

Defining the Urban Greenspaces in the Indian Context

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Abstract

With the increasing rate of urbanization and decreasing percentage of overall greenspaces in the cities, the urban areas are becoming vulnerable to various hazards and climate change. The presence of adequate and well-maintained greenspaces plays a vital role in society's well-being and the creation of a healthy environment. Despite being such an essential feature of urban areas, Indian legislative & regulatory documents still lack in terms of a standard working definition. Hence, this study aims to frame a standard working definition of "urban greenspace" in the Indian context. In order to achieve the goal of this work, a rigorous study of 237 research papers based on Indian scenarios was done. These papers were categorized based on the domain and the context of their study. From the literature review, the evolution of greenspace definition specific to the planning domain was traced and the criteria used to define urban greenspace in the various other domains were identified. The proposed definition of "urban greenspace" will incorporate the maximum criteria identified and shall best suit the heterogeneous nature of the Indian cities. This research is an initial attempt to trace the evolution of the definition of urban greenspace in the planning domain and to frame a standard working definition of urban greenspaces for the urban Indian context. The outcome of this work will help urban planners and policymakers to overcome the current issue of the dilemma about the standard definition of "greenspace".

Introduction

The increased rate of urbanization led to a decrease in greenspace [1]. In addition, infrastructure development is directly proportional to urbanization, better infrastructure attracts migration and thus resulting in increasing population in the cities. In the same way, government projections in India [2] show that about half of its population will live in urban areas by 2050. These developed centres affect the existing natural areas resulting in overcrowding and creates more stress and give limited access to them. The problem is that the increasing population and limited resources impact society's well-being. Greenspaces uniquely structure urban spaces in terms of mass space relationships, work area, living area relationships, and overall town/city density of an urban centre [3], [4]. To overcome these issues, it becomes crucial to plan greenspaces (also categorise them and set the required standards) within the city limits, develop them, and maintain them to ensure desirable outcomes. M. L. Derkzen et al., S. Lahot and M. Turaga

[5]– [7] highlighted that the problem remains undefined in the Indian context, as the term "greenspaces" is not used in official documents. However, the term "recreational/open spaces" is used to define open spaces, green areas, parks and playgrounds, etc. S. Lahoti and P. Rao [8], [9] highlighted in their studies that recreational areas in legislative documents fail to explain the synonymous nature of greenspaces. As there is variation in the understanding and definition of greenspaces, it is important to identify and categorize them, and only then their impact can be assessed and urban planning standards and policies can be revised. Variations in the definition of greenspaces need to be addressed so that they cater to the requirement and amorphous nature of the term which can be incorporated and taken into consideration for execution [10]. However, addressing real-time problems like execution of the green initiatives tends to fall back due to multiple notations of greenspace. Hence, it is important to standardize a working definition of greenspaces, which is looked through the lenses of urban planning.

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TABLE I
Evolution of Terminology and Definition of Greenspace in the Sources [developed by authors]

Terminology	Definition	Source
Greenspace	"A form of common land open to all for lawful exercise."	[28]
Green areas	"Open country tract such as open recreational areas, farmland, or woodland of varying width, not necessarily continuous"	[29]
Open space	"Any piece of land that is undeveloped."	[28], [30]
Recreational spaces	"Place of Any pursuit or leisure-time activity undertaken voluntarily, primarily for pleasure, satisfaction, refreshment or entertainment."	[28], [29]
Urban green space	"UGSs include all public open spaces primarily covered by vegetation, which are available for the users either directly or indirectly."	[31], [24]
	"Gardens, parks, informal greenspaces or recreation venue as a unit of UGS are an integral part of any urban area and possess their importance of maintaining the environmental quality."	[25]
UGS	"Space possess the property of active or passive recreation, or indirect benefits serving the needs of people and enhancing the life quality in cities or urban regions."	[24]
Urban green	"Public spaces in conjunction with squares, gardens, parks, allotments or cemeteries and natural areas set within the urban fabric."	[26]
Green space	"Acknowledged levels of greenness, explicitly by use, ecosystem services (where the ecosystem service contribution defines green space), green areas, land use and vegetated areas" are the type for the identification of greenspace.	[32]
Urban greenspace	"Urban greenspace can comprise a single element (a street tree), as well as a combination of elements (a park with lawns, trees, and ponds), and its character can be natural, semi-natural or manmade."	[5]

The greenspaces in the city are natural and semi-natural areas [11] and are indicators of urban sustainability [12]. These spaces impart physical, social, environmental, economic, and planning-related benefits to human society. It also improves the physical, mental and social well-being of the people [13]–[20]. Planning of these spaces needs special consideration while preparing the master plans of

the city. But available literature on the planning of urban greenspaces provides a narrow comprehension of concepts and is unclear about the evolution of its definition [21], [22].

J. Gehl [23] defines a greenspace as a setting for leisure time, relaxation and social interactions, whereas as per R. Coles and N. Grayson [24], greenspaces are areas covered with vegetation, while S. Venn and J. Niemela

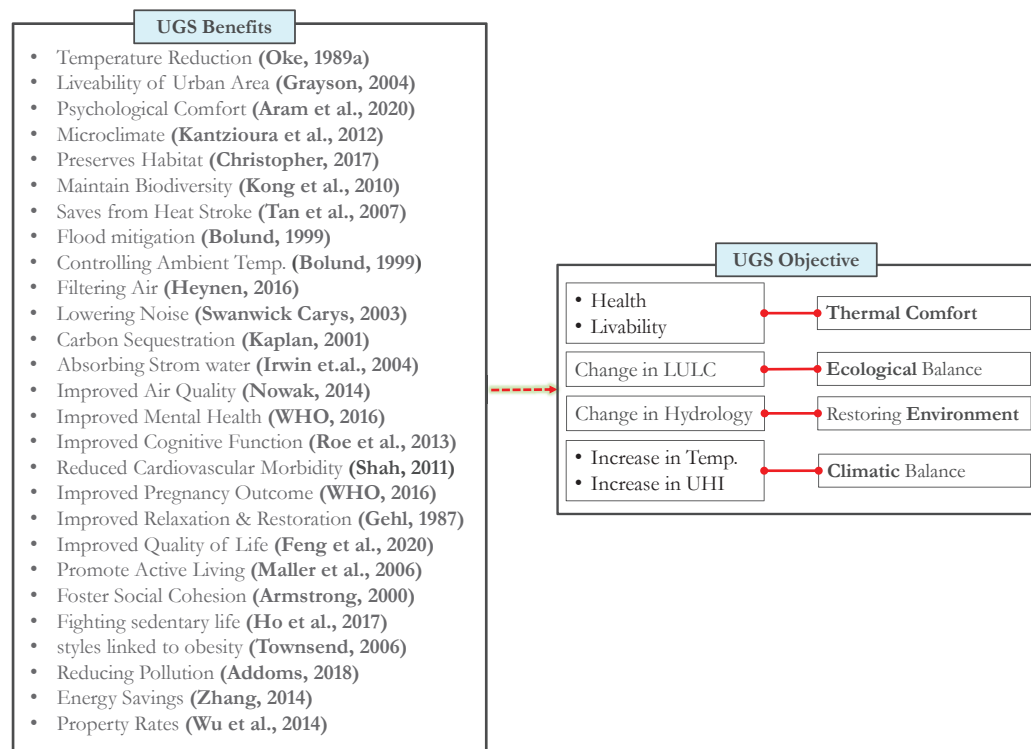


Fig. 1. Objective benefits of greenspaces [developed by authors].

[25] address parks and gardens as greenspaces, but H. Doygun [17] addresses greenspaces as urban ecological and recreational venues. This dilemma gave rise to the lack of a standard definition of urban greenspace. This definition changes with the change in the researcher’s perspective about greenspaces. C. Smaniotto Costa et al. [26] say that greenspaces are landscape conservation areas within the city, while per N. Comstock [27], greenspaces act as a medium to enhance the social interactions within the community. The synonymous nature of greenspace is depicted in Table I with some of the most cited definitions along with the terminologies used by those authors.

The literature studies identified greenspace’s benefits [33]–[37], which are shown in Fig. 1. This greenspace fulfils the objectives of thermal comfort, ecological balance, restoring the environment and climatic modification.

It is also found that the definition of greenspaces changes from country to country; in the UK, it is defined as predominantly unsealed, permeable and soft surfaces in and around the urban settlement [38]. Greenspace in China is defined as green land or an area covered by vegetation throughout the city [39]. The European Union definition of greenspace is “areas located in urban settings mainly covered by vegetation” [40]. In Germany, this definition is a detailed one and it states that the addition of public open space in the city characterized by the presence of vegetation and make up the urban green fabric and can be used directly or indirectly, are termed as greenspace [5], [41], [42].

In India, greenspace comprises trees in all urban parks, forests, woodlands, roads and canals, contributing to the city’s greenery [43]. Greenspace’s synonymous and amorphous nature in the Indian context creates further ambiguities, as shown in Fig. 2.

In India, the term greenspace has evolved over time, but despite being such an important entity, there is no standard working definition of urban greenspace available in India, which can be adopted for the city development and policy-making process. The absence of a standard working definition creates a dilemma amongst the decision-makers about the prioritisation of the parameters affecting the urban greenspaces.

Apart from this, many researchers have addressed the term greenspace through their research work, but there is no standard, one-for-all definition of urban greenspace. Hence, this study attempts to develop a standard working definition of urban greenspace for cities in India. This definition will be adopted in the master planning process and similar relevant policy-making documents, and it will ease out the present hurdle of defining urban greenspace in India. This is the motivation behind the research work. This study aims to frame a standard working definition of urban greenspace in the Indian context. To achieve the outcome, a rigorous literature review was done. The methodology adopted for the study and the outcome of the literature review is explained in the next sections.

I. Methodology

In this study, a systematic literature review (SLR) approach has been adopted. This method, in contrast to a descriptive literature review, aids in providing a thorough and understandable overview of the literature. In [44]–[46] it is stated that SLR is a valuable way to identify novel research prospects in a research subject by reviewing and integrating previously published articles. However,

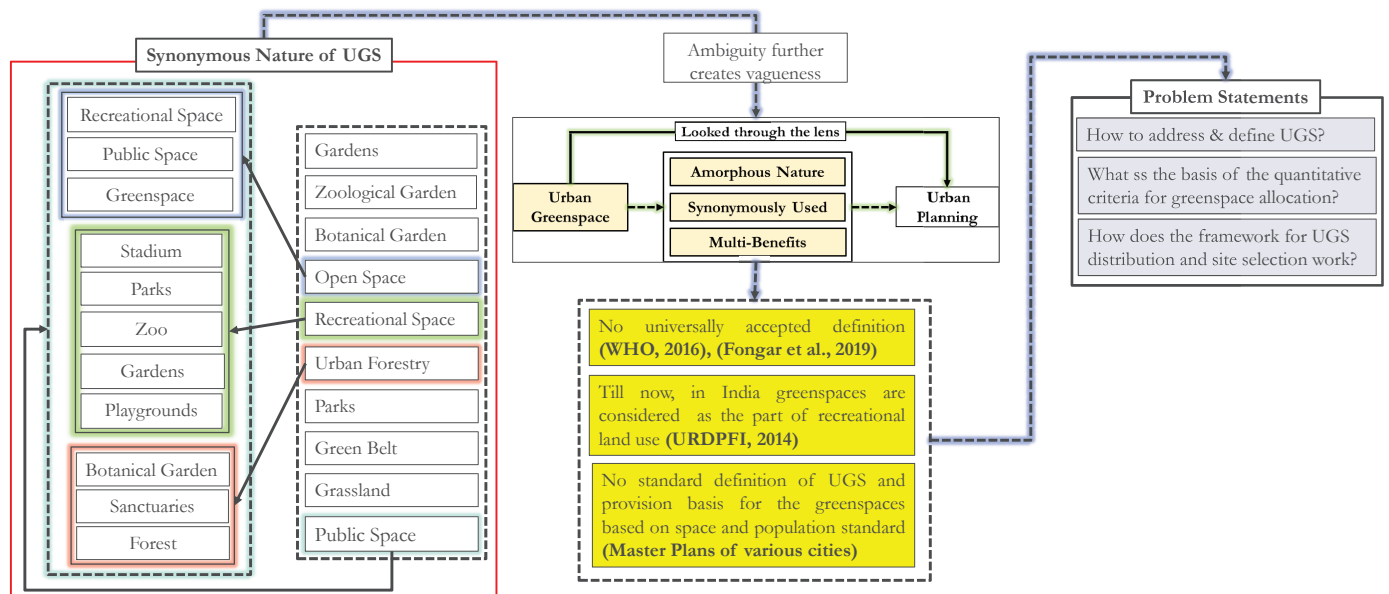


Fig. 2. Ambiguities caused by the synonymous nature of greenspace [developed by authors].

M. Petticrew [47] defined a systematic literature review as “an efficient technique for hypothesis testing, summarizing the results of existing studies, and assessing consistency among previous studies; these tasks are unique to medicine.”

In recent years, SLR techniques have been used in a multitude of scientific disciplines by utilising a variety of databases [48]–[55]. But numerous studies have documented the application of SLR method using a single scientific database. Urban greenspaces are a growing study trend among academics and industry professionals. Research trends and emerging prospects in a particular field of research can be discovered with the aid of SLR. In the current study, two research questions (Q) were developed as follows:

Q1: How to address and define urban greenspace in the Indian context?

Q2: What is the basis of the quantitative criteria for greenspace allocation?

In April 2020, a search was carried out for peer-reviewed journal articles and conference papers linked to the definition of urban greenspaces and urban planning. The search for articles was conducted by using the keywords related to the research area as follows: (TITLE-ABS-KEY (“Urban Greenspaces” OR “GreenSpace”) AND TITLE-ABS-KEY (“Urban Planning” AND “India”)). The following were the study’s inclusion requirements:

- 1) research papers published in the English language;
- 2) research papers published before Feb. 2021;
- 3) research papers should be from peer-reviewed journals or conference proceedings;

- 4) research papers focused on the area of urban greenspaces and urban planning;
- 5) research papers must be in the short or full version (not an editorial or abstract).

Scopus, a major database including the research articles collected on urban greenspaces, was selected for the primary search. The search and selection process of articles is discussed in Fig. 3. Article search was conducted in April 2020 using the different search strings of the scientific database Scopus (see Fig. 3). Researchers widely use the Scopus database for quantitative analysis [56]. This database is adopted for the study, as it offers peer-reviewed articles from journals, conference proceedings, and book series. Some authors have discussed the merits of adopting the Scopus database over the Web of Science (WoS) database, since 84 per cent of the literature in the WoS database coincides with Scopus [57], [58]. In this study, the PRISMA flow developed by [59] is used for the selection of the articles for analysis. Generally, PRISMA consists of three main steps (presented in Fig. 3), which are: (A) identification of studies related to the topic; (B) screening (C) inclusion.

A systematic literature review of 237 papers was done to study the nature of the definition of urban greenspace. Out of these, all papers were from the planning, ecology, environment, climate, and health domains (a total of 237). From this vast dataset, the definition related to the planning domain is given more importance in terms of their evolution than other domains. After this, the literature review was categorised into two parts. The first one intends to study the chronological evolution of the definition of urban greenspaces specific to the planning domain. At the same time, the second was intended to identify the criteria based on the characteristics and benefits of greenspace as adopted by other study domains and contexts. The studies of researchers were categorized by characteristics of greenspace, their benefits, and the criteria used to define greenspace.

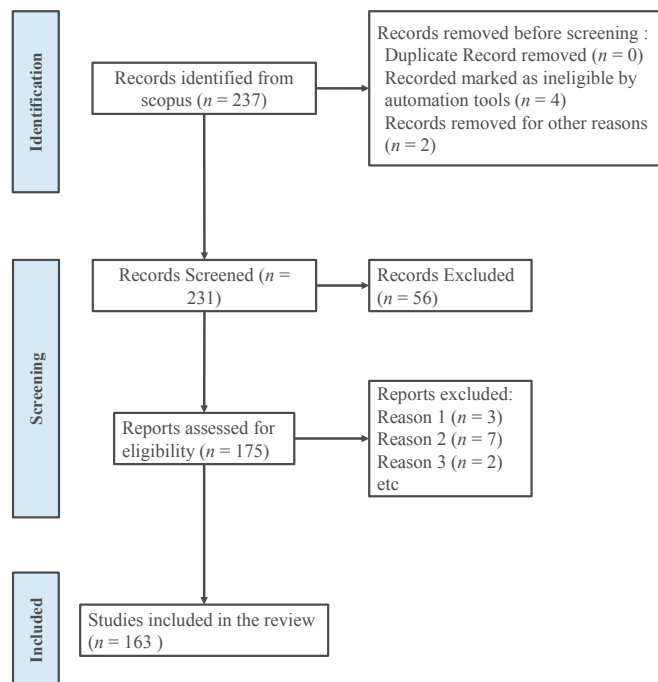


Fig. 3. Literature review search and selection process [developed by authors].

II. Evolution of the Urban Greenspace Definition

The definition of urban greenspace may vary per the researchers’ perspective. This may range from urban planning, geography, urban ecology, public health, psychology, social sciences, and other professional divisions within urban areas. This multidisciplinary nature becomes important to address such dynamic concepts which have multilateral impacts on all the strata of society. From identified literature sources, only those belonging to the planning domain were considered for the identification of the evaluation of the definition. At the same time, the rest of the research papers were used to identify the benefits and characteristics of urban greenspaces, which will help

to figure out the parameters that may affect the actual context of defining the greenspaces.

From targeted literature sources, it was found that many research papers have used the terms open space, recreational spaces, green belt, parks, grassland, and urban green areas along with the greenspace terminology. Hence, it becomes necessary to trace the evolution of this terminology. As given by [60], this terminology was used to address two broad concepts, viz. greenspace as a natural area and green space as a dedicated recreational activity area within the urban context. As per the researchers, greenspace can take any form based on the availability of infrastructure and its characteristics. The most common type in an urban context, as per [60], were unplanned natural areas, neighbourhood green areas, tot lots, green utility areas, playgrounds, and community parks.

B. Goodall [28] defined the term open space in his dictionary of human geography as any piece of land that has not undergone any type of development. He has also proposed a definition of a green belt and grassland for the urban context in the same dictionary. As per him, the green belt is a zone of open, semi-rural and low-density land around the existing urban settlement, while it may be considered grassland if it is laid down to grass, either permanently or temporarily, for hay or pasture. An international project funded by the European Union between the mid-1990s to 2005 defined the term greenspace as the areas of a city that are not built over and where the surface is not sealed. Two main classifications of greenspace were adopted by the members of this project, viz. formally designed greenspace and actually existing greenspace. This classification looks similar to the one given by [60], but here the authors have also considered additional parameters, such as accessibility, a function of the space, ownership of land, cultural as well as educational importance and economics related to that space. Urban greenspace was used to address natural and semi-natural areas within the city irrespective of their proximity and accessibility [11].

Urban greenspace, from a landscape planning and design perspective, comprises mostly soft elements (such as grass, trees, planting shrubs, hedges, water channels, etc.) [61], [62] and eye soothers [63]. Their role is balancing hard elements consisting of cement, steel and concrete surfaces, which in many cases are not good from aesthetic point of

view [64]–[66]. A. N. Clark used the green belt terminology and defined it as an open country tract of varying width and non-continuous land parcel with open recreational areas, woodland, farmland, etc. [29]. The term urban green, with an added advantage, was emphasized as a prominent recreational activity space. B. Tuzin et al. [31] defined the urban greenspaces as an area consisting of all public spaces in urban proximity covered by vegetation and are active or passive recreation areas or make an optimistic impact on the urban environment and ultimately are available for the users. Here we can see the intervention of the term availability while defining greenspace along with the others mentioned earlier. S. Venn and J. Niemela [25], explained the importance of the urban greenspace as maintaining the environmental quality of urban areas. As per S. Venn and J. Niemela, the greenspace is defined as an area which constitutes parks, gardens, recreation locations, informal greenspaces, and greenspaces around historical sites and railway corridors.

R. Coles and N. Grayson [24] gave a more detailed understanding of the urban greenspace as spaces located in urban areas covered with vegetation, which are directly used for recreation and are used by virtue of their location in the urban environment, mode of accessibility to the citizens, serving the needs and hence, ultimately, the quality of life in urban regions. C. Smaniotto Costa [26] gave the concept of the urban green system and defined it as a system that consists of all types of public greenspaces such as public parks, gardens, squares, cemeteries, woodlands, and natural areas and areas of landscape conservation set within the limits of the urban fabric. Urban greenspace was well defined by Marthe L. Derkzen et al. [5] as an area comprising a single element, such as a roadside tree, or a combination of elements, such as trees, park with lawns and ponds, and having natural, semi-natural or manmade character.

The Indian concept of urban greenspaces such as Company Bagh, Gardens of Princely states (Figs. 5(a) and 5(b)), which are now open for public use, a concept like Chaugan (Fig. 4(a)), Ram Lila grounds, Dusshera Grounds, a religious concept like Nandan Van (Fig. 4(b)), Ashok Vatika Kunj Kareels of Nand Goan, and Baikunth, etc. are the best examples of greenspace planning of that time (16th to 18th century).

Mughals built planned gardens more systematically in India (16th century). These gardens had symmetrical



Fig. 4. (a) Chaugan [Source: <https://en.wikipedia.org/wiki/Chaugan>], (b) Nandan Van [Photos by Hitendrasahu, source: <https://www.tripadvisor.in/>].



Fig. 5. (a) Company Bagh [Source: <https://www.google.com/maps/>], (b) Princely state of Bhavnagar [Source: <https://tripindia.co.in/home/destinationdetail/detail/243>].



Fig. 6. (a) Nishat Garden (Srinagar, Jammu & Kashmir) [Source: <https://www.youtube.com/watch?v=Zb5ugOy98cc>], (b) Lake Palace Landscape (Udaipur, Rajasthan) [Source: <https://www.tripadvisor.com/>].

facades within enclosed towns with provision for water tanks, fountains, and water channels along with other facilities. As a result, the Mughals retained the habit of creating fourfold (Charbagh)-symmetrical, rectangular pearl, terraced, and circular gardens. Some of these gardens' salient characteristics are bubbling fountains, gazebo, surrounding walls, and water channels. Ram Bagh (Agra, Uttar Pradesh), Khusrau Bagh (Allahabad, Uttar Pradesh), Amber (two gardens) (Jaipur, Rajasthan), Sahelion-ki-Bari (Udaipur, Rajasthan), Lake Palace Landscape (Udaipur, Rajasthan) (Fig. 6(b)), Nishat Bagh (Fig. 6(a)), Nasim Bagh, Shalimar Bagh, Shalimar Bagh (Srinagar, Jammu & Kashmir) are the best examples of India based Mughal garden concept for greenspaces.

Ravindra Garden, Haryana (Fig. 7(a)), was planned in the 17th Century in memory of Maharaja Yadvindra Singh by Nawab Fidia Khan. There is a central way in the garden with a channel of water in it and palm trees on both sides of the central way. Whereas Rashtrapati Bhavan garden, New Delhi (Fig. 7(b)), also called Presidential Garden, is the finest example of a Mughal garden. There is a variety of flowers in the garden, and in February, it is open to public only.

III. Notation of the Greenspace in Indian Regulatory and Legislative Documents

The amorphous nature of urban greenspaces replicates a lot of ambiguities in professional planning practice. As per the regulatory documents in India, urban greenspaces are not specified but rather categorized as open spaces and have been considered a part of recreational land uses in various guidelines [67], as tabulated in Table II. Government policy guidelines such as urban green guidelines 2014 (URDPFI) and Atal Mission for Rejuvenation and Urban Transformation 2015 (AMRUT) ensure sufficient provisions of land area to be covered in recreational spaces, eco-sensitive zones, forest and green areas in terms of per capita or percentage of the total developed area [22]. In 2014, URDPFI defined organized greenspaces' hierarchical category and area based on population size, whereas Urban Green Guidelines define the typologies of greenspaces based on greenness. Further, in 2015, AMRUT suggested the detailed classification of green based on the geographic information system (GIS). In the Indian Context, URDPFI is the only document to be followed for city planning countrywide. Other documents, like NBC



Fig. 7. (a) Pinjore Garden – Yadvindra Garden (Chandigarh) [Source: <https://www.trawell.in/chandigarh/chandigarh/pinjore-gardens>], (b) The Presidential Garden, New Delhi [Source: Rashtrapati Bhavan, The Office and Residence of the President of India, <https://rashtrapatisachivalaya.gov.in>].

TABLE II
Addressing Greenspace in Regulatory Documents [developed by authors]

City	Context	Basis	Category	Classification	Hierarchy/Coverage	
UDPFI, 1996	Open spaces	15 % of total developed land	Recreational facilities	Parks & open spaces Sports centres & playgrounds Botanical & zoological parks Water bodies/other natural features Places of tourist interest	Housing cluster Sector Community District Sub-city centre	
URDPFI, 2014	Open spaces	Provision of 10–12 m ² per person may be desirable Area based on population size	Recreational space Organized greens Other common spaces (vacant land/open spaces including forest cover, flood plains, etc in plain areas)	Recreational	RECREATIONAL P-1 Playgrounds/Stadium/sports complex P-2 Parks & gardens – public open spaces P-3 Multi-open space (Maidan) ORGANISED GREEN (Parks) Housing cluster Neighbourhood Community District/zone Sub-city centre	
Urban Green Guidelines, 2014	Type of urban greens	Typologies of greenspaces based on greenness	Protected forest Reserved forest District park Neighbourhood park Tot-lots Playgrounds Green belts (buffer) Green strip Tree cover	Recreational space	Tot lot Playground Neighborhood park Community park	
AMRUT, 2015	LULC	Green based on the GIS	Recreational space Green areas	Recreational space		Green areas
				Garden & park Playground Club Sports centre Gymnasium Stadium	Planetarium Golf course Aquarium Open air theatre Swimming pool Race course	Reserved forest Protected forest/notified forest Social Green belt Tree clad area & tree

and AMRUT guidelines, are used for specific purposes. URDPFI also focuses on Recreational spaces only and does not specify the notation of greenspaces; however, there are references in different building byelaws and layout approval rules for the provision of parks or plantation belt within plots/layouts. But, still, the legislative documents lack the true representation of the notation of the term greenspace. The major lacunae in the byelaws, township development policies and rules are that there is no clear-cut categorisation of green spaces and provision standards.

Indian cities have defined synonymous nature of UGS provision in their respective master plans under the recreational spaces, parks and open space, green areas, open space or forest, as shown in Table III. Further, the per capita of its classified spaces is calculated and allocated under different sub-categories based on population and area.

International studies have sorted and refined typology of UGS based on their uses and function in comparison with the Indian scenario [22]. Amorphous nature of UGS

in Indian cities tends to have a contextual classification and thus is not the true representation of per capita UGS. Therefore, it should not be compared to the per capita UGS proposed by URDPFI or WHO unless we have a standard set for UGS classification.

IV. Characteristics of the Urban Greenspaces

In previously published studies, UGS characteristics such as type of vegetation cover, size, scale and hierarchy, ownership, function, landscape, access, control, amenities and ecology were used to define UGS. Their characteristics help to determine the criteria that may directly impact the planning and function of the urban greenspace. From the literature review, based on the level of importance [68], the characters and criteria of the urban greenspaces have been identified as shown in Table IV.

Posing the multifunctional characteristic, as mentioned in Table IV, and amorphous nature of UGS [10] evident in

TABLE III

Addressing of Greenspace in Master Documents of Indian Cities [developed by authors]

State/UT	Master plan/ DP	Category	Classification	Hierarchy/provisions	Section under AMRUT
Jammu	Jammu Master Plan (2015–2032)	Recreational	Buffer Open space Recreation	Open Spaces @1.25 m ² per capita at community level (5000–6000 population) 1.5 m ² per capita at neighbourhood level (10 000–12 000) Sector level (40 000–50 000), Nodal level (1 000 000–1 500 000) 1 m ² /capita at zone level (4 000 000–5 000 000) Around 33.33 km ² , i.e., 9.39 % of the developed area is earmarked as parks & open spaces (1.65 hectares per 1000 population)	Green areas Recreational Recreational
		Forest	Forest	43.80 km ² of area is covered under forest area	Green areas
Chandigarh (UT)	Chandigarh Master Plan (2015–2031)	Open spaces & landscape	Open space	1850.33 (19.69 %) acres of open areas	Recreational
		Ecology & environment		Conservation and maintenance of existing	Eco-sensitive zone
Delhi	Delhi Master Plan (2007–2021)	Recreational	P1 Regional park P2 City park, district park, community park, multi-purpose ground P3 Historical monument/ archaeological park P4 Green buffers P5 Sports facilities/ complex/ stadium/sports centre	Specified green areas as lung spaces 15 % of total urban land-use is under recreational area/green spaces	Recreational Recreational Heritage Green Areas Recreational
Punjab	Amritsar Master Plan (2010–2031)	Public spaces /recreational spaces	Parks/public open spaces & Playground	Prescribed norm for recreational spaces are 20–25 % of the total developed area	Recreational Recreational Water bodies
	Bhatinda Master Plan (2009–2031)	Recreational space	G1 Playgrounds, stadiums, sports complex G2 Parks & gardens (public open spaces) G3 Lakes	2.21 % open area of total municipal area	
Uttar Pradesh	Lucknow Master Plan (2016–2031)	Recreational	Green belt Regional park & playground Botanical garden/ park Environment park/ forest	----	Green Areas Recreational Eco-sensitive zone Green areas
	Varanasi Master Plan (2011–2031)	Park & open spaces/green belt	Regional park Park & open area/ multi-purpose open area Playground & stadium	----	Recreational
			Green belt	----	Green areas
Maharashtra	Pune	Recreational space	Community halls Museum Theatres Parks Gardens Open spaces	----	Recreational
	Nagpur City Development Plan (2015–2041)	Recreational/ open spaces	Sports facilities Parks & gardens Urban greenspaces	----	Recreational

State/UT	Master plan/ DP	Category	Classification	Hierarchy/provisions	Section under AMRUT
Rajasthan	Jaipur	Recreational space	G1 Eco-sensitive area G2 Green zone G3 Parks	G1 & G2 – Consisting of rivers, Nallahs, water bodies, reserved forest, protected forest (area is earmarked around these areas to give a continuum. G3 – Central park, district park	Eco-sensitive area & green areas
			Parks & open spaces Stadium & playfields Semi-public Entertainment Fair & tourism facilities Stadium	Community park Children park & playground	Recreational
	Sikar	Recreational Space	Parks & open spaces	Community park District stadium	Recreational
Jharkhand	Ranchi	Recreational	P1: Playground, stadium/ sports complex/golf course P2: Parks & gardens/water park/public open spaces	----	Recreational
			P3: Special recreational zones (district park/zoo/ biodiversity/ botanical garden/tourist hutments)		Eco-sensitive zone
			P4: Multipurpose open space/exhibition ground		Recreational
			P5: Reserved green / green belt		Green areas
			Open spaces as per Ranchi Master Plan – 1983		Recreational
Chhattisgarh	Naya Raipur	Recreational	Film City	Facilities like vending booths, clubhouses, film studios, greenhouses, golf courses, and other such use permissible shall be allowed with permission from the authority	
			Stadium & sports complex	----	Recreational
			Parks and play areas	Maximum built space to be within 0.1 FAR	Recreational
			Nature resort and theme park	----	Recreational
			Plantation	----	Agriculture area
			City park (incl. plantation forest botanical garden, jungle safari & golf course)	----	Recreational
			Waterbody	----	
	Plantation (located within uses other than recreational)	----	Recreational		
	Ambikapur	Recreational	Park	----	Recreational
			Mela ground		
			Botanical garden		Eco-sensitive zone
			Plantation		Agriculture area
			Playground/stadium		Recreational
Picnic spot					
Water park	Recreational				

State/UT	Master plan/ DP	Category	Classification	Hierarchy/provisions	Section under AMRUT
Andhra Pradesh	Amravati	Open spaces and recreation	P1: Passive zone	----	
			P2: Active zone		
	P3: Protected zone				
	P4: Protected zone				
	Vijayawada	Recreational	No classification	----	
Bihar	Patna	Open space zone	Open space recreational	----	Recreational
			Parks		
			Playgrounds		
			Exhibition ground		

TABLE IV
Characteristics of the Urban Greenspaces [compiled by authors]

Classification	Identified Characteristics	Reference
Defence	Serves a defence function	[28], [69], [70]
Aesthetic & recreation	Pleasant and aesthetic view	[28], [30], [71], [72], [73]
	Pleasure, satisfaction, refreshment, or entertainment	[28], [29], [65], [74], [75]
	An ornamental piece of ground	
	Enclosed areas of land in towns used for public recreation	
	Open to all for the lawful exercise	[28]
	Availability for the users, viz. direct or indirect	[31], [76], [77], [78]
	Enhances the quality of life	[24], [79], [80], [81], [82], [83]
	Accessible to citizens	[41], [73], [84], [85], [86]
	Enhances social interactions	[87], [88], [89], [90], [91], [92], [93]
	Improves physical and mental health	[13], [17], [94], [95]-[99]
Environment & ecology	Indicator of sustainable development (urban sustainability)	[12], [100]-[103]
	Semi-natural areas	[11]
	Biodiversity conservation	[104]-[107]
	Stimulates and maintains seasonal growth	[29], [108], [109]
	Urban lungs	[109]-[111], [107], [112]
	Design elements and environmental improvement	[82]
	Improves and maintains the environmental quality	[17], [25], [104]
	Natural or artificial vegetation cover	[113]
Urban Planning & design	Provides an amenity	[29]
	Landscape conservation	[26]
	A subset of open spaces that involve green elements	[28], [30]
	Contributes greenery to the city	[114], [115], [111], [116], [117]

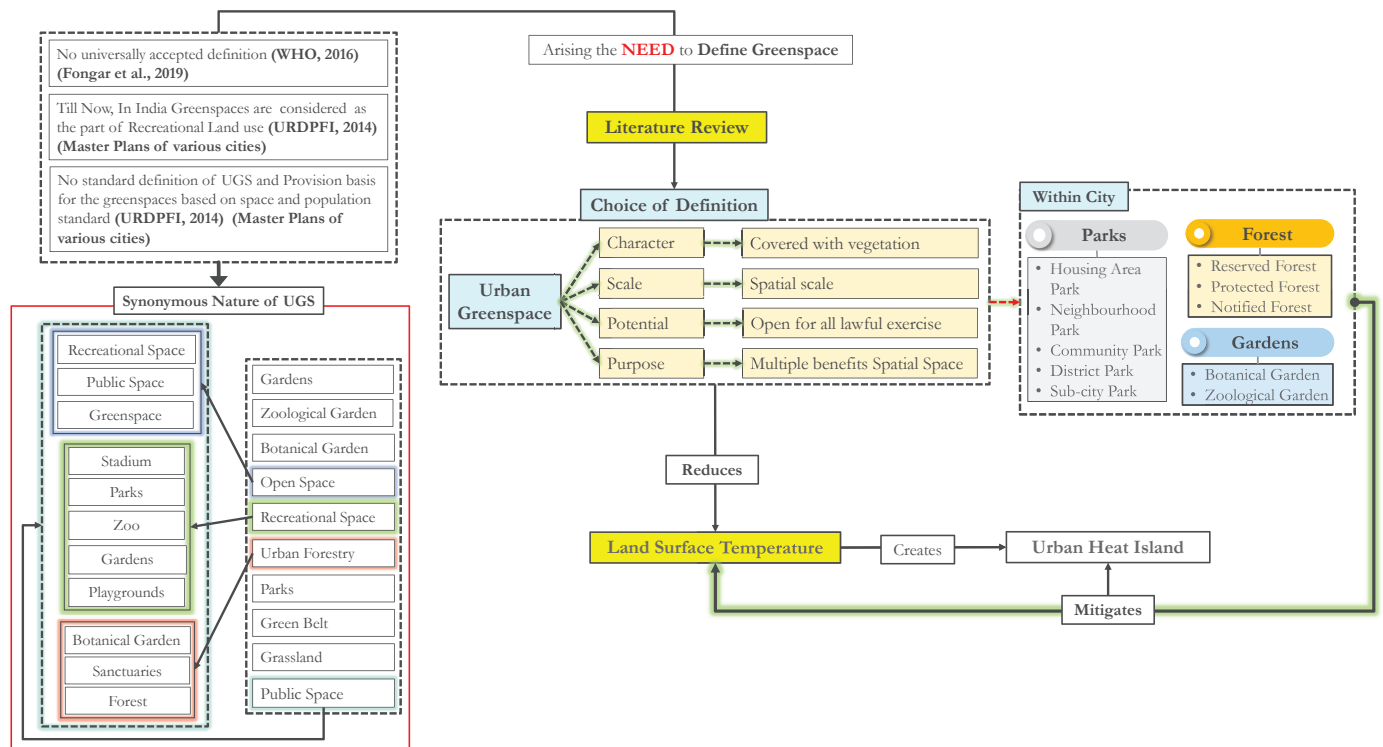


Fig. 8. Methodological flow to define urban greenspace [developed by authors].

literature, as shown in Fig. 8, it may be used to define greenspace in an urban context. Based on this, an attempt is made to list the criteria that may be used to define a greenspace, as shown in Table V. Due to restrictions of the data available and knowledge constraints, broadly, three different criteria (character, scale, purpose) are identified from the finite literature sources. These criteria are directly related to the objective characteristics of the greenspace.

Based on the three different criteria (character, scale, purpose), as identified from the literature review and the study of the papers, an attempt was made to define the term urban greenspace in the Indian context. It can be defined as “multifunctional spatial spaces covered with vegetation at a spatial scale”. This definition covers all the major criteria identified and found easy to be adopted in the master planning and policy-making process. The

outcome of this research will help to quantify the dynamic character of the greenspace in the urban Indian context and will help to overcome the current issue of the dilemma about the standard working definition of the greenspace.

V. Results and Discussion

The literature review outcomes have shown the chronological evolution of the definition of greenspace. Earlier, only broad concepts were used to describe greenspaces, such as those which are naturally available and the one which is developed within the boundaries of the urban growth area. After that, researchers started to actually quantify the definition of urban greenspace, and this need gave rise to various concepts. The broad terminology of the greenspace was further divided into open space, greenspace, green belt, grassland, recreational areas, parks and urban greenspace. Different researchers defined these terms as per the site context and the study objectives.

The term urban greenspace has witnessed the change in its definition through time. B. Goodall [28] had talked about accessibility, a function of the space and ownership of land while defining the urban greenspace, apart from the earlier existing one. The parameters of the proximity of greenspaces and their impact on the environment were

TABLE V
Criteria to Define Urban Greenspace [compiled by authors]

No	Criteria	Explanation	Category of Criteria
1	Character	Covered with vegetation	Quantitative
2	Scale	Spatial scale	Quantitative
3	Purpose	Multiple benefits at spatial space	Qualitative & quantitative

further added by B. Tuzin et al. [31]. R. Coles and N. Grayson [24] added the term quality of life of the users while defining the urban greenspace, where they also talked about the type of vegetation cover over the land parcel. The concept of the urban green system was introduced by C. Smaniotto Costa [26], which gave a new dimension to the existing literature. The detailed definition of the urban greenspace as given by Marthe L. Derkzen et al. [5] includes available amenities in that area.

Apart from these researchers, many others have also contributed to the definition of greenspace, from which an attempt was made to list the characteristics used to define the urban greenspace. From these broad characteristics, the further division is made based on the criteria used, shown in Table V. These criteria will guide to achieving the desirable definition of urban greenspaces in the Indian context. Constraining available knowledge sources and finite literature lead to the identification of three different criteria: character, scale, and purpose.

Hence, this study is carried out to establish a uniform working definition, which can be considered for the planning and development of the Indian region. Greenspaces could be categorized and working definition can be worked out and can be assigned the importance value in terms of its use. Based on this, the urban greenspace in the Indian context can be defined as multifunctional spatial spaces covered with vegetation at a spatial scale. This definition attempts to cover all the criteria identified in the literature review covering all the aspects mentioned in the earlier definitions of urban greenspace. Compared to the earlier definitions, we can see that the proposed definition is precise and generic, adding scale and hierarchy, along with the objective parameters of the greenspace. This definition will help quantify greenspace's dynamic character in the urban Indian context. It will help to overcome the current issue of the dilemma about the standard working definition of greenspace.

Conclusions

Urban greenspaces play an important role in the overall development of the city. The presence of greenspace ensures physical, social, environmental, economic and planning-related benefits to human beings. The availability of adequate greenspace helps achieve our societies' sustainable growth. The major gap in the current literature is the unavailability of the standard definition, parameters, and modal framework for allocation of the urban greenspace at a spatial scale in India. It is important to develop a standard definition, hierarchy, and distribution pattern of urban greenspace from regional to city and to local level to understand its different typologies and benefits.

Various researchers have defined the term greenspace, but all were from different study backgrounds, which led

to the formulation of many discipline-specific definitions of greenspaces. The definition of greenspace changes from country to country, from one physical environment to another. These definitions impacted the local climate, type of governance, the culture of people, goal of the development authorities, socialism, and many other active departments in the city. Here in India, the term greenspace has evolved. Still, despite being such an important entity, there is no standard definition of urban greenspace available in India, which can be adopted for the city development and policy-making process. The absence of a standard working definition creates a dilemma amongst the decision-makers about prioritising the parameters affecting the urban greenspaces. Hence, this research attempts to develop a standard definition of urban greenspace for cities in India. This definition will be adopted in the master planning process and similar relevant policy-making documents and will ease the present hurdle of defining urban greenspace in India.

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