance structure where the local government together with the civil society counterparts can ensure an inclusive representation of all residents and steer greening agendas in the cities. Adopting the approach can lead to formation of urban greens that are co-designed, co-implemented and, co-managed to provide a decent quality of life in urban areas and support social justice in terms of environmental and human health benefits procured for all.

8.3. Future Research

The results derived in this thesis point at relevance of seeing small green spaces such as neighborhood parks, and their maintenance from the perspective of citizen organization like Resident Welfare Associations and their understanding of this process. The dissertation provides some interesting and promising findings, which can be explored further. However due to the low sample size and other methodological limitations (discussed previously) findings can only be used as possible explanations to the current trend of RWA participation in park maintenance and the influence of their actions on the quality of these parks in the study area. While the research may have contributed to increase in understanding of citizen group participation in park maintenance, it also identifies a number of gaps in knowledge to explore in future research studies, if the concept of sustainability with respect to green spaces has to evolve further and applied to places in developing world.

Further studies can look at the role of RWA as not just a voluntary organization, but as an actor in the broader game of urban governance. It can look into the need for acquiring a formal set up of a platform for providing these associations, a recognition for their contribution to ensuring urban amenities. While this thesis primarily focused on the Resident Welfare Associations (RWA), it will be

immensely significant to take into account the on-site staff such as gardeners, as to what constitutes maintenance for them. Future studies can reflect on the role of manual staff in terms of their skills, organization, and resources required in taking care of smaller parks. In addition to this, some park user perspective may also be able to provide a balanced account of things in contrast to just the Presidents of RWA. This may address the question of how a well maintained space is seen and experienced by its users, and how they end up feeling the sense of attachment or belonging to these green spaces. This could also lead to addressing the question of how inclusive green spaces can be created in balance with the feelings of place ownership. The motivation of users to eventually participate in the process of green space maintenance can also be explored. Further it must be acknowledged that more evidence and information is required about the influence of citizen group's decisions on the physical quality of green spaces, especially in developing countries. Here, studies conducted over a longer time period to compare before- and after- situations can be a way to record consequences of their actions on the green space.

This research only bases its conclusions on the empirical findings from East Delhi, future research projects in other places and contexts can add depth to the status and potential of citizen group involvement in green space management and how it eventually contributes to creation of safe, inclusive, resilient and sustainable urban environment.

8.4. Theoretical Implications

This section reflects upon the theoretical concept used in the thesis and their subsequent implications on what can be concluded from the findings of this research. It also reflects upon what can be the contribution of this PhD thesis on the development of theory within the field of landscape architecture, open space management, and green space maintenance from the perspective of an example from developing world.

The thesis is a collection of events of my journey as a researcher towards understanding and seeking knowledge about greater theoretical concepts and ideas. The process has been extremely arduous, with application and rejection of few concepts before final agreement on the concept of strategic space management. It meant application of this theoretical approach late in the research process and therefore used as a way to understand the collected data in a retrospective way.

The previous concepts explored in terms of theory with respect to this research have been resilience and place keeping. The concept of resilience was first applied to this research to look at how green spaces can contribute towards urban resilience against air pollution in the city of Delhi. However,

due to lack of available data, some methodological limitations, and lack of clarity in the application of the concept to the underlying research question, the concept was discarded. Next theoretical approach to be applied was the concept of Place Keeping, which deals with the mechanisms of place based governance. However, the concept was again rejected because the study was focused at one set of actor when it came to the maintenance of local green spaces, and governance in itself means to include all the involved actors, and the related connections and networks amongst them.

Eventually, the concept of open space strategic management was applied, as it specifically involved the operational aspect of green space maintenance, and described it in terms of both actors involved, and the activities undertaken. The intension of this PhD project was to understand the involvement of citizen groups in onsite maintenance of smaller green spaces such as neighborhood parks and playgrounds in a developing country. Thereby a comprehensive perspective from open space management was taken. The advantage to use this perspective was to become aware of the inter relatedness of various tasks in connection to upkeep of green spaces. These citizen groups do not necessarily make the same distinction between what is physical maintenance and what are the strategic and tactical aspects of management, as one would expect from an urban authority responsible for park management. In the light of this evidence I adopted an approach to the study area by seeing maintenance as just the context in which processes were undertaken, perceived, and described by this particular group of actors (RWA Presidents). From this perspective a clear indication was seen that the contribution of these actors at the operational level was more than just the physical tasks, it was also about the perceived understanding of park management by these actors that guide the procedures and activities for maintenance, which may find similarity to different levels (strategic, tactical) of the municipal organization if it was actually performing its original duty to maintain the park.

However, as mentioned throughout the thesis, the focus of this research was extremely narrow, only on the maintenance level, and not on the broader long term management plans. Had the research shifted its focus beyond this up-keep, the selection criteria of the case study area would have been different, and also moved towards a deeper understanding of the Resident Welfare Associations (or other citizen groups), and their working in partnership (wherever it existed) with the local authorities and users of the park. Also, this probably would have had an impact on my own understanding of the overall situation in which maintenance is carried out. Though this would have increased the scale of the study, and would have required more time and resources to finish.

The theoretical frame of this research study served well as a way to understand the data and the results clearly show the different actions and outcomes of the actors that occur at the operational level. However the outcomes of the actions deemed as maintaining do not always feed directly and positively into policy making for urban sustainability (example the tradeoff between having safer parks and them being not inclusive in this study), but rather result in site specific manifestation of maintenance activities as preferred and understood by the care-takers. This, I believe is a new understanding of the process of maintenance of parks, especially in the developing world, and in this way the thesis contributes with development in the field of green space management.

8.5. Contribution of this thesis

As mentioned in the Introduction chapter, this thesis aims to look at a certain problem in the study area, and thereby contribute towards the gap in scientific information and knowledge that exists with regards to neighborhood parks, and in specific in developing countries. It also aims to contribute towards the policy and design developments regarding these spaces, both general, and area specific contexts. This section here cumulates all the implied contributions in brief for the convenience of the reader. These are:

8.5.1.Contribution to gap in literature

Delhi, the capital of India is considered to be one of the fastest growing mega cities in the global south. Despite of this fact, there are very few studies that exist on the city of Delhi. However, except a handful of studies that focus on urban expansion of this region, very little information is available on the presence of green spaces in and around the city. This thesis has therefore tried to showcase an insight into this missing information. It provides a site-specific context to the information. The thesis has tried to form a link between the smallest unit of urban green spaces (neighborhood parks) and their contribution to the overall concept of urban sustainability. It begins by describing the urban hierarchical structure of various recreational green spaces in the city. However, due to the scope and limitations of the research, this thesis managed to only look at one district in the city. It describes the situation of neighborhood parks in this area, and how they are looked after. It also gives information on the participatory mechanism involved in management of these spaces in the area, and how these aspects link the bigger concepts of inclusivity, safety, resilience, and sustainability in UN Sustainable Development Goal 11. The thesis has made an effort to discuss the role of active citizenship with respect to maintenance of smaller recreational spaces under the umbrella term of urban sustainability. And its site specific context, coming from a developing country is what makes it a new contribution to this field of literature.

8.5.2.Contribution to Landscape Architecture

International Federation of Landscape Architects (IFLA) describes landscape architecture as a discipline that "employs principles and theories from diverse fields such as arts, physical and social sciences to the process of environmental planning, design, and conservation. This serves to ensure long lasting improvement, sustainability, and harmony of natural and cultural systems or landscape parts thereof, as well as design of outdoor spaces with consideration of their aesthetic, functional, and ecological aspects" (Evert *et al.*, 2010). According to the definition three main areas of activity where a study can contribute to this field are planning, design, and subsequent management of any landscape.

This thesis here contributes with information to all three areas by providing a site specific context. The contribution to planning is by collecting information about the planning practices in Delhi. It describes the various state departments involved in planning, and what is the urban structure in the study area. The contribution to design is the description of diverse green spaces in the city. The special focus on neighborhood parks, and their comparison with parallel spaces from other parts of the world in terms of size, location and access gives an overview into the functioning of design professionals when it comes to urban green spaces. Especially drawing parallels with the garden squares in London, gives an insight into the historical planning and design of smaller green spaces in the capital city of India. It also paves way for understanding how smaller green spaces can be managed outside the state allotted mechanisms. Last, contribution to management comes in the form of information related to a specific group of citizens (RWAs) that are involved in the maintenance of their local parks. This again, provides a specific insight into management of smaller green spaces such as neighborhood parks, especially in a city in a developing country. Any other city in the global south with similar spatial, political, and social structures can adapt lessons from this study and integrate in their own mechanisms for green space development. This also leads to future research prospects as to how the planners and design professionals can deliver a green space in an area so as to ensure a continuous management of its aesthetic, functional, and ecological aspects.

8.5.3.Contribution to Policy Development

As has been evident from the literature review in this thesis, there exists no efficient and effective policy that consolidates the planning, design, and management of smaller green spaces in the city of Delhi. There exists the provisions for planning (functionality and size) of a park in a the urban area categorized as neighborhood in the Master Plan, however there is serious lack of information on how these spaces are designed and maintained, and whether they perform their intended function.

From the results of this thesis it was evident that there is unique scenario in the study area where resident associations have taken up the responsibility of these parks in some neighborhoods. However, there still existed a gap where these associations and their work can be recognized and labeled as being in favor of efficient maintenance of green spaces. Due to these findings, the thesis suggests certain policy recommendations that will have an impact n the smaller green space development in the area and the associations involved in it. The thesis may contribute to designing an effective policy for neighborhood park design and development that focuses on inclusivity of socially diverse people as park users, and further their inclusion of in design and maintenance phase. Currently the study area lacks such initiatives. It may also contribute towards framing of guidelines for park standards, as to what constitutes a quality park for these users. These standards can then be applied to maintain a constant level of quality amongst the neighborhood parks, thereby contributing further to enhance the quality of life of its users, and the people in its immediate vicinity. This would further contribute towards achieving the goal of urban sustainability be recognizing these spaces as beneficial for human wellbeing and health.

9.   Bibliography

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Appendix A: Questionnaire

Section A: Description of Resident Welfare Association

1. Kindly state the origin and start of your association? You can start with providing information related to what year did it come into being, and what prompted the formation of this association?

2. Kindly elaborate on the expectations that you and the residents of your area have with the association?

3. Do you feel in conflict with the working of the state while undertaking your responsibility as a RWA representative? Could you please elaborate?

4. Please indicate the number of male or female members in the association

Male	Female

5. Please indicate the number with regards to what age category would you say your members belong to?

1.	18-29 years	
2.	30-49 years	
3.	50-64 years	
4.	65 and above	

6. What would you select as their highest level of education? Indicate the number of members with these qualifications

1.	Primary	
2.	High School	
3.	Intermediate	
4.	Undergraduate	

5.	Post graduate	
6.	PhD	
7.	Other qualification, please specify	

7. Kindly select their situation regarding work. Indicate the number of members with these qualifications

1.	Business owner	
2.	Private employee	
3.	Government employee	
4.	Military	
5.	Teacher/ Professor	
6.	Senior citizen/retired personnel	
7.	Others, please specify	

8. Do you consider your association as a part of a partnership model (Bhagidari) with state?

   Yes/No

9. How would you describe the nature of this partnership?

Strong	Weak
Formal	Informal

10. How successful would you say this partnership has been with respect to addressing civic issues in your area?

Extremely successful	Very successful	Moderately successful	Slightly successful	Not successful at all

11. As member of RWA, do you face situations like:

	YES	NO
Deadlocked discussions		
Personal conflicts		
Frustrated participants		

12. How do you resolve such situations?

Section B: Involvement in maintenance of local green spaces

Maintenance here can be described as any activity that brings about physical changes in the appearance, and upkeep of your local green space. Involvement can involve both direct, physical participation or indirect, decision making authority regarding the physical processes.

13. What would you say are the possible reasons for your involvement?

1.	As a member of the RWA, I am obliged to take part	
2.	I also personally like to be involved in the process (personal reasons)	
3.	Others, please elaborate	

14. As a member of RWA, how do you participate in the maintenance process

1.	By arranging money for maintenance	
2.	By attending every RWA meeting, and bringing up the issue of park maintenance	
3.	By providing necessary expertise and guidance	

4.	By helping manually in maintenance process: mowing, planting, cutting of plants, and removal of rubbish	
5.	Others, please elaborate	

15. As a member of the RWA, do you have access to these processes:

1.	Internet/print media in a language other than Hindi (preferably English)	
2.	Right to Information Act	
3.	Master Planning Process (Public consultation)	
4.	Courts (Public Interest Litigations)	
5.	Urban plans via Community Participation law under JnNURM	

16. As a member of RWA, where do you arrange the financial help for maintenance of your local green space from?

1.	From the local MLA Fund	
2.	Voluntary donations from other organizations	
3.	Collection of community funds	
4.	Others, please elaborate	

17. As a member of RWA, how do you arrange meetings with other members

1.	Face to face meetings	
2.	Telephone calls	
3.	Online groups on facebook or whatsapp	

4.	Pre-decided time and place	
5.	Others, please specify	

18. As a member of RWA, how often are these meetings arranged?

1.	Once a month	
2.	Twice a month	
3.	Once a year	
4.	Others, please specify	

19. What is the basis for taking up issues in these meetings? (for example: public opinion, public sentiment, suggestions by influential people in the association?)

20. As a member of RWA, how are the decisions taken during these meetings communicated? Amongst the association and the residents both.

1.	News letter	
2.	Word of mouth	
3.	Formal Notices	
4.	Others, please specify	

21. As a member of the RWA how do you address you grievance with the state?

1.	Bhagidari meetings	
2.	Direct contact with Bhagidari cell	

3.	Bhagidari workshops	
4.	Direct compliant with the respective state department	
5.	Others, please specify	

22. What will you state is the most preferred reason for involvement in the process, state the level of importance?

S.no	Statement/Reason	Extremely important	Very important	Moderately important	Slightly important	Not important at all
1.	My technical qualification					
2.	My educational qualifications					
3.	My level of influence or importance in the society					
4.	Personal belief in benefits of green spaces					

Section C: Outcomes of RWA actions and activity on the quality of local green space

23. Please name the biggest green space in your neighborhood

24. How will you rate the condition of this space in terms of

S.no		Very Good	Good	Fair	Poor	Very Poor	Do not know
V	Absence of anti-social activity						
VI	Well protected via fencing and gates						
VII	Presence of security guard						
VII	Entry of people not from the area						

25. How often do you think people in your neighborhood visit this space?

1.	Daily or more	
2.	4-6 times a week	
3.	1-3 times a week	
4.	Few times a month	
5.	Monthly or less	

26. Why do you think is the most plausible reason for people visiting this green space? (more than one choice can be indicated)

1.	Because it is the closest green space available	
2.	Because it is the closest, easily	

	accessible green space available	
3.	Because it's a good place to meet other people from the community	
4.	Because it's a good place for undertaking physical activity like walking, cycling, yoga, and other sports	
5.	Because it looks green and visibly appealing	
6.	Because it makes me relax	
7.	Because it's a good place to take my kids to	
8.	Because it's a good place to get fresh air to breathe	
9.	Because it is safe place to visit	
10.	Other, please specify	

27. What improvements would you suggest in order to make more people visit this space and more often?

1.	Cleaner space: less litter or garbage	
2.	More space for kids to play	

3.	Stop entry of people from outside the neighbourhood	
4.	Stop entry of dogs and stray animals	
5.	Better/more walking paths	
6.	Better/more seating area	
7.	More lighting	
8.	More flowers or trees	
9.	More artistic artefacts like water structures or pieces of modern art	
10.	Easier access: in terms of close proximity to your home	
11.	If other people from your neighbourhood use it as well	
12.	Other reason, please elaborate	

28. How strongly do you agree or disagree with these statements regarding your local green space

S.no.	Statement	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree
I	It is a good place to meet other people from the community					
II	It is a good place to relax					
III	It is a safe place to visit					
IV	It is visually appealing to the eyes					

S.no.	Statement	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree
V	It is a good place to connect with nature					
VI	It is a good place to exercise					
VII	It has the right amount of plants and trees					
VIII	It appears very clean and free from litter					

29. How strongly do you agree or disagree with these statements regarding your local green space

S.no.	Statement	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree
1.	I believe that the space is well maintained					
2.	I believe the quality of the space has degraded in the past few years					
3.	I would like to take part in activities that help improve the space					

Other Comments.

Appendix B

Format for the Invitation letter, along with support letter from the supervisor.

Invite

Dear Sir/Madam,

My name is Shikha Ranjha, and I kindly invite you for an interview that I am conducting with representatives of Resident Welfare Associations in East Delhi and their involvement in maintenance of local parks and green spaces in the area. I am a **PhD student at the Dresden Leibniz Graduate School, Technische Universitat Dresden, Germany**, and this interview is part of my doctoral studies titled: *The Role of Resident Welfare Associations in Maintaining Local Green Spaces-The Case of East Delhi*. The interview involves questions regarding your involvement with the process of maintenance and looking-after of green spaces in your neighborhood and will not be longer than 15-20 minutes.

In case of further questions, you can contact the researcher:

Shikha Ranjha

Email: s.ranjha@dlgs.ioer.de

Phone: +49(0)351 / 463 42351
Fax: +49(0)351 / 4679 212

Also, the supervisor of the doctoral candidate can be contacted.
Details of the supervisor:

Wolfgang Wende, Prof. Dr.-Ing.

Head of Research Area Landscape Change and Management

Leibniz-Institut für ökologische Raumentwicklung
Phone: +493514679218 (Secretary)
Email: w.wende@ioer.de

Kindly state your acceptance to participate in the survey by emailing me (Shikha Ranjha) back at the email address provided above. The interviews will be conducted in the month of July, and I will be pleased if we can arrange a meeting then.

Sincerely,

Shikha Ranjha
PhD Candidate
TU Dresden, Germany

Support Letter

Technische Universitat Dresden

01062 Dresden

DLGS Management Board

Date:

To whom it may concern.

Shikha Ranjha with student identification number 4124347, born on 1st October 1989, and an Indian national is a PhD candidate and a scholarship holder at the Dresden Leibniz Graduate School at the Technische Universität Dresden, Germany.

This is to express my support to Shikha who is academically supervised by me, at the Faculty of Architecture, Technische Universität Dresden, Germany. Her PhD thesis is entitled (working title): The Role of Resident Welfare Associations in Maintaining Local Green Spaces-The Case of East Delhi.

Shikha intends to interview RWA members in Delhi as empirical basis for her research during her stay in India. For the interviews, she needs some information about the role and nature of working of RWAs in the area. Your kind support of the research in this direction would be very much appreciated. For any clarifications, please do not hesitate to contact me.

Thank you very much in advance.

Yours sincerely

Prof. Dr. Wolfgang Wende

Appendix C

Table depicting administrative structure in territory if Delhi

Table 30: Services and the administrative control in Delhi (Adapted from Ahmad *et al.*, 2013)

Level of Organisation	Agency/Authority	Services/Utilities
Central (Government of India)	Delhi Development Authority (DDA)	Urban Planning and Development, enforcement of planning laws, Management of city parks,
	Archaeological Survey of India (ASI)	City Heritage buildings and management
	Central Pollution Control Board (CPCB)	Pollution control and monitoring
	Department of Delhi Police	Law and order
	Delhi Metro Rail Corporation	City Transport (Metro rail)
State (Government of NCT)	Delhi Transport Corporation (DTC)	City Transport (Bus)
	Delhi Jal Board (DJB)	Potable water supply and sewer management
	Delhi Urban Shelter Improvement Board (DUSIB)	Slums and JJ cluster improvement
	Delhi Electricity Regulatory Commission (DERC)	Management of distribution of electricity and set-up of tariff
	Department of Irrigation and	Storm water drainage

	Flood Controls (I&FC)	
Local (Urban Local Bodies)	NDMC, DCB, Trifurcated MCD	Delegated powers from central and state government for local development

Civil Society in Delhi: *Bhagidari*

Prior to 2015, public participation was actively sought via the Bhagidari scheme that started in 2003. This system was touted as a mechanism for a citizen-government partnership that will intend to develop a joint ownership of the city and its processes (Harris, 2005). The scheme in simple terms was launched to create a platform where citizen groups could communicate with the government in a democratic fashion and address their civic problems (CUE, 2014). The system fostered partnership via a number of mechanisms, majorly organizing thematic workshops at regular intervals, through which citizen group representatives get opportunity to interact with each other and officials from local administration, where they discuss common problems and try to come up with mutually agreed solutions. However, this scheme has been discontinued since the current government came into power in 2015.

Post this; Delhi saw a new way of citizen engagement in the form of Mohalla Sabhas. These are public meetings held in an area consisting of 4 or more neighbourhoods (or as called Mohalla), and consist of volunteers from the neighbourhood, local councillor, local administrative officials and contractors. The main purpose of conducting Mohalla Sabha is to make the process of catering and financing of urban services more accountable and transparent. These meetings are open for all members or citizens of the mohalla thereby involving the citizens from unauthorised colonies and slums too, neighbourhoods that are usually considered to be illegal and not registered with the development authority (a long standing critique of the previous *Bhagidari* system as mentioned in Ghertner, 2011). The meetings are video recorded, and grievances from all the attending members are collected. A voting system decides which grievance is to be given priority, and the councillor then and there itself allots funds for addressing this grievance. The Sabhas, allow opportunity for participation by almost anyone living in the area, and are not restricted to representatives alone.

Appendix D: Maps of sub areas under East district

As plotted on GoogleMaps. Each red dot indicates the location of the RWA selected via random sampling.
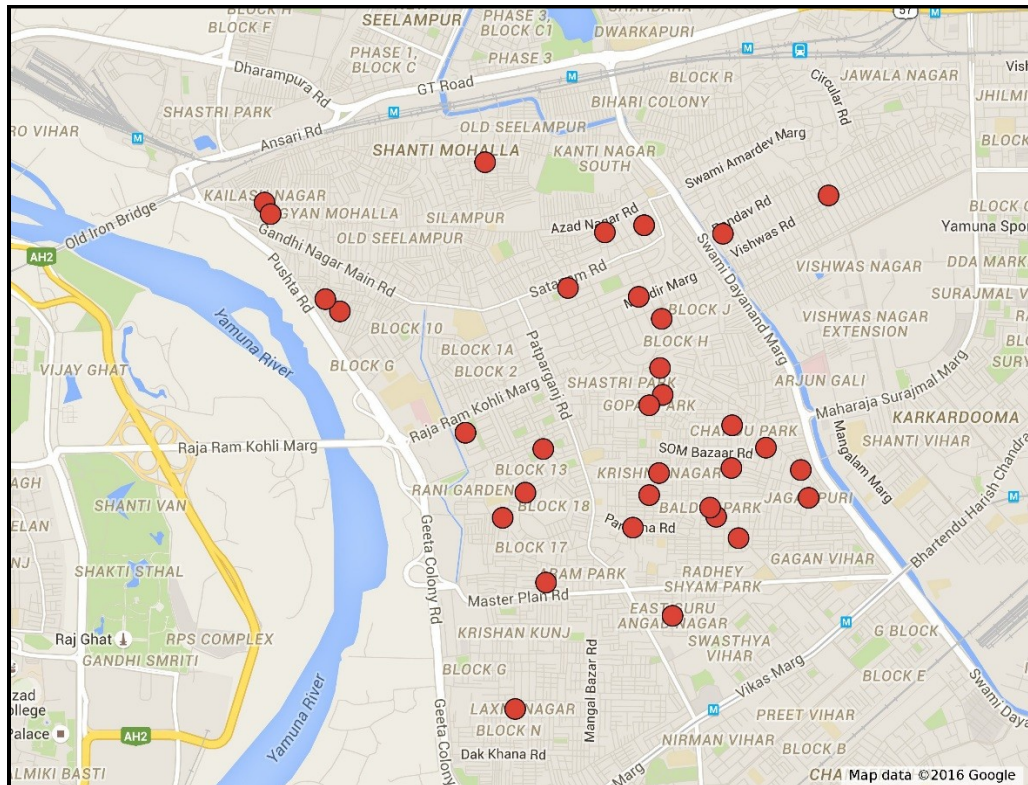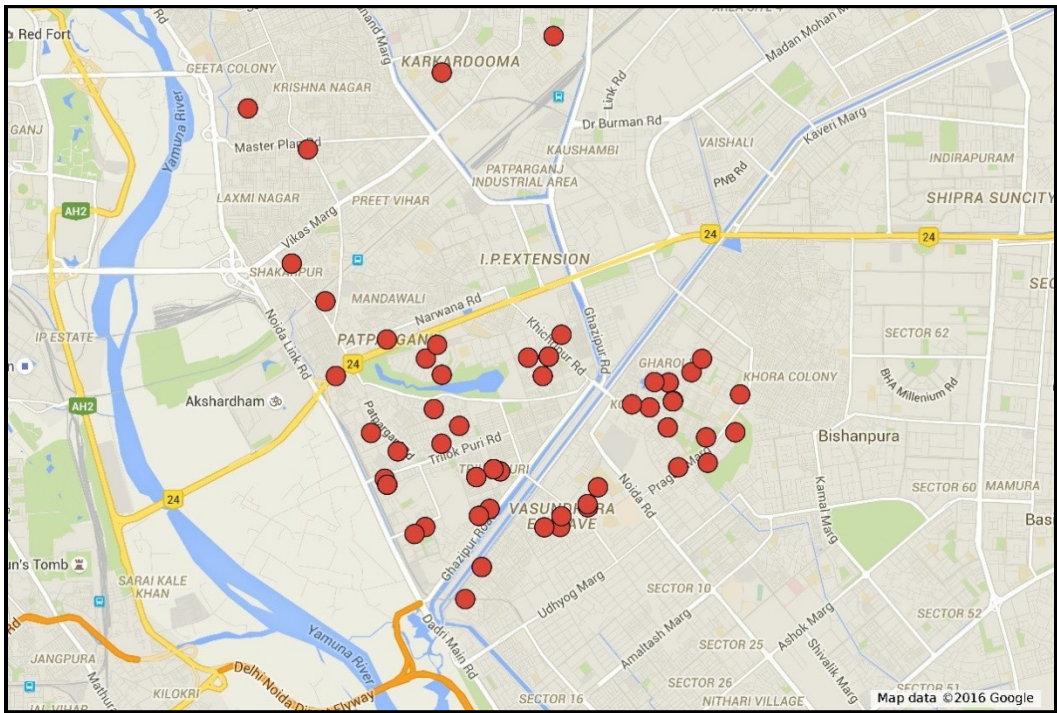

Figure 50: Selected RWA in Gandhi Nagar area

Figure 51: Selected RWA in Mayur Vihar area

Figure 52: Selected RWA in Preet Vihar area

Appendix E: Examples of Citizen Participation in other cities in India.

1. Mumbai

Mumbai, like any other Indian city suffers with the increasing problem of litter and waste dumping on street sides. So in association with the Municipal Corporation of Greater Mumbai (MCGM), the local citizens of Mumbai started an initiative to address the problem of waste piling on the streets in North Eastern Suburb of Mumbai. The scheme was more formally launched in 1996, and involved representatives from housing societies, MCGM personnel, and waste collectors on the street. Later on various NGO's joined as well. The program today boasts a successful citizen participation program in maintenance of public spaces.

Source: CUE, 2014.

2. Ahmedabad

Ahmedabad is one of the most populated cities in the western state of Gujarat in India. The city is also a place for one of the biggest slums in the state. These slums house people involved in informal jobs like sweeping, cleaning, house workers and such. As part of a slum, and considered as a 'nuisance' under Indian land zoning and planning laws, these slums often live under the threat of being razed down at any moment. In order to find a solution to eliminate this threat and a desire for their own place, the women in these slums formed a women's self-help group called Mahila Housing SEWA Trust (MHT). It is registered as an autonomous organisation promoted by the Self Employed Women's Association (SEWA) with the aim and vision to avail the basic right to shelter and dignity for all. This organisation ever since its registration in 1996 has launched programs addressing basic civic and infrastructure needs such as housing, water, sanitation, solid waste management, roads. These programs also facilitate access to information and financial, legal and technical services to the members of MHT, with a focus on improving the quality of lives and livelihoods of poor women. It boasts of successful civic engagement by involving slum residents, women and rural poor, through promotion of Community Based Organisation (CBOs) and grassroots women's leadership. Recently the organisation was selected as a winning team for the Global Resilience Challenge.

Source: http://mahilahousingtrust.org/

3. Bangalore

Bangalore is another metropolitan city in the southern state of Karnataka. The state is famous for being an IT hub and is often referred to as the silicon valley of India. In addition to this, it is also called as the Garden city because of the vast amount of greens in and around the city, which instilled a sense of environmental consciousness amongst its citizens from the very beginning. As a result there are several organisations and individuals who work for the preservation of environment in the city. The city has an informal group consisting of both organisation and individuals as members, joined together by an email list of around 850 people. Started in 2005, the group is referred to as Green Life in literature on environmental stewardship in the city. The group works to conserve, monitor, restore, manage, and educate the public about various issues relating to significance of sustainability and environment in the city. It gained official recognition as a representative of citizens of Bangalore after protests and legal actions regarding road widening and tree felling in 2005, when the state court ordered the local urban body (municipal authority) to start consulting Green Life, every time a tree is to be cut in the city.

Source: Enqvist *et al.*, 2014.

4. Hyderabad

Hyderabad, another big city in the southern state of Telangana (Previously part of Andhra Pradesh), also has several citizen groups, and resident associations that facilitate participation of local citizens in everyday civic activities. One such association is called Jubilee Hills Civic EXNORA (JHCE), a women's group initiative to organise household refuse collection in the posh neighbourhood of Jubilee Hills in the city. The association was first started in 1998, but was not very successful in its early years. Later in 2002, another NGO joined hands with JHCE and provided them with financial support to start bio composting facility in their locality. The main aims of the JHCE was to have a cleaner neighbourhood by assimilating their local waste in an efficient manner and in a way also rehabilitate socially deprived section of their society by including them to collect the waste from every household and deposit it at the centre for compost and recycling.

Source: Colon and Fawcett, 2006.

Appendix F: Statistical Test Values

List of Table summarising Chi square test values and Kendall's coefficient for the variables used in the study. Kendall's co-efficient was calculated only for tests that were significant for Chi square test of Independence.

1. Cleanliness

Table 31: SPSS test value summary for Cleanliness aspect (own compilation)

S.no.	Variables tested	Chi Square Value (Degree of Freedom) N=34	P value	Kendall's Tau b (value, significance)
1.	Arrange money vs. litter free	7.1 (2)	.029	-0.106 ; p=0.529
2.	Raising up park issues vs. litter free	7.7 (2)	.021	-0.334; p=0.048
3.	Providing guidance vs. litter free	7.1 (2)	.028	0.378; p=0.025
4.	Manually helping in the park vs litter free	2.8 (2)	.247	
5.	Other ways vs. litter free	.3 (2)	.831	

2. Upkeep of vegetation

Table 32: SPSS test value summary for Upkeep of Vegetation aspect (own compilation)

S.no.	Variables tested	Chi Square Value (Degree of Freedom) N=34	P value	Kendall's Tau b (value, significance)
1.	Arrange money vs. enough tree cover	3.2 (2)	.197	

S.no.	Variables tested	Chi Square Value (Degree of Freedom) N=34	P value	Kendall's Tau b (value, significance)
2.	Raising up park issues vs. tree cover	7.7 (2)	.021	-0.283; p=.091
3.	Providing guidance vs. tree cover	1.2 (2)	.531	
4.	Manually helping in the park vs. tree cover	1.5 (2)	.471	
5.	Other ways vs. tree cover	1.6 (2)	.435	

3. Safety

Table 33: SPSS test value summary for Safety aspect (own compilation)

S.no.	Variables tested	No anti-social activity	Protection via fence and gates	Controlled outside entry
1.	Arrange money			
	Chi Square value (df)	8.8 (1)	10.61 (2)	12.27 (2)
	P value	.003	.005	.002
	Kendalls tau b	0.510; p=.003	0.354; p=0.038	-0.139; p=0.408
2.	Raising up park issues			
	Chi Square value (df)	3.3 (1)	5.9 (2)	2.473(2)
	P value	.067	.050	.290
	Kendalls tau b		-0.309; p=0.071	

S.no.	Variables tested	No anti-social activity	Protection via fence and gates	Controlled outside entry
3.	Providing guidance			
	Chi Square value (df)	3.4 (1)	1.3(2)	2.9 (3)
	P value	.065	.595	.392
4.	Manual help			
	Chi Square value (df)	3.4 (1)	7.1 (2)	13.87 (3)
	P value	.065	.029	.001
	Kendalls tau b			0.411; p=0.015
5.	Other ways			
	Chi Square value (df)	.31 (1)	.26(2)	3.3 (3)
	P value	.573	.875	.341

4. Visual Appeal

Table 34: SPSS test value summary for visual appeal aspect (own compilation)

S.no.	Variables tested	Perceived visual appeal
1.	Arrange money	
	Chi square value (df)	12.93 (2)
	P value	.002
	Kendalls tau b	0.598; p=.000
2.	Raising up park issues	
	Chi square value (df)	7.7 (2)

S.no.	Variables tested	Perceived visual appeal
	P value	.021
	Kendalls tau b	-0.334; p=.048
3.	Providing guidance	
	Chi square value (df)	7.1 (2)
	P value	.028
	Kendalls tau b	-0.219; p=0.195
4.	Manually helping in the park	
	Chi square value (df)	9.6 (2)
	P value	.008
	Kendalls tau b	-0.338; p=.045
5.	Other ways	
	Chi square value (df)	5.9 (2)
	P value	.050
	Kendalls tau b	-0.234; p=0.166

5. Functionality of Equipment: Creation of recreational opportunity

Table 35: SPSS test value summary for functionality of equipment aspect (own compilation)

S.no.	Variables tested	Good meeting place	Good place to relax	Good place to exercise
1.	Arrange money			
	Chi square value (df)	7.3 (2)	3.6 (2)	.65 (2)

S.no.	Variables tested	Good meeting place	Good place to relax	Good place to exercise
	P value	.026	.164	.721
	Kendalls tau b	0.199; p=0.246		
2.	Raising up park issues			
	Chi square value (df)	16.485 p=0.000	10.64 (2)	.06 (2)
	P value		.005	.968
	Kendalls tau b	-0.438; p=0.011	-0.487; p=0.005	
3.	Providing guidance			
	Chi square value (df)	.43 (2)	.43 (2)	.20 (2)
	P value	.803	.803	.902
4.	Manually helping in the park			
	Chi square value (df)	4.5 (2)	2.5 (2)	.20 (2)
	P value	.101	.285	.902
5.	Other ways			
	Chi square value (df)	.13 (2)	.13 (2)	.06 (2)
	P value	.934	.934	.968

Appendix G

Park Size and Survey done by Delhi Parks and Garden Society, 2016

	Size of the Park in Acres	2013-14	2014-15	2015-16
	1.035	Satisfactory	Satisfactory	Poor
	0.169	Satisfactory	Satisfactory	Poor
	0.474	Satisfactory	Satisfactory	Satisfactory
	0.588	Satisfactory	Satisfactory	Poor
	0.182	Satisfactory	Satisfactory	Poor
	1.2	Satisfactory	Satisfactory	Satisfactory
	0.1	Satisfactory	Satisfactory	Satisfactory
	0.4	Satisfactory	Satisfactory	Satisfactory
	0.106	Satisfactory	Satisfactory	Satisfactory
	0.073	Satisfactory	Satisfactory	Satisfactory
	0.169	Satisfactory	Satisfactory	Satisfactory
	0.223	Satisfactory	Satisfactory	Satisfactory
	0.146	Satisfactory	Poor	Satisfactory
	0.244	Satisfactory	Poor	Satisfactory
	0.247	Satisfactory	Satisfactory	Satisfactory
	0.163	Satisfactory	Satisfactory	Satisfactory
	0.413	Satisfactory	Poor	Satisfactory
	0.086	Satisfactory	Poor	Satisfactory
	0.433	Satisfactory	Satisfactory	Well-maintained
	0.235	Satisfactory	Satisfactory	Satisfactory
	0.513	Satisfactory	Poor	Satisfactory
	0.248	Satisfactory	Poor	Well-maintained
	0.066	Satisfactory	Satisfactory	Satisfactory
	0.579	Satisfactory	Satisfactory	Satisfactory

	0.096	Satisfactory	Satisfactory	Satisfactory
	0.165	Poor	Satisfactory	Poor
	0.161	Satisfactory	Satisfactory	Satisfactory
	0.136	Well-maintained	Satisfactory	Satisfactory
	0.106	Well-maintained	Satisfactory	Satisfactory
	0.133	Poor	Satisfactory	Poor
	0.586	Satisfactory	Satisfactory	Satisfactory
	0.52	Satisfactory	Satisfactory	Satisfactory
	0.181	Satisfactory	Satisfactory	Satisfactory
	0.09	Satisfactory	Satisfactory	Poor
	0.271	Satisfactory	Satisfactory	Satisfactory
	0.415	Satisfactory	Satisfactory	Satisfactory
	0.312	Satisfactory	Satisfactory	Satisfactory
	0.903	Satisfactory	Satisfactory	Satisfactory
	0.903	Satisfactory	Satisfactory	Satisfactory
	0.088	Satisfactory	Satisfactory	Satisfactory
	0.307	Satisfactory	Satisfactory	Satisfactory
	0.032	Poor	Poor	Poor
	0.047	Poor	Poor	Poor
	0.045	Poor	Poor	Poor
	0.042	Poor	Poor	Poor
	0.048	Poor	Poor	Poor
	0.042	Poor	Poor	Poor
	0.04	Poor	Poor	Poor
	0.395	Satisfactory	Poor	Poor
	0.08	Poor	Poor	Poor
	0.043	Poor	Poor	Poor
	0.042	Poor	Poor	Poor
	0.037	Poor	Poor	Poor
	0.315	Satisfactory	Poor	Poor

	0.31	Poor	Poor	Poor
	0.048	Poor	Poor	Poor
	0.048	Poor	Poor	Poor
	0.048	Poor	Poor	Poor
	0.048	Poor	Poor	Poor
	0.338	Satisfactory	Satisfactory	Poor
	0.03	Poor	Poor	Poor
	0.03	Poor	Poor	Poor
	0.267	Satisfactory	Satisfactory	Satisfactory
	0.044	Poor	Poor	Poor
	0.044	Poor	Poor	Poor
	0.044	Poor	Poor	Poor
	0.044	Poor	Poor	Poor
	0.301	Satisfactory	Satisfactory	Satisfactory
	0.042	Poor	Poor	Poor
	0.04	Poor	Poor	Poor
	0.042	Poor	Poor	Poor
	0.042	Poor	Poor	Poor
	0.042	Poor	Poor	Poor
	0.042	Poor	Poor	Poor
	0.042	Poor	Poor	Poor
	0.04	Poor	Poor	Poor
	0.048	Poor	Poor	Poor
	0.044	Poor	Poor	Poor
	0.303	Satisfactory	Satisfactory	Satisfactory
	0.04	Poor	Poor	Poor
	0.04	Poor	Poor	Poor
	0.04	Poor	Poor	Poor
	0.315	Poor	Poor	Satisfactory
	0.041	Poor	Poor	Poor

	0.042	Poor	Poor	Poor
	0.042	Poor	Poor	Poor
	0.042	Poor	Poor	Poor
	0.042	Poor	Poor	Poor
	0.317	Satisfactory	Satisfactory	Satisfactory
	0.042	Poor	Poor	Poor
	0.042	Poor	Poor	Poor
	0.044	Poor	Poor	Poor
	0.04	Satisfactory	Poor	Poor
	0.055	Poor	Poor	Satisfactory
	0.354	Satisfactory	Satisfactory	Poor
	0.058	Poor	Poor	Poor
	0.042	Poor	Poor	Poor
	0.044	Poor	Poor	Poor
	0.3	Satisfactory	Poor	Poor
	0.042	Poor	Poor	Poor
	0.05	Poor	Poor	Poor
	0.044	N/A	N/A	Poor
	0.044	Satisfactory	Poor	Poor
	0.044	Satisfactory	Poor	Poor
	0.044	Satisfactory	Poor	Poor
	0.22	Satisfactory	Satisfactory	Satisfactory
	0.035	Poor	Poor	Poor
	0.042	Satisfactory	Poor	Satisfactory
	0.162	Satisfactory	Satisfactory	Poor
	0.085	Poor	Poor	Poor
	0.123	Satisfactory	Poor	Poor
	0.12	Satisfactory	Satisfactory	Satisfactory
	0.202	Satisfactory	Satisfactory	Poor
	0.042	Poor	Poor	Poor

	0.042	Poor	Poor	Poor
	0.32	Satisfactory	Poor	Satisfactory
	0.048	Satisfactory	Poor	Poor
	0.042	Poor	Poor	Poor
	0.312	Well-maintained	Poor	Poor
	0.041	Poor	Poor	Poor
	0.052	Poor	Poor	Poor
	0.041	Poor	Poor	Poor
	0.042	Poor	Poor	Poor
	0.31	Satisfactory	Satisfactory	Satisfactory
	0.041	Poor	Poor	Poor
	0.04	Poor	Poor	Poor
	0.035	Poor	Poor	Poor
	0.304	Well-maintained	Satisfactory	Satisfactory
	0.045	Poor	Poor	Poor
	0.042	Poor	Poor	Poor
	0.04	Poor	Poor	Poor
	0.035	Poor	Poor	Poor
	0.035	Poor	Poor	Poor
	0.041	Poor	Poor	Poor
	0.041	Poor	Poor	Poor
	0.101	Satisfactory	Satisfactory	Poor
	0.048	Poor	Poor	Poor
	0.041	Poor	Poor	Satisfactory
	0.035	Poor	Poor	Poor
	0.05	Poor	Poor	Poor
	0.305	Satisfactory	Satisfactory	Satisfactory
	0.042	Poor	Poor	Poor
	0.043	Poor	Poor	Poor
	0.038	Poor	Poor	Poor

	0.038	Poor	Poor	Poor
	0.038	Poor	Poor	Poor
	0.038	Poor	Poor	Poor
	0.153	Satisfactory	Poor	Satisfactory
	0.102	Satisfactory	Poor	Poor
	0.148	Satisfactory	Satisfactory	Poor
	0.058	Satisfactory	Poor	Poor
	0.176	Satisfactory	Poor	Poor
	0.061	Poor	Poor	Poor
	0.076	Poor	Poor	Poor
	0.074	Poor	Poor	Poor
	0.026	Poor	Poor	Poor
	0.026	Poor	Poor	Poor
	0.058	Poor	Poor	Poor
	0.093	Poor	Satisfactory	Poor
	0.034	Poor	Satisfactory	Poor
	0.041	Poor	Poor	Poor
	0.044	Poor	Poor	Poor
	0.04	Poor	Poor	Poor
	0.044	Poor	Poor	Poor
	0.042	Poor	Poor	Poor
	2.56	Satisfactory	Poor	Poor
	0.306	Satisfactory	Poor	Poor
	0.318	Satisfactory	Satisfactory	Poor
	0.044	Satisfactory	Poor	Poor
	0.315	Satisfactory	Satisfactory	Satisfactory
	0.29	Satisfactory	Poor	Satisfactory
	0.247	Satisfactory	Poor	Poor
	0.305	Satisfactory	Satisfactory	Satisfactory
	0.274	Satisfactory	Satisfactory	Poor

	7.061	Satisfactory	Satisfactory	Well-maintained
	0.045	Satisfactory	Poor	Poor
	0.046	Poor	Poor	Poor
	0.362	Satisfactory	Poor	Poor
	0.043	Poor	Poor	Poor
	0.044	Poor	Poor	Poor
	0.044	Poor	Poor	Poor
	0.043	Poor	Poor	Poor
	0.0428	Poor	Poor	Poor
	0.042	Poor	Poor	Poor
	0.072	Poor	Poor	Poor
	0.046	Poor	Poor	Poor
	0.048	Poor	Poor	Poor
	0.042	Poor	Poor	Poor
	0.048	Poor	Poor	Poor
	0.047	Poor	Poor	Poor
	0.043	Poor	Poor	Poor
	0.042	Poor	Poor	Poor
	0.044	Poor	Poor	Poor
	0.042	Satisfactory	Poor	Poor
	0.314	Satisfactory	Satisfactory	Poor
	0.043	Poor	Poor	Poor
	0.047	Poor	Poor	Poor
	0.043	Poor	Poor	Poor
	0.045	Poor	Poor	Poor
	0.075	Poor	Poor	Poor
	0.044	Poor	Poor	Poor
	0.048	Poor	Poor	Poor
	0.041	Poor	Poor	Poor
	0.045	Poor	Poor	Poor

	0.043	Poor	Poor	Poor
	0.042	Poor	Poor	Poor
	0.044	Poor	Poor	Poor
	0.044	Poor	Poor	Poor
	0.039	Poor	Poor	Poor
	0.042	Poor	Poor	Poor
	0.043	Poor	Poor	Poor
	0.042	Poor	Poor	Poor
	0.052	Poor	Poor	Poor
	0.043	Poor	Poor	Poor
	0.043	Poor	Poor	Poor
	0.315	Satisfactory	Satisfactory	Satisfactory
	0.045	Poor	Poor	Poor
	0.046	Poor	Poor	Poor
	0.044	Poor	Poor	Poor
	0.218	Satisfactory	Poor	Poor
	0.053	Poor	Poor	Poor
	0.097	Poor	Poor	Poor
	0.041	Poor	Poor	Poor
	0.07	Poor	Poor	Poor
	0.043	Poor	Poor	Poor
	0.044	Poor	Poor	Poor
	0.063	Poor	Poor	Poor
	0.098	Poor	Poor	Satisfactory
	0.088	Poor	Poor	Poor
	0.05	Poor	Poor	Poor
	0.04	Satisfactory	Satisfactory	Poor
	0.205	Satisfactory	Poor	Poor
	0.043	Poor	Poor	Poor
	0.0369	Satisfactory	Satisfactory	Poor

0.179	Poor	Satisfactory	Poor
0.042	Poor	Poor	Poor
0.044	Poor	Poor	Poor
0.186	Poor	Poor	Poor
0.044	Poor	Poor	Poor
0.186	Poor	Poor	Poor
0.044	Poor	Poor	Poor
0.044	Poor	Poor	Poor
0.034	Poor	Poor	Poor
0.166	Satisfactory	Poor	Poor
0.044	Satisfactory	Satisfactory	Poor
0.045	Satisfactory	Satisfactory	Poor
0.31	Poor	Poor	Poor
0.041	Poor	Satisfactory	Poor
0.043	Satisfactory	Poor	Poor
0.04	Poor	Poor	Poor
0.043	Poor	Poor	Poor
0.043	Poor	Poor	Poor
0.043	Poor	Poor	Poor
0.045	Poor	Poor	Poor
0.048	Poor	Poor	Poor
0.035	Poor	Poor	Poor
0.035	Poor	Poor	Poor
0.04	Poor	Poor	Poor
0.045	Satisfactory	Poor	Poor
0.043	Poor	Poor	Poor
0.05	Poor	Poor	Poor
0.046	Poor	Poor	Poor
0.038	Poor	Poor	Poor
0.078	Satisfactory	Poor	Poor

0.038	Satisfactory	Poor	Poor
0.041	Satisfactory	Poor	Poor
0.044	Satisfactory	Poor	Poor
0.045	Satisfactory	Poor	Satisfactory
0.108	Satisfactory	Poor	Poor
0.051	Satisfactory	Poor	Poor
0.04	Satisfactory	Poor	Poor
0.013	Satisfactory	Poor	Poor
0.051	Satisfactory	Satisfactory	Poor
2	Satisfactory	Satisfactory	Poor
0.053	Satisfactory	Satisfactory	Poor
0.05	Satisfactory	Satisfactory	Poor
0.052	Satisfactory	Satisfactory	Poor
0.052	Poor	Poor	Poor
0.052	Poor	Poor	Poor
0.053	Poor	Poor	Poor
0.052	Poor	Poor	Poor
0.054	Poor	Poor	Poor
0.051	Poor	Poor	Poor
0.051	Poor	Poor	Poor
0.0622	Satisfactory	Satisfactory	Satisfactory
0.093	Satisfactory	Satisfactory	Satisfactory
0.051	Poor	Poor	Poor
0.051	Poor	Poor	Satisfactory
0.48	Poor	Poor	Satisfactory
0.051	Poor	Poor	Poor
0.051	Poor	Poor	Poor
0.515	Satisfactory	Satisfactory	Satisfactory
0.575	Poor	Poor	Satisfactory
0.051	Poor	Poor	Poor

	2.216	Satisfactory	Satisfactory	Satisfactory
	2.855	Satisfactory	Satisfactory	Satisfactory
	0.0052	Poor	Poor	Poor
	0.046	Poor	Poor	Poor
	0.049	Poor	Poor	Satisfactory
	0.052	Poor	Poor	Poor
	0.052	Poor	Poor	Poor
	0.052	Satisfactory	Satisfactory	Poor
	0.052	N/A	N/A	N/A
	1.78	Satisfactory	Satisfactory	Satisfactory
	2.08	Satisfactory	Satisfactory	Satisfactory
	1.187	Poor	Poor	Satisfactory
	2.293	Poor	Poor	Satisfactory
	0.0412	Poor	Poor	Satisfactory
	0.051	Poor	Poor	Satisfactory
	0.098	Poor	Poor	Poor
	0.031	Poor	Poor	Satisfactory
	0.031	Poor	Poor	Poor
	0.294	Poor	Poor	Poor
	0.031	Poor	Poor	Satisfactory
	0.039	Poor	Poor	Satisfactory
	0.044	Poor	Poor	Poor
	0.032	Poor	Poor	Poor
	0.033	Poor	Poor	Satisfactory
	0.98	Poor	Poor	Satisfactory
	1.2	Satisfactory	Satisfactory	Satisfactory
	0.282	Poor	Satisfactory	Satisfactory
	0.322	Poor	Poor	Satisfactory
	0.266	Satisfactory	Satisfactory	Satisfactory
	0.448	Satisfactory	Satisfactory	Satisfactory

	0.366	Satisfactory	Satisfactory	Satisfactory
	0.943	Satisfactory	Satisfactory	Poor
	0.866	Poor	Poor	Satisfactory
	0.203	Poor	Poor	Satisfactory
	0.266	Poor	Poor	Satisfactory
	0.267	Poor	Poor	Satisfactory
	0.252	Poor	Poor	Satisfactory
	0.252	Satisfactory	Satisfactory	Satisfactory
	0.383	Satisfactory	Satisfactory	Satisfactory
	0.252	Satisfactory	Satisfactory	Satisfactory
	0.05	Poor	Poor	Satisfactory
	0.038	Poor	Poor	Satisfactory
	0.207	Poor	Poor	Poor
	0.242	Poor	Poor	Satisfactory
	0.484	Poor	Poor	Satisfactory
	0.66	Poor	Poor	Satisfactory
	0.49	Poor	Poor	Satisfactory
	0.45	Poor	Poor	Satisfactory
	0.41	Poor	Poor	Satisfactory
	0.44	Satisfactory	Satisfactory	Satisfactory
	0.043	Satisfactory	Satisfactory	Satisfactory
	0.06	Satisfactory	Satisfactory	Satisfactory
	0.06	Satisfactory	Poor	Poor
	0.06	Satisfactory	Satisfactory	Poor
	0.06	Satisfactory	Poor	Poor
	0.06	Satisfactory	Poor	Poor
	0.6	Satisfactory	Poor	Poor
	0.06	Satisfactory	Satisfactory	Poor
	0.08	Satisfactory	Satisfactory	Poor
	0.08	Satisfactory	Satisfactory	Satisfactory

0.15	Satisfactory	Satisfactory	Poor
0.15	Satisfactory	Satisfactory	Satisfactory
0.06	Satisfactory	Satisfactory	Poor
0.15	Satisfactory	Satisfactory	Poor
0.09	Satisfactory	Satisfactory	Satisfactory
0.06	Satisfactory	Poor	Satisfactory
0.24	Satisfactory	Poor	Poor
0.15	Satisfactory	Satisfactory	Satisfactory
0.06	Satisfactory	Satisfactory	Poor
0.15	Satisfactory	Satisfactory	Poor
0.68	Satisfactory	Satisfactory	Satisfactory
0.76	Satisfactory	Poor	Satisfactory
0.06	Satisfactory	Satisfactory	Poor
0.07	Satisfactory	Satisfactory	Poor
0.42	Satisfactory	Poor	Poor
1.14	Satisfactory	Poor	Poor
0.12	Satisfactory	Satisfactory	Satisfactory
0.12	Satisfactory	Satisfactory	Poor
0.1	Satisfactory	Satisfactory	Satisfactory
0.1	Satisfactory	Satisfactory	Poor
0.32	Satisfactory	Poor	Poor
0.08	Poor	Poor	Poor
0.24	Satisfactory	Satisfactory	Poor
0.24	Poor	Poor	Poor
0.22	Poor	Poor	Poor
0.24	Poor	Poor	Poor
0.16	Poor	Poor	Poor
0.798	Poor	Poor	Satisfactory
0.6	Poor	Poor	Poor
0.6	Poor	Poor	Poor

	0.26	Poor	Poor	Poor
	0.75	Poor	Poor	Poor
	0.18	Poor	Poor	Poor
	0.041	Poor	Poor	Poor
	0.033	Poor	Poor	Satisfactory
	0.044	Poor	Poor	Satisfactory
	0.04	Poor	Poor	Poor
	0.031	Poor	Poor	Poor
	0.15	Poor	Poor	Poor
	0.26	Poor	Poor	Poor
	0.04	Poor	Poor	Poor
	0.223	N/A	N/A	Poor
	0.041	Poor	Poor	Satisfactory
	0.039	Poor	Poor	Satisfactory
	0.044	Poor	Poor	Satisfactory
	0.043	Poor	Poor	Poor
	0.043	Poor	Poor	Poor
	0.3566	Poor	Poor	Poor
	0.3566	Poor	Poor	Satisfactory
	0.096	Satisfactory	Satisfactory	Poor
	0.2373	Well-maintained	Poor	Poor
	0.3133	Well-maintained	Well-maintained	Poor
	3.8697	Well-maintained	Poor	Poor
	0.2449	Well-maintained	Poor	Poor
	0.1039	Well-maintained	Poor	Poor
	0.1012	Well-maintained	Well-maintained	Poor
	0.094	Satisfactory	Satisfactory	Poor
	0.257	Satisfactory	Satisfactory	Poor
	3.139	Satisfactory	Satisfactory	Satisfactory
	0.2455	Satisfactory	Poor	Poor

	0.2449	Satisfactory	Poor	Satisfactory
	0.2413	Satisfactory	Poor	Poor
	0.2509	Satisfactory	Poor	Poor
	0.2709	Satisfactory	Poor	Poor
	4.4194	Satisfactory	Poor	Poor
	0.3468	Satisfactory	Satisfactory	Poor
	0.2984	Satisfactory	Satisfactory	Poor
	0.1045	Satisfactory	Poor	Poor
	0.0979	Satisfactory	Poor	Poor
	0.0087	Satisfactory	Poor	Poor
	0.008	Satisfactory	Poor	Poor
	0.0544	Satisfactory	Poor	Poor
	0.0844	Satisfactory	Poor	Poor
	0.1226	Satisfactory	Satisfactory	Poor
	0.0568	Satisfactory	Satisfactory	Poor
	0.0568	Satisfactory	Satisfactory	Satisfactory
	0.2958	Satisfactory	Satisfactory	Satisfactory
	0.0256	Satisfactory	Satisfactory	Poor
	0.0092	Satisfactory	Poor	Poor
	0.0256	Satisfactory	Poor	Poor
	0.0924	Satisfactory	Satisfactory	Satisfactory
	0.0087	Satisfactory	Satisfactory	Poor
	0.0087	Satisfactory	Satisfactory	Poor
	0.0986	Satisfactory	Satisfactory	Poor
	0.0252	Satisfactory	Satisfactory	Poor
	0.0581	Satisfactory	Satisfactory	Poor
	0.0386	Satisfactory	Satisfactory	Poor
	0.479	Well-maintained	Poor	Well-maintained
	0.0315	Satisfactory	Satisfactory	Poor
	0.0083	Satisfactory	Satisfactory	Satisfactory

0.0082	Satisfactory	Satisfactory	Poor
0.0183	Satisfactory	Satisfactory	Poor
0.0761	Satisfactory	Satisfactory	Satisfactory
0.0102	Satisfactory	Satisfactory	Poor
0.0102	Satisfactory	Satisfactory	Poor
0.0092	Satisfactory	Satisfactory	Poor
0.0093	Satisfactory	Poor	Poor
0.0346	Satisfactory	Poor	Satisfactory
0.0463	Satisfactory	Poor	Poor
0.0641	Satisfactory	Poor	Satisfactory
0.1223	Satisfactory	Satisfactory	Satisfactory
0.0447	Satisfactory	Satisfactory	Satisfactory
0.1063	Satisfactory	Satisfactory	Poor
0.2595	Satisfactory	Poor	Poor
0.3253	Poor	Poor	Poor
0.1186	Satisfactory	Poor	Poor
0.3683	Poor	Poor	Well-maintained
0.1125	Poor	Poor	Poor
0.3426	Poor	Poor	Poor
0.4572	Poor	Poor	Poor
2.86	Satisfactory	Satisfactory	Poor
0.02	Poor	Poor	Satisfactory
0.03	Poor	Poor	Poor
0.05	Poor	Poor	Poor
0.32	Poor	Poor	Poor
0.0964	Satisfactory	Satisfactory	Poor
0.0964	Satisfactory	Satisfactory	Poor
0.1972	Well-maintained	Well-maintained	Satisfactory
0.0964	Satisfactory	Satisfactory	Satisfactory
0.0964	Satisfactory	Satisfactory	Satisfactory

	0.1953	Poor	Poor	Poor
	0.0964	Satisfactory	Satisfactory	Poor
	0.0964	Poor	Poor	Poor
	0.0964	Satisfactory	Satisfactory	Poor
	0.1972	Poor	Poor	Poor
	0.0964	Satisfactory	Satisfactory	Poor
	6.6021	Satisfactory	Satisfactory	Satisfactory
	0.0714	Poor	Poor	Poor
	0.0791	Poor	Poor	Poor
	0.084	Poor	Poor	Poor
	0.0751	Poor	Poor	Poor
	0.0791	Poor	Poor	Poor
	0.6228	Poor	Poor	Poor
	0.0791	Poor	Poor	Poor
	0.0939	Poor	Poor	Poor
	0.1236	Poor	Poor	Poor
	0.0791	Poor	Poor	Poor
	0.0751	Poor	Poor	Poor
	0.1033	Poor	Poor	Poor
	0.1023	Poor	Poor	Poor
	0.0791	Poor	Poor	Poor
	0.089	Poor	Poor	Poor
	0.0712	Poor	Poor	Poor
	0.0791	Poor	Poor	Poor
	0.0704	Poor	Poor	Poor
	0.0692	Poor	Poor	Poor
	0.0751	Poor	Poor	Poor
	0.0741	Poor	Poor	Poor
	0.0751	Poor	Poor	Poor
	0.108	Poor	Poor	Poor

	0.1087	Poor	Poor	Poor
	0.0741	Poor	Poor	Poor
	0.0845	Poor	Poor	Poor
	0.0747	Poor	Poor	Poor
	0.0747	Poor	Poor	Poor
	0.0747	Poor	Poor	Poor
	0.0747	Poor	Poor	Poor
	0.0747	Poor	Poor	Poor
	0.0747	Poor	Poor	Poor
	0.1362	Satisfactory	Satisfactory	Poor
	0.0311	Satisfactory	Poor	Poor
	0.0423	Satisfactory	Poor	Poor
	0.1092	Satisfactory	Poor	Poor
	0.0489	Satisfactory	Poor	Poor
	0.041	Satisfactory	Poor	Poor
	0.2395	Satisfactory	Poor	Poor
	0.1038	Satisfactory	Poor	Poor
	0.1463	Satisfactory	Poor	Poor
	0.2224	Satisfactory	Poor	Poor
	0.0445	Satisfactory	Poor	Poor
	0.0245	Satisfactory	Poor	Poor
	0.3856	Satisfactory	Poor	Poor
	0.0376	Satisfactory	Poor	Poor
	0.1089	Satisfactory	Poor	Satisfactory
	0.1008	Satisfactory	Poor	Poor
	0.1008	Satisfactory	Poor	Poor
	0.1036	Satisfactory	Poor	Poor
	0.1031	Satisfactory	Poor	Poor
	0.0999	Satisfactory	Poor	Poor
	0.1085	Satisfactory	Poor	Poor

	0.1137	Satisfactory	Poor	Poor
	0.1047	Satisfactory	Poor	Poor
	0.2435	Satisfactory	Poor	Poor
	0.1037	Satisfactory	Poor	Poor
	0.0953	Satisfactory	Poor	Poor
	0.0952	Satisfactory	Poor	Poor
	0.1094	Satisfactory	Poor	Satisfactory
	0.0817	Satisfactory	Poor	Poor
	0.1023	Satisfactory	Poor	Satisfactory
	0.1039	Satisfactory	Poor	Poor
	0.0949	Satisfactory	Poor	Poor
	0.0952	Satisfactory	Poor	Poor
	0.0952	Satisfactory	Poor	Poor
	0.0952	Satisfactory	Poor	Poor
	0.0346	Satisfactory	Poor	Satisfactory
	0.0148	Satisfactory	Poor	Poor
	0.0341	Satisfactory	Poor	Poor
	0.0348	Satisfactory	Poor	Satisfactory
	0.0254	Poor	Poor	Poor
	0.031	Poor	Poor	Poor
	0.0561	Poor	Poor	Poor
	0.0312	Poor	Poor	Poor
	0.0558	Poor	Poor	Poor
	0.0574	Satisfactory	Poor	Poor
	0.0574	Satisfactory	Poor	Poor
	0.0256	Satisfactory	Poor	Poor
	0.0254	Satisfactory	Poor	Poor
	0.0567	Poor	Poor	Poor
	0.0567	Poor	Poor	Poor
	0.0565	Poor	Poor	Poor

0.0325	Poor	Poor	Poor
0.0437	Satisfactory	Poor	Poor
0.0328	Poor	Poor	Poor
0.0561	Poor	Poor	Poor
0.0378	Poor	Poor	Poor
0.0303	Poor	Poor	Poor
0.0534	Poor	Poor	Poor
0.0332	Poor	Poor	Poor
0.0303	Poor	Poor	Poor
0.0534	Poor	Poor	Poor
0.0332	Poor	Poor	Poor
0.0559	Satisfactory	Poor	Satisfactory
0.0559	Satisfactory	Poor	Satisfactory
0.0537	Poor	Poor	Poor
0.054	Poor	Poor	Poor
0.0548	Poor	Poor	Satisfactory
0.0434	Poor	Poor	Satisfactory
0.0567	Poor	Poor	Satisfactory
0.0338	Poor	Poor	Satisfactory
0.0328	Satisfactory	Poor	Satisfactory
0.0559	Poor	Poor	Poor
5.46006	Poor	Poor	Poor
0.089	Poor	Poor	Poor
0.2097	Poor	Poor	Poor
0.0601	Poor	Poor	Poor
0.0801	Satisfactory	Poor	Poor
0.1157	Satisfactory	Poor	Poor
0.084	Satisfactory	Poor	Poor
0.0367	Satisfactory	Poor	Satisfactory
0.0134	Satisfactory	Poor	Satisfactory

0.0934	Satisfactory	Poor	Satisfactory
0.0087	Satisfactory	Poor	Poor
0.0076	Satisfactory	Poor	Poor
0.0076	Satisfactory	Poor	Poor
0.0083	Satisfactory	Poor	Poor
0.262	Satisfactory	Poor	Poor
1.5057	Poor	Poor	Poor
0.0557	Satisfactory	Poor	Poor
0.0415	Satisfactory	Poor	Poor
0.0484	Poor	Poor	Poor
0.0484	Poor	Poor	Poor
0.0363	Poor	Poor	Poor
0.0277	Poor	Poor	Poor
0.0311	Poor	Poor	Poor
0.0467	Poor	Poor	Poor
0.0415	Poor	Poor	Satisfactory
0.0433	Poor	Poor	Poor
0.0222	Poor	Poor	Poor
0.0356	Poor	Poor	Poor
0.0816	Poor	Poor	Poor
0.2373	Satisfactory	Satisfactory	Satisfactory
0.0519	Poor	Poor	Poor
0.1424	Poor	Poor	Poor
0.2842	Poor	Poor	Satisfactory
0.0415	Poor	Poor	Poor
0.0311	Poor	Poor	Poor
0.0311	Poor	Poor	Poor
0.0519	Poor	Poor	Poor
0.0356	Satisfactory	Satisfactory	Satisfactory
0.1898	Satisfactory	Poor	Satisfactory

0.0267	Poor	Poor	Poor
0.2795	Satisfactory	Poor	Poor
0.0741	Poor	Poor	Poor
0.0415	Poor	Poor	Poor
0.045	Poor	Poor	Poor
0.0734	Poor	Poor	Satisfactory
0.0415	Poor	Poor	Poor
0.0267	Poor	Satisfactory	Poor
0.0408	Poor	Satisfactory	Satisfactory
0.0408	Satisfactory	Satisfactory	Poor
0.042	Poor	Poor	Poor
0.0257	Poor	Poor	Poor
0.3972	Satisfactory	Satisfactory	Poor
0.969	Satisfactory	Poor	Satisfactory
0.0445	Satisfactory	Satisfactory	Satisfactory
0.0415	Poor	Poor	Poor
0.04	Poor	Poor	Poor
0.069	Satisfactory	Satisfactory	Satisfactory
0.0272	Poor	Poor	Poor
0.0282	Poor	Poor	Poor
0.0235	Poor	Poor	Poor
0.0356	Poor	Poor	Poor
0.0415	Satisfactory	Satisfactory	Poor
0.0415	Satisfactory	Satisfactory	Poor
0.41	Poor	Poor	Poor
0.35	Poor	Poor	Poor
0.03	Poor	Poor	Poor
0.02	Poor	Poor	Poor
0.04	Poor	Poor	Poor
0.03	Poor	Poor	Poor

	0.03	Poor	Poor	Poor
	0.03	Poor	Poor	Poor
	0.03	Poor	Poor	Poor
	0.03	Poor	Poor	Poor
	0.32	Poor	Poor	Poor
	0.03	Poor	Poor	Poor
	0.04	Poor	Poor	Poor
	0.03	Poor	Poor	Poor
	0.03	Poor	Poor	Poor
	0.03	Poor	Poor	Poor
	0.04	Poor	Poor	Poor
	0.32	Poor	Poor	Satisfactory
	0.03	Poor	Poor	Poor
	0.03	Poor	Poor	Poor
	0.03	Poor	Poor	Poor
	0.03	Poor	Poor	Poor
	0.03	Poor	Poor	Poor
	0.14	Poor	Poor	Poor
	0.29	Satisfactory	Poor	Satisfactory
	0.04	Poor	Poor	Poor
	0.04	Poor	Poor	Poor
	0.04	Poor	Poor	Poor
	0.068	Poor	Poor	Poor
	0.31	Poor	Poor	Poor
	0.035	Poor	Poor	Poor
	0.03	Poor	Poor	Poor
	0.32	Poor	Poor	Poor
	0.605	Satisfactory	Satisfactory	Satisfactory
	0.199	Poor	Poor	Poor
	0.04	Poor	Poor	Poor

	0.038	Poor	Poor	Poor
	0.04	Poor	Poor	Poor
	0.03	Poor	Poor	Poor
	0.32	Satisfactory	Satisfactory	Poor
	0.04	Poor	Poor	Poor
	0.04	Poor	Poor	Poor
	0.04	Poor	Poor	Poor
	0.04	Poor	Poor	Poor
	0.04	Poor	Poor	Poor
	0.31	Satisfactory	Poor	Well-maintained
	0.04	Poor	Poor	Poor
	0.03	Poor	Poor	Poor
	0.04	Poor	Poor	Poor
	0.06	Poor	Poor	Satisfactory
	0.04	Poor	Poor	Poor
	0.04	Poor	Poor	Poor
	0.02	Satisfactory	Poor	Poor
	0.01	Poor	Poor	Poor
	0.038	Poor	Poor	Poor
	0.04	Satisfactory	Satisfactory	Poor
	0.593	Satisfactory	Satisfactory	Satisfactory
	0.038	Poor	Poor	Poor
	0.038	Poor	Poor	Poor
	0.336	Poor	Poor	Satisfactory
	0.044	Poor	Poor	Poor
	0.04	Poor	Poor	Poor
	0.03	Poor	Poor	Poor
	0.04	Poor	Poor	Poor
	0.04	Poor	Poor	Poor
	0.041	Poor	Poor	Poor

	0.1174	Poor	Poor	Poor
	0.0952	Satisfactory	Poor	Satisfactory
	0.0955	Satisfactory	Poor	Poor
	0.1038	Satisfactory	Poor	Satisfactory
	0.1246	Satisfactory	Poor	Poor
	0.0556	Poor	Poor	Poor
	0.3262	Poor	Poor	Poor
	0.04	Poor	Poor	Poor
	0.1401	Satisfactory	Poor	Poor
	0.0156	Satisfactory	Satisfactory	Poor
	0.0322	Satisfactory	Satisfactory	Poor
	0.0084	Satisfactory	Satisfactory	Poor
	0.0009	Satisfactory	Satisfactory	Satisfactory
	0.0013	Satisfactory	Satisfactory	Poor
	0.0025	Satisfactory	Satisfactory	Poor
	0.0022	Satisfactory	Satisfactory	Poor
	0.0013	Satisfactory	Satisfactory	Satisfactory
	0.0011	Satisfactory	Satisfactory	Poor
	0.0036	Satisfactory	Satisfactory	Poor
	0.0017	Poor	Poor	Poor
	0.0017	Poor	Poor	Poor
	0.0063	Poor	Poor	Poor
	0.0217	Poor	Poor	Poor
	0.0233	Satisfactory	Satisfactory	Poor
	0.0156	Satisfactory	Satisfactory	Poor
	0.341	Satisfactory	Satisfactory	Satisfactory
	0.605	Satisfactory	Satisfactory	Satisfactory
	0.1796	Poor	Poor	Poor
	0.135	Satisfactory	Satisfactory	Poor
	0.188	Satisfactory	Satisfactory	Satisfactory

	1.65	Poor	Poor	Satisfactory
	0.093	Satisfactory	Satisfactory	Poor
	0.163	Satisfactory	Satisfactory	Poor
	0.176	Poor	Poor	Poor
	0.362	Poor	Poor	Poor
	0.165	Satisfactory	Satisfactory	Poor
	0.048	Poor	Poor	Poor
	0.716	Poor	Poor	Satisfactory
	0.35	Poor	Poor	Poor
	0.045	Poor	Poor	Poor
	0.141	Poor	Poor	Poor
	0.2	Poor	Poor	Poor
	0.787	Satisfactory	Satisfactory	Poor
	0.254	Satisfactory	Satisfactory	Satisfactory
	0.122	Poor	Poor	Poor
	0.43	Poor	Poor	Poor
	0.868	Satisfactory	Poor	Satisfactory
	0.59	Satisfactory	Poor	Satisfactory
	0.524	Satisfactory	Poor	Poor
	0.51	Satisfactory	Poor	Poor
	0.754	Satisfactory	Poor	Satisfactory
	0.46	Satisfactory	Poor	Satisfactory
	0.48	Satisfactory	Poor	Satisfactory
	0.106	Satisfactory	Poor	Poor
	0.073	Satisfactory	Poor	Poor
	1.053	Satisfactory	Poor	Satisfactory
	0.2	Poor	Poor	Poor
	0.054	Poor	Poor	Poor
	0.067	Poor	Poor	Poor
	0.62	Satisfactory	Satisfactory	Satisfactory

0.13	Satisfactory	Satisfactory	Poor
0.05	Poor	Poor	Poor
0.33	Poor	Poor	Satisfactory
2.08	Satisfactory	Satisfactory	Poor
2.35	Satisfactory	Satisfactory	Well-maintained
0.867	Satisfactory	Satisfactory	Satisfactory
0.138	Satisfactory	Satisfactory	Poor
0.138	Satisfactory	Satisfactory	Poor
0.138	Poor	Poor	Poor
0.138	Poor	Poor	Poor
0.104	Satisfactory	Satisfactory	Satisfactory
0.111	Satisfactory	Satisfactory	Satisfactory
0.22	Poor	Poor	Satisfactory
0.263	Poor	Poor	Satisfactory
0.086	Satisfactory	Satisfactory	Satisfactory
0.197	Satisfactory	Satisfactory	Satisfactory
0.1	Satisfactory	Satisfactory	Satisfactory
0.255	Satisfactory	Satisfactory	Satisfactory
7.08	Satisfactory	Poor	Poor
0.424	Satisfactory	Satisfactory	Satisfactory
0.262	Satisfactory	Satisfactory	Satisfactory
0.256	Satisfactory	Satisfactory	Satisfactory
0.135	Satisfactory	Satisfactory	Satisfactory
0.09	Poor	Satisfactory	Poor
0.235	Satisfactory	Satisfactory	Satisfactory
0.125	Satisfactory	Satisfactory	Satisfactory
0.352	Satisfactory	Satisfactory	Satisfactory
0.384	Satisfactory	Satisfactory	Poor
0.523	Satisfactory	Satisfactory	Poor
0.682	Satisfactory	Satisfactory	Satisfactory

	0.316	Satisfactory	Poor	Satisfactory
	0.316	Satisfactory	Satisfactory	Satisfactory
	0.316	Satisfactory	Satisfactory	Satisfactory
	0.222	Satisfactory	Poor	Satisfactory
	0.358	Satisfactory	Satisfactory	Satisfactory
	0.421	Satisfactory	Satisfactory	Poor
	0.239	Satisfactory	Satisfactory	Satisfactory
	0.595	Satisfactory	Satisfactory	Satisfactory
	0.359	Satisfactory	Satisfactory	Satisfactory
	0.359	Satisfactory	Satisfactory	Satisfactory
	0.359	Satisfactory	Satisfactory	Satisfactory
	0.439	Satisfactory	Satisfactory	Satisfactory
	0.436	Satisfactory	Satisfactory	Satisfactory
	0.334	Satisfactory	Satisfactory	Poor
	1.605	Satisfactory	Satisfactory	Poor
	0.115	Satisfactory	Satisfactory	Satisfactory
	0.239	Satisfactory	Satisfactory	Poor
	1.196	Satisfactory	Poor	Satisfactory
	0.195	Satisfactory	Satisfactory	Satisfactory
	0.053	Satisfactory	Satisfactory	Satisfactory
	0.206	Satisfactory	Well-maintained	Poor
	0.316	Satisfactory	Satisfactory	Satisfactory
	0.116	Satisfactory	Poor	Poor
	0.787	Satisfactory	Poor	Satisfactory
	0.11	Poor	Poor	Poor
	0.115	Satisfactory	Satisfactory	Satisfactory
	0.284	Satisfactory	Satisfactory	Poor
	0.372	Satisfactory	Satisfactory	Satisfactory
	0.486	Satisfactory	Satisfactory	Satisfactory
	1.64	Satisfactory	Satisfactory	Satisfactory

0.32	Satisfactory	Satisfactory	Poor
0.032	Satisfactory	Satisfactory	Poor
0.156	Satisfactory	Poor	Satisfactory
0.121	Satisfactory	Poor	Satisfactory
0.121	Satisfactory	Satisfactory	Poor
0.154	Satisfactory	Satisfactory	Satisfactory
1.83	Poor	Poor	Satisfactory
0.05	Poor	Poor	Poor
0.05	Poor	Poor	Poor
0.071	Poor	Poor	Poor
0.154	Satisfactory	Satisfactory	Satisfactory
0.121	Satisfactory	Satisfactory	Satisfactory
0.08	Satisfactory	Poor	Poor
0.312	Satisfactory	Satisfactory	Poor
0.426	Satisfactory	Satisfactory	Poor
0.04	Satisfactory	Satisfactory	Satisfactory
0.354	Poor	Poor	Satisfactory
0.654	Poor	Satisfactory	Poor
0.195	Poor	Poor	Poor
0.06	Poor	Poor	Poor
0.594	Satisfactory	Satisfactory	Poor
0.721	Satisfactory	Satisfactory	Poor
0.11	Satisfactory	Satisfactory	Satisfactory
0.112	Satisfactory	Poor	Poor
0.104	Satisfactory	Poor	Satisfactory
1.39	Poor	Poor	Poor
0.091	Poor	Poor	Poor
0.069	Poor	Poor	Poor
0.311	Satisfactory	Poor	Satisfactory
0.12	Satisfactory	Satisfactory	Satisfactory

	0.046	Satisfactory	Satisfactory	Poor
	0.104	Poor	Poor	Poor
	0.08	Poor	Poor	Poor
	0.816	Satisfactory	Poor	Poor
	0.856	Satisfactory	Poor	Satisfactory
	0.196	Poor	Poor	Poor
	0.149	Poor	Poor	Poor
	0.183	Poor	Poor	Satisfactory
	0.077	Satisfactory	Satisfactory	Satisfactory
	0.61	Poor	Poor	Poor
	0.253	Satisfactory	Satisfactory	Satisfactory
	0.157	Satisfactory	Satisfactory	Satisfactory
	0.47	Satisfactory	Satisfactory	Poor
	0.263	Satisfactory	Poor	Poor
	0.126	Poor	Poor	Satisfactory
	0.105	Poor	Poor	Poor
	0.052	Satisfactory	Satisfactory	Satisfactory
	0.085	Satisfactory	Satisfactory	Poor
	0.33	Satisfactory	Satisfactory	Satisfactory
	0.258	Satisfactory	Satisfactory	Satisfactory
	0.07	Satisfactory	Satisfactory	Poor
	0.524	Satisfactory	Satisfactory	Satisfactory
	0.55	Poor	Poor	N/A
	1.516	N/A	Satisfactory	Poor
	0.181	Poor	Poor	N/A
	2.451	Poor	Poor	Poor
	1.55	Poor	Poor	Poor
	0.202	Satisfactory	Satisfactory	Poor
	0.208	Satisfactory	Satisfactory	Poor
	0.8	N/A	N/A	N/A

1.972	N/A	N/A	N/A
0.3	Satisfactory	Satisfactory	Poor
0.401	Satisfactory	Satisfactory	Satisfactory
0.65	Poor	Poor	Poor
2	Satisfactory	Poor	Satisfactory
0.2454	Poor	Poor	Poor
0.2148	Satisfactory	Poor	Satisfactory
0.1698	Satisfactory	Poor	Poor
0.2457	Satisfactory	Poor	Satisfactory
0.2481	Satisfactory	Poor	Poor
0.2788	Satisfactory	Poor	Satisfactory
0.3287	Satisfactory	Satisfactory	Satisfactory
0.3801	Poor	Poor	Satisfactory
0.1972	Poor	Poor	Satisfactory
0.2051	Poor	Poor	Satisfactory
0.3534	Poor	Poor	Satisfactory
0.1928	Satisfactory	Satisfactory	Poor
0.2798	Satisfactory	Satisfactory	Satisfactory
0.2341	Poor	Poor	Satisfactory
2.882	Satisfactory	Satisfactory	Satisfactory
0.506	Satisfactory	Satisfactory	Satisfactory
0.123	Poor	Satisfactory	Poor
0.212	Satisfactory	Satisfactory	Satisfactory
0.115	Poor	Poor	Satisfactory
0.158	Satisfactory	Poor	Satisfactory
0.204	Poor	Poor	Poor
0.104	Satisfactory	Satisfactory	Satisfactory
0.108	Poor	Poor	Satisfactory
0.151	Poor	Poor	Satisfactory
0.21	Poor	Poor	Poor

0.165	Poor	Poor	Poor
0.015	Poor	Poor	Poor
0.017	Poor	Poor	Poor
0.227	Poor	Poor	Satisfactory
0.1742	Poor	Satisfactory	Satisfactory
0.1966	Satisfactory	Satisfactory	Poor
1.3642	Satisfactory	Satisfactory	Satisfactory
0.2408	Satisfactory	Satisfactory	Satisfactory
0.2649	Satisfactory	Satisfactory	Poor
0.3298	Satisfactory	Satisfactory	Poor
1.3841	Satisfactory	Satisfactory	Satisfactory
0.2858	Poor	N/A	Satisfactory
0.4498	Satisfactory	Satisfactory	Satisfactory
0.3093	Satisfactory	Satisfactory	Satisfactory
0.2785	Satisfactory	Satisfactory	Satisfactory
0.6379	Satisfactory	Satisfactory	Satisfactory
0.3088	Satisfactory	Satisfactory	Satisfactory
0.2502	Satisfactory	Satisfactory	Satisfactory
0.5511	Satisfactory	Satisfactory	Satisfactory
0.4137	Satisfactory	Satisfactory	Satisfactory
0.2545	Satisfactory	Satisfactory	Satisfactory
0.4992	Satisfactory	Satisfactory	Satisfactory
0.1597	Satisfactory	Satisfactory	Satisfactory
0.0494	Satisfactory	Poor	Satisfactory
0.9417	Satisfactory	Satisfactory	Satisfactory
0.3262	Satisfactory	Satisfactory	Satisfactory
0.3114	Satisfactory	Satisfactory	Satisfactory
0.346	Poor	Poor	Poor
0.5655	N/A	N/A	Poor
0.3502	N/A	N/A	Poor

	0.9454	Satisfactory	Satisfactory	Satisfactory
	0.655	Satisfactory	Satisfactory	Poor
	0.1777	Satisfactory	Satisfactory	Satisfactory
	0.6142	Poor	Poor	Satisfactory
	1.6002	Satisfactory	Satisfactory	Satisfactory
	0.6601	Satisfactory	Satisfactory	Satisfactory
	0.3385	Satisfactory	Satisfactory	Satisfactory
	0.2228	Satisfactory	Satisfactory	Satisfactory
	0.155	Satisfactory	Satisfactory	Satisfactory
	0.1176	Satisfactory	Satisfactory	Satisfactory
	0.0673	Satisfactory	Satisfactory	Satisfactory
	0.109	Satisfactory	Satisfactory	Satisfactory
	0.2716	Satisfactory	Satisfactory	Satisfactory
	0.0808	Satisfactory	Satisfactory	Satisfactory
	0.8932	Satisfactory	Satisfactory	Satisfactory
	0.7266	Poor	Poor	Satisfactory
	0.2699	Satisfactory	Poor	Satisfactory
	0.1661	Satisfactory	Satisfactory	Poor
	0.432	Satisfactory	Satisfactory	Poor
	0.4523	Satisfactory	Satisfactory	Poor
	0.2688	Satisfactory	Poor	Satisfactory
	0.1456	Satisfactory	Poor	Satisfactory
	0.8613	Satisfactory	Poor	Satisfactory
	0.4894	Satisfactory	Poor	Poor
	1.2612	Satisfactory	Satisfactory	Poor
	0.2769	Satisfactory	Satisfactory	Satisfactory
	0.084	Poor	Poor	Satisfactory
	0.3663	Satisfactory	Satisfactory	Poor
	0.216	Satisfactory	Satisfactory	Satisfactory
	0.5126	Poor	Poor	Satisfactory

	0.2026	Satisfactory	Satisfactory	Poor
	0.2487	Satisfactory	Satisfactory	Poor
	0.1901	Satisfactory	Satisfactory	Poor
	0.2529	Satisfactory	Satisfactory	Satisfactory
	0.0674	Satisfactory	Satisfactory	Poor
	0.0756	Satisfactory	Satisfactory	Poor
	0.0913	Satisfactory	Satisfactory	Satisfactory
	0.2038	Satisfactory	Satisfactory	Satisfactory
	0.2844	Satisfactory	Satisfactory	Satisfactory
	0.1017	Satisfactory	Satisfactory	Satisfactory
	0.0418	Satisfactory	Satisfactory	Poor
	0.1121	Satisfactory	Satisfactory	Satisfactory
	0.0612	Satisfactory	Satisfactory	Poor
	0.0607	Satisfactory	Satisfactory	Poor
	0.1087	Satisfactory	Satisfactory	Satisfactory
	0.1725	Satisfactory	Satisfactory	Satisfactory
	0.1087	N/A	N/A	N/A
	0.1109	Satisfactory	Satisfactory	Satisfactory
	0.0704	Satisfactory	Satisfactory	Poor
	0.1316	Satisfactory	Satisfactory	Satisfactory
	0.1298	Satisfactory	Satisfactory	Poor
	0.1562	Satisfactory	Satisfactory	Satisfactory
	0.1028	Poor	Poor	Satisfactory
	0.6163	Satisfactory	Poor	Satisfactory
	3.5207	Poor	Poor	Satisfactory
	0.3114	Poor	Poor	Satisfactory
	0.0761	Poor	Poor	Poor
	0.0567	Satisfactory	Satisfactory	Poor
	0.5648	Satisfactory	Satisfactory	Satisfactory
	0.0834	Satisfactory	Satisfactory	Poor

0.1866	Satisfactory	Satisfactory	Satisfactory
0.165	Satisfactory	Satisfactory	Satisfactory
0.0938	Satisfactory	Satisfactory	Poor
0.1008	Poor	Poor	Satisfactory
0.0989	Satisfactory	Satisfactory	Satisfactory
0.1515	Satisfactory	Poor	Poor
0.0578	Satisfactory	Poor	Poor
0.2071	Satisfactory	Satisfactory	Satisfactory
0.1846	Satisfactory	Poor	Satisfactory
0.2795	Satisfactory	Poor	Poor
0.0519	Satisfactory	Satisfactory	Poor
0.087	Satisfactory	Satisfactory	Poor
0.0801	Satisfactory	Poor	Poor
0.0623	Satisfactory	Poor	Poor
0.1043	Satisfactory	Poor	Poor
0.117	Satisfactory	Poor	Poor
0.0756	Satisfactory	Poor	Poor
0.1157	Satisfactory	Poor	Poor
0.989	Satisfactory	Poor	Poor
0.3136	Satisfactory	Satisfactory	Poor
0.0566	Satisfactory	Poor	Poor
0.04	Satisfactory	Poor	Poor
0.0525	Satisfactory	Poor	Poor
0.0354	Satisfactory	Poor	Poor
0.0928	Satisfactory	Poor	Poor
0.0146	Satisfactory	Satisfactory	Poor
0.0044	Satisfactory	Satisfactory	Satisfactory
0.0047	Satisfactory	Satisfactory	Satisfactory
0.0047	Satisfactory	Satisfactory	Satisfactory
0.0006	Satisfactory	Satisfactory	Satisfactory

	0.0008	Satisfactory	Satisfactory	Satisfactory
	0.0195	Satisfactory	Satisfactory	Poor
	0.0032	Satisfactory	Satisfactory	Poor
	0.0576	N/A	N/A	Satisfactory
	0.1268	Satisfactory	Satisfactory	Satisfactory
	0.3114	Satisfactory	Satisfactory	Poor
	0.0809	Satisfactory	Satisfactory	Satisfactory
	0.1513	Satisfactory	Poor	Poor
	0.1246	Satisfactory	Satisfactory	Poor
	0.0445	Satisfactory	Satisfactory	Poor
	0.2533	Satisfactory	Satisfactory	Poor
	2.048	Satisfactory	Satisfactory	Satisfactory
	0.971	Satisfactory	Poor	Satisfactory
	0.542	Satisfactory	Satisfactory	Satisfactory
	0.992	Satisfactory	Poor	Satisfactory
	0.673	Satisfactory	Satisfactory	Satisfactory
	0.836	Satisfactory	Satisfactory	Satisfactory
	0.781	Satisfactory	Satisfactory	Satisfactory
	0.729	Satisfactory	Satisfactory	Satisfactory
	0.192	Satisfactory	Satisfactory	Satisfactory
	0.38	Satisfactory	Satisfactory	Satisfactory
	0.137	Satisfactory	Satisfactory	Satisfactory
	0.253	Satisfactory	Satisfactory	Satisfactory
	0.156	Satisfactory	Satisfactory	Poor
	0.169	Satisfactory	Satisfactory	Poor
	0.419	Satisfactory	Satisfactory	Satisfactory
	0.257	Satisfactory	Satisfactory	Satisfactory
	0.398	Satisfactory	Satisfactory	Satisfactory
	0.339	Satisfactory	Satisfactory	Satisfactory
	0.306	Satisfactory	Satisfactory	Satisfactory

	0.739	Satisfactory	Satisfactory	Satisfactory
	0.387	Satisfactory	Satisfactory	Satisfactory
	0.358	Poor	Satisfactory	Satisfactory
	0.18	Satisfactory	Satisfactory	Poor
	0.127	Satisfactory	Satisfactory	Satisfactory
	0.41	Satisfactory	Satisfactory	Satisfactory
	0.227	Satisfactory	Poor	Poor
	0.056	Poor	Poor	Poor
	0.259	Satisfactory	Satisfactory	Satisfactory
	0.08	Satisfactory	Satisfactory	Satisfactory
	0.223	Satisfactory	Satisfactory	Satisfactory
	0.239	N/A	Satisfactory	Poor
	0.09	N/A	Satisfactory	Poor
	0.06	Satisfactory	Satisfactory	Poor
	0.211	Satisfactory	Satisfactory	Poor
	0.167	Poor	Poor	Satisfactory
	0.164	Poor	Poor	Poor
	0.07	Satisfactory	Poor	Poor
	0.112	Poor	Poor	Poor
	0.12	Poor	Poor	Poor
	0.385	Satisfactory	Satisfactory	Satisfactory
	0.679	Satisfactory	Poor	Satisfactory
	0.872	Poor	Poor	Satisfactory
	0.161	Satisfactory	Satisfactory	Satisfactory
	0.611	Satisfactory	Satisfactory	Satisfactory
	0.204	Satisfactory	Satisfactory	Satisfactory
	0.033	Poor	Poor	Poor
	0.057	Poor	Poor	Poor
	0.088	Satisfactory	Satisfactory	Poor
	0.011	Satisfactory	Satisfactory	Satisfactory

	0.472	Satisfactory	Satisfactory	Satisfactory
	0.194	Satisfactory	Satisfactory	Poor
	0.544	Satisfactory	Satisfactory	Satisfactory
	1.479	Satisfactory	Satisfactory	Satisfactory
	2.119	Satisfactory	Satisfactory	Satisfactory
	0.519	Satisfactory	Satisfactory	Satisfactory
	0.298	Satisfactory	Satisfactory	Satisfactory
	0.838	Satisfactory	Satisfactory	Satisfactory
	0.413	Satisfactory	Satisfactory	Satisfactory
	0.401	Satisfactory	Satisfactory	Satisfactory
	0.146	Satisfactory	Satisfactory	Satisfactory
	0.425	Satisfactory	Satisfactory	Poor
	0.107	Satisfactory	Satisfactory	Satisfactory
	0.423	Satisfactory	Satisfactory	Satisfactory
	0.321	Satisfactory	Satisfactory	Satisfactory
	0.266	Satisfactory	Satisfactory	Poor
	0.281	Satisfactory	Satisfactory	Satisfactory
	0.435	Satisfactory	Satisfactory	Satisfactory
	0.147	Satisfactory	Satisfactory	Satisfactory
	0.054	Satisfactory	Satisfactory	Satisfactory
	0.105	Satisfactory	Satisfactory	Satisfactory
	0.238	Satisfactory	Satisfactory	Satisfactory
	0.017	Satisfactory	Satisfactory	Satisfactory
	0.011	Satisfactory	Satisfactory	Poor
	0.748	Satisfactory	Satisfactory	Poor
	0.043	Satisfactory	Satisfactory	Poor
	0.068	Satisfactory	Satisfactory	Poor
	0.12	Satisfactory	Satisfactory	Satisfactory
	0.181	Satisfactory	Satisfactory	Satisfactory
	0.175	Satisfactory	Satisfactory	Satisfactory

	0.531	Satisfactory	Satisfactory	Satisfactory
	0.083	Poor	Poor	Satisfactory
	0.248	Satisfactory	Satisfactory	Poor
	0.062	Poor	Poor	Satisfactory
	0.208	Satisfactory	Satisfactory	Satisfactory
	0.153	Satisfactory	Poor	Poor
	0.15	Poor	Poor	Poor
	0.126	Satisfactory	Satisfactory	Satisfactory
	0.239	Satisfactory	Satisfactory	Poor
	0.25	Satisfactory	Satisfactory	Poor
	0.275	Satisfactory	Satisfactory	Satisfactory
	0.2	Satisfactory	Satisfactory	Satisfactory
	0.316	Satisfactory	Satisfactory	Satisfactory
	0.079	Satisfactory	Satisfactory	Poor
	0.314	Satisfactory	Satisfactory	Poor
	0.04	Satisfactory	Poor	Poor
	0.036	Satisfactory	Satisfactory	Poor
	0.134	Satisfactory	Satisfactory	Satisfactory
	0.012	Satisfactory	Satisfactory	Satisfactory
	0.98	Satisfactory	Satisfactory	Satisfactory
	0.12	Poor	Poor	Poor
	0.24	Poor	Poor	Satisfactory
	0.35	Poor	Poor	Satisfactory
	0.49	Poor	Poor	Poor
	1.35	Satisfactory	Satisfactory	Satisfactory
	0.053	Poor	Poor	Poor
	1.09	N/A	N/A	Satisfactory
	0.57	Satisfactory	Satisfactory	Satisfactory
	0.67	Satisfactory	Satisfactory	Poor
	0.41	Satisfactory	Satisfactory	Poor

	0.68	Satisfactory	Satisfactory	Satisfactory
	0.34	Satisfactory	Satisfactory	Satisfactory
	0.57	Satisfactory	Satisfactory	Satisfactory
	0.6	Satisfactory	Satisfactory	Poor
	0.43	Satisfactory	Satisfactory	Poor
	0.57	Satisfactory	Satisfactory	Satisfactory
	0.6	Satisfactory	Satisfactory	Poor
	0.43	Satisfactory	Satisfactory	Poor
	0.57	Satisfactory	Satisfactory	Satisfactory
	0.9	Satisfactory	Satisfactory	Poor
	0.43	Satisfactory	Satisfactory	Poor
	0.38	Satisfactory	Satisfactory	Satisfactory
	1.91	Satisfactory	Satisfactory	Satisfactory
	0.54	Satisfactory	Satisfactory	Satisfactory
	0.47	Satisfactory	Satisfactory	Satisfactory
Satisfactory		644	457	415
poor		510	707	751
well-maintained		12	4	7
N/A		13	11	6
Average Size	0.263489618			
Median Size	0.1008			
Mode Size	0.04			Total No. of Parks 1179