

# 中国城市老旧小区非正式绿地改造及其公众感知研究

## RENOVATION OF INFORMAL GREEN SPACES IN OLD URBAN RESIDENTIAL COMMUNITIES IN CHINESE CITIES AND RELATED PUBLIC PERCEPTION INVESTIGATION

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### 摘要

当前，低密度的大型城市绿地难以满足城市居民尤其是老旧小区居民的便捷需求和共享需求，而触手可及的非正式绿地（IGS）作为一种新型城市绿色基础设施，有助于城市实现共建、共治、共享的美好愿景。本研究选取了包含北京地区典型老旧社区的北太平庄街道，以场地实景与虚拟改造场景相结合的方式，分析了居民对IGS的看法、评价及治理意愿，以及影响居民改造偏好、活动偏好及积极-消极感知的多种景观要素。结果发现，大部分居民对所在社区中的IGS的使用现状及其优缺点有所了解，且对IGS在社区中的改造有较强的共治意愿；居民对改造后IGS的偏好与场景空间变量显著相关——植物物种丰富度高、树冠覆盖率大、游憩型设施完善的绿地更受居民青睐。因此，合理控制植物种类、绿地率，恰当选择建植方式、设施类型将有效提升居民的积极感知。最后，本文提出了在该研究基础上展开后续相关研究的可能方向，以期为城市公众生活环境的优化提供更具针对性的建设依据。

### 关键词

非正式绿地；老旧小区改造；新型绿色基础设施；景观感知；社区治理；活动偏好

### ABSTRACT

Existing large-scale urban green spaces in a low distribution density can hardly meet citizens' diverse and growing needs for convenient access and sharing modes, especially to those living in old communities. Compared with formal green spaces, informal green space (IGS) is a new urban green infrastructure contributing to the city's co-construction, co-governance, and co-sharing. This study was conducted based on a typical old residential community in the historic city center of Beijing, namely Beitaipingzhuang Neighborhood, acquired residents' opinions, evaluation, and willing to participate in IGS governance, and investigated their preference of IGS renovation, activity, and the positive / negative perception of IGS scenarios through virtual renovation proposals upon the real scenes. According to the survey result, most residents have been aware of the existing IGS in communities as well as the advantages and disadvantages, and shown their support to IGS co-governance; residents' preference of IGS renovation scenarios is significantly affected by environmental factors—residents prefer the green spaces with a higher plant richness, a larger crown size, and a more complete leisure facility system. Therefore, residents' positive perception can be enhanced through enriching plant species, adjusting green space ratio, and introducing proper planting patterns and facility types. Finally, the authors put forward several research interests for following up so as to provide targeted guidelines for the optimization of urban living environment.

### KEYWORDS

Informal Green Space; Old Residential Community Renewal; New Green Infrastructure; Landscape Perception; Community Governance; Activity Preference

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## 1 引言

城市绿地与人们的生活息息相关。公园、城市森林、社区花园等城市绿地为人们提供了休闲、娱乐和放松的场所，在美化城市环境、提升市民生活质量方面起着巨大作用。然而，伴随着城市的发展，生活在城市中的人们与自然直接接触的机会逐渐减少，难以享用自然所提供的健康福祉<sup>[1]</sup>。城市公园等正式绿地所提供的有限的服务也不足以明显改善这样的情况。

研究表明，居住人口密度、居民的收入及年龄都会导致正式绿地使用情况上的差异<sup>[2]-[5]</sup>。例如，低收入居民在移动性和可达性上的劣势导致他们的日常活动往往集中在居住地附近，同时，他们也更容易受到城市更新过程中空间重构的负面影响<sup>[6]</sup>。可以发现，当前的正式绿地已经难以满足日益增长的城市人口多样化的“便捷需求”与“共享需求”<sup>[7]</sup>，而触手可及的非正式绿地作为一种新型城市绿色基础设施，有助于城市实现共建、共治、共享的美好愿景。

## 2 非正式绿地的分类与特点

除了密集的建筑区域与绿地，城市中还存在着一些边界模糊的地块，包括闲置用地、街道边缘、铁道周边绿地等。这类空间具有自发性、流动性和延展性等特点，是一种不确定的“松散空间”<sup>[8]</sup>。这种边缘化的用地在土地所有权、维护、使用、管理和（改造行为的）合法性方面都有含糊不清之处<sup>[9]</sup>。彼得·戴尔·特雷迪奇指出：“虽然那些杂草丛生的地方通常被称为‘荒地’，但重新审视这一被忽视的资源无疑可以推动城市生态学的进步。”<sup>[10]</sup>克里斯多夫·D·D·鲁普雷希特和贾森·A·伯恩为这类具有阈限的、准公共的绿地类型提出了一种可供参考的定义和分类方式，将其称为“非正式绿地”<sup>[9]</sup>。

非正式绿地（informal green space，简称IGS），也被称为“城市野景”（urban wildscapes）或“剩余空间”（leftover spaces）<sup>[9]</sup>，是一种常被忽视的城市自然景观。根据鲁普雷希特和伯恩的定义，IGS“包含任何曾经遭受强烈人为干扰，如今被非残余的、自发生长的植被占据的空间”，它们是明确的社会生态实体，而不仅仅是文化或生物上的实体<sup>[9]</sup>。其所有权属与管理权属并不一定明确或统一：“它们并未被管理机构或财产所有者正式划定为用于农业、林业、园艺、休闲或环境

## 1 Introduction

Urban green spaces, such as parks, urban forests, and community gardens, provide citizens with recreational and leisure places, unfolding a close relation with people's well-beings through the improvement of urban environment and the quality of life. However, due to the increasingly urbanized lifestyle, people are losing daily connection with nature, and hardly get benefited by the wide variety of associated health welfare<sup>[1]</sup>. Existing urban parks and other formal green spaces with limited service contribute little to mitigate the situation.

Previous studies have revealed that the way people using formal green spaces is impacted by their living density, income, age, and other factors<sup>[2]-[5]</sup>. For example, the activity range of low-income groups is often confined due to the limited transportation means and less accessibility to formal green spaces; also, they often bear the brunt of spatial reconstruction in urban renewal<sup>[6]</sup>. Existing formal green spaces can hardly meet citizens' diverse and growing needs for convenient access and sharing modes<sup>[7]</sup>. As an alternative, informal green space is a new urban green infrastructure contributing to the city's co-construction, co-governance, and co-sharing.

## 2 Categories and Characteristics of Informal Green Space

Besides densely constructed lands and green spaces, there are also “betweenness” spaces without clear boundaries found in cities, including vacant lots, and street or railway verges. Such “loose spaces” are often characterized by spontaneity, fluidity, malleability, and indeterminacy<sup>[8]</sup>, and of ambiguity with regard to land tenure, maintenance regime, use, regulation, and legitimacy (of renewal)<sup>[9]</sup>. Peter Del Tredici pointed out that “while ruderal landscapes often referred to as ‘wastelands,’ advancements in urban ecology warrant a fresh look at this neglected resource.”<sup>[10]</sup> Christoph D. D. Rupprecht and Jason A. Byrne drew on a provisional, non-exclusive definition and typology of a form of liminal, quasi-public green spaces—“informal green space”<sup>[9]</sup>.

Informal green space (IGS), also known as “urban wildscapes” or “leftover spaces”<sup>[9]</sup>, is a natural urban landscape that is often neglected in city. Rupprecht and Byrne defined that “IGS consists of any urban space with a history of strong anthropogenic disturbance covered at least partly with non-remnant, spontaneous vegetation”; more than being solely cultural or biological, IGS is explicitly socio-ecological<sup>[9]</sup>. IGS is not owned or managed by a certain or unified entity: “It is neither formally recognized by governing institutions

保护的“空间”——土地所有者不会对其中的植被进行任何管理，任何游憩目的的使用都是非正式的和过渡性的<sup>[9]</sup>。IGS在一定程度上受人类活动影响，为人们提供休闲娱乐和与自然接触的空间。

与正式绿地相比，IGS的优势主要包括：1) 正式绿地中的植物往往有明显的人工维护痕迹，而IGS以自发生长的植被为主，更具自然野趣；2) 城市中的正式绿地的分布密度较低，而IGS几乎随处可见，居民的出行时间和经济成本较少；3) 正式绿地需要高昂的设施维护和管理费用，而IGS主要依靠居民自发性维护，维护成本较低。

鲁普雷希特和伯恩将IGS分为9种类型：街道边缘 (street verge)、空置或废弃地块 (lot)、缝隙空间 (gap)、铁道周边绿地 (railway)、棕地 (brownfield)、水系周边绿地 (waterside)、结构性空间 (structural)、微型绿地 (microsite)，以及电力线周边绿地 (power line)，且同一地块可能同时从属于多个类别<sup>[11]</sup>。基于中国的老旧社区的用地特征，老旧社区涉及的IGS一般包括街道边缘、空置或废弃地块、缝隙空间、结构性空间、微型绿地，以及电力线周边绿地。

### 3 国内外社区中的IGS改造

在战术都市主义思潮的影响下，西方国家对城市IGS的改造策略包括低效空间激活、功能叠加复合、已有功能再生等，都是通过引入适宜的植物和多样化的设施来实现的（如“快闪”公园、可食性花园）<sup>[12]</sup>。例如，“596英亩”基金会在其位于美国纽约的一个试点项目中，通过对可利用的土地空间进行重组，将2.7hm<sup>2</sup>的空地转变为开放的社区花园、都市农园和游乐空间，提高了社会公平和社区韧性。在政府与社区组织的支持下，基金会以众包制图为基础，协助制定了143项以社区为主导的行动计划，其中的26项已经成功执行。通过在线工具和宣传，基金会尝试创造更多的公共空间，并为市民提供参与IGS改造和城市共建的机会。<sup>①</sup>

在中国，自20世纪80年代改革开放以后，市场经济的迅猛发展带动了新建小区数量的大幅增长，也提升了对绿色环境理念的关注<sup>[13]</sup>。相较而言，老旧社区的绿地普遍面临着数量不足、质量不高、建设参与

or property owners as greenspace designated for agriculture, forestry, gardening, recreation, or for environmental protection.” The vegetation within such spaces is rarely managed by the owner, and any use for recreational purposes is informal and temporary<sup>[9]</sup>. Intervened by human activities, IGS can provide spaces for informal recreational opportunities in natural environment.

Compared with formal green space, IGS has advantages in following aspects: 1) The vegetation within IGS is spontaneous which allows people to enjoy the wilderness that cannot be perceived in highly maintained green spaces; 2) Widespread IGS provides citizens with convenient opportunities to access green spaces; 3) Less investment in facility and management to IGS is needed, which largely relies on the spontaneous maintenance by local communities.

Rupprecht and Byrne identified 9 IGS types: street verge, lot, gap, railway, brownfield, waterside, structural, microsite, and power line; an IGS may be categorized into one or multiple types<sup>[11]</sup>. In China, IGS found within old residential communities mostly includes 7 types, namely verges, lots, gaps, structural, microsite, and power line, due to the characteristics and attributes of land use.

### 3 IGS Renovation in Communities in China and Abroad

IGS renovation strategies in Western cities, influenced by Tactical Urbanism, consist of revitalizing negative spaces, integrating multiple functions, renewing existing services, etc., combining with adaptive planting design and diversified facilities, such as “Pop-Up” parks, PARK(ing) Day, and edible gardens<sup>[12]</sup>. For example, “596 Acres” Fund transformed 2.7 hm<sup>2</sup> vacant lots in one of its pilot projects in New York, USA into public community gardens, farms, and play spaces through land use reorganization, strengthening social equity and community resilience. With the support from the government and community organizations and based on a crowd-sourced map, the Fund has assisted the launch of 143 neighbor-led campaigns, 26 of which have been implemented. With online tools and hands-on advocacy, 596 Acres provides citizens with more opportunities to participate in IGS renovation and city co-construction.<sup>①</sup>

Since the reform and opening up, China has witnessed an economy boom, with a massive construction of residential areas which have relatively highlighted the eco-environment building and relevant concepts<sup>[13]</sup>. Since the green spaces in most earlier-built communities suffer from the insufficiency in quantity, quality, and public engagement, and a mismatch with public

① 请登录“596英亩”基金会官方网站了解更多信息。

① Please find more information about the “596 Acres” Fund in its official website.

② 详见“北京市园林绿化局关于印发《北京市公共绿地建设管理办法》的通知”。

② More details can be found from the Notice on Publishing the Administrative Measures of Public Greening Spaces Construction in Beijing by Beijing Gardening and Green Bureau.

度不高、与人群使用需求不符等问题<sup>[14]</sup>，绿地数量提高与品质提升迫在眉睫。而社区中的IGS恰好具备改造为居民日常活动空间的巨大潜力：

1) 从绿地分布上看，社区公园分布不均衡、服务范围差异较大，而老旧社区的闲置用地与边角料空间（IGS）较多，可以作为社区公园绿地的补充；2) 从使用状态上看，由于老旧社区缺乏管理，常常出现居民将公共绿地改造为私用晾衣场地、停车位，以及私用果园、菜园等现象，IGS改造恰好可以在响应居民上述需求的基础上对社区景观进行重组和提升；3) 从产权性质上看，老旧社区内的房屋产权性质复杂，街道与居委会、责任规划师、居民都可以共同参与公共空间改造的过程中来，实现小区管理/治理形式多元化<sup>[15]</sup>。其中的IGS改造也可以发挥居民自发性维护的优势，实现绿地的灵活有效治理。

中国各地已提出各种针对城市老旧社区绿地提升的方式和路径。以北京市为例，在指导方针层面，北京市园林绿化局对老旧社区提出了绿化改造的三个工作原则：统筹兼顾、以人为本；保护为先、多元增绿；和谐长效、精细管理<sup>②</sup>。其中，“多元增绿”包含宜绿则绿、见缝插绿、垂直披绿等不同的增绿方式，在老旧社区有限的条件下，尽可能地服务于居民的日常活动。在实践项目层面，北京景山片区公共空间景观更新<sup>[16]</sup>、茶儿胡同12号院改造<sup>[17]</sup>，以及三庙社区花园改造<sup>[18]</sup>等项目都尝试在较窄小的空间中充分利用不同的空间界面，丰富绿化面积与设施功能。

## 4 IGS的公众感知研究

### 4.1 研究目的与意义

时下，中国的城市建设已经由增量扩张进入到存量提升的转型阶段，自2015年起开始推行的“城市双修”（生态修复与城市修补）政策也已取得了阶段性成果<sup>[19]</sup>。由于IGS具备激活消极或碎片化绿地的潜力，因此，无论对于生态修复还是城市修补来说，IGS都是重要的战场。在已经开展或正在开展的一系列老旧社区改造项目中，IGS不可避免地成为了改造重点之一<sup>[16]-[18]</sup>。然而，居民对于改造成果的感知与使用偏好仍有待验证。现有研究大多是将改造前与最终唯一改造成果进行纵向对比，缺乏多个同类方案之间的横向对比。此外，由于此类空间的特殊性，公众的积极感知与消极感知可能共存<sup>[20]</sup>，同时调查两方面的感知有助于设计者寻求使用体验最优化的方案。因此，此次研究希

usage demands<sup>[14]</sup>，IGS displays its potential for satisfying residents' daily activity needs. First, the widespread IGS such as vacant lots and verges in old residential communities can supplement to formal green spaces such as community parks that are in a disequilibrium distribution and varied in service radius. Secondly, existing green spaces in old communities are often occupied by residents for drying clothes, car parking, fruit and vegetable planting, and other daily uses. IGS renovation practice needs to respond to residents' needs and reorganize and improve the community landscape. Thirdly, IGS renovation can take advantage of residents' bottom-up governance and facilitate the co-management of public space renewals among local governments, neighborhood committees, planners, and community members who share the complicated property rights in old residential communities<sup>[15]</sup>.

Efforts for renovating green spaces in old residential communities and exploring associated roadmaps have taken place across China. Beijing, for example, has made demonstration in both policy making and practice. On the one hand, Beijing Gardening and Greening Bureau has proposed three principles for the renovation works: making overall-considered and user-oriented plans; emphasizing ecosystem protection and diverse greening; and balancing urban development and sustainability through refined management<sup>②</sup>. Facing with many limitations, various measures, e.g. taking advantage of suitable patches, potential verges, and vertical surface, are encouraged to serve residents' daily needs for green spaces. On the other hand, cases like the Landscape Renewal of Public Space of Jingshan Area<sup>[16]</sup>, the Renovation of No. 12 Chaer Hutong<sup>[17]</sup>, and the Regeneration of Sanmiao Community Garden<sup>[18]</sup> all attempt to introduce green spaces and facilities into limited places by making full use of the spatial interfaces within the sites.

## 4 Public Perception Research on IGS

### 4.1 Research Objectives

Nowadays, cities in China have entered the phase of inventory development from incremental growth. The City Betterment and Ecological Restoration Programs launched in 2015 has seen interim achievements<sup>[19]</sup>. Echoing the programs, IGS which has the potential to activate negative or fragmented green spaces has played a key role in old residential community renovation<sup>[16]-[18]</sup>. However, studies on residents' perception of renovated sites and the preference of utilization are inadequate, and mostly adopt comparative research between the existing situation with the given final renovation plan or result, lacking

望以场地实景与虚拟改造场景相结合的方式，在改造尚未进行之前，收集社区居民对场地现有IGS的感知，以及对不同改造场景的偏好及其可能造成的积极或消极感知，以期获得有较强借鉴意义的改造方向，从而使改造结果符合最广大居民的预期。

## 4.2 研究方法

自2016年推行《老旧小区综合整治工作方案（2017—2020）》至今，北京一直是老旧社区改造的先行城市。因此，笔者在北京老城区中选择了较为有代表性的北太平庄街道进行调研（图1）——街道73.72%的小区已建成10年以上——建成年代在2000年以前的比例占22.10%，建于2000~2005年间的占26.53%<sup>③</sup>。这片5.17km<sup>2</sup>的街道区域辖37个社区居委会，总人口201 614人（2010年）<sup>[21]</sup>，拥有足够的样本数量用于开展研究。

研究针对社区居民设置了以下5套问卷，分别对应5个方向的关键性问题：1）对社区现状问题的认知；2）对IGS的评价及治理意向<sup>[18]</sup>；3）对基于不同IGS改造方式的景观场景的偏好；4）对不同景观场景的活动偏好；5）对不同景观场景的积极与消极感知。随后面向社区居民进行线上发放。研究最终共回收问卷2 013份，其中有效问卷2 009份（5套问卷分别为362份、369份、415份、425份和438份），有效率为99.8%。在获得调查数据后，本研究运用R-Studio软件对所得数据进行深入统计分析，以总结各类景观要素与居民感知、活动偏好之间的关联。

## 4.3 调查结果

### 4.3.1 对社区现状问题的认知

针对小区现状的调查显示，绝大多数居民对小区的活动场地并不满意（90.88%）；近半数居民认为小区内儿童活动场地（43.92%）、健身运动设施（41.99%），以及老年活动场地不足（38.95%）；除此

comparative research across possible proposals. Moreover, people would have both positive and negative perception of IGS<sup>[20]</sup>, hence investigation on the both perception would inform green space design that optimizes users' experience. Therefore, this study aims to learn users' perception of existing IGS within a site before the renovation implementation, and their preferences to and associated positive / negative perception of different virtual scenarios. It is expected to offer reference to the practical IGS renovation that meets residents' needs to the greatest extent.

## 4.2 Research Methods

Beijing is one of the pioneer cities practicing urban renewal and has issued the Program of Comprehensive Renewal of Old Residential Communities (2017–2020) in 2016. The research selected the Beitaipingzhuang Neighborhood, a typical old residential area in the historical city center of Beijing, as the study area (Fig. 1), where 73.72% residential communities were built over 10 years ago—22.10% were built before 2000 and 26.53% between 2000 and 2005<sup>③</sup>. Covering an area of 5.17 km<sup>2</sup>, this neighborhood consists of 37 communities, and homes a total population of 201,614 (in 2010)<sup>[21]</sup>.

The authors designed 5 online questionnaires to investigate different aspects of residents' opinions on community IGS: 1) general awareness of existing issues in communities; 2) IGS evaluation and governance opinions<sup>[18]</sup>; 3) preference to alternative IGS renovation scenarios; 4) activity preference in different renovation scenarios; 5) positive and negative perceptions to different renovation scenarios. Finally, there were 2,009 valid replies (362, 369, 415, 425, and 438 to the 5 questionnaires respectively) among the received 2,013 copies, with a validity of 99.8%. A further analysis was conducted with R-Studio, to reveal the impacts landscape factors have on residents' perception and activity preferences.

## 4.3 Questionnaire Results

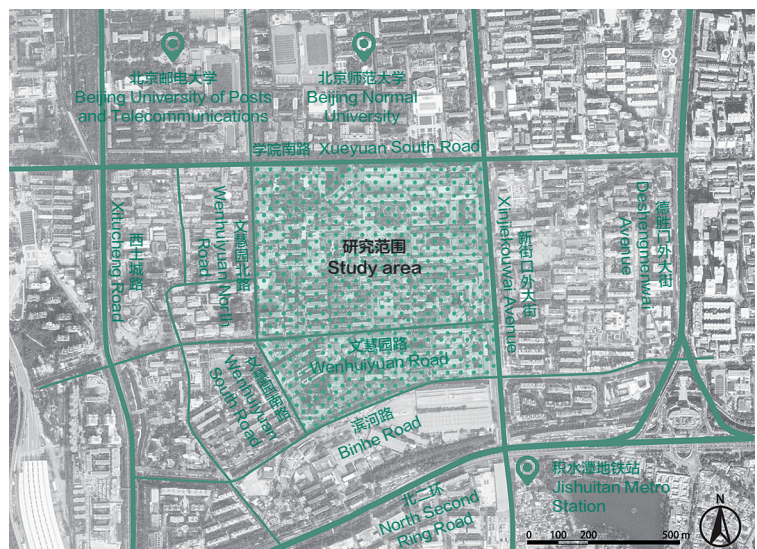
### 4.3.1 General Awareness of Existing Issues in Communities

The survey result reveals that the activity space in communities fails to satisfy the majority's daily needs (90.88%); the lack of activity space for children (43.92%) and for the elderly (38.95%), and of exercise facilities (41.99%) commonly discontented the residents; other problems such as uncomfortable pavement (32.87%), poor activity space for teenagers (31.49%), and limited shaded space (30.66%) also undermine users' experience and comfort (Fig. 2).

85.64% of the residents were unsatisfied with the existing greening condition in communities. About half of the residents

③ 笔者根据链家网上公示的北太平庄街道社区信息估算得出。

③ Estimated by data sourced from the official website of Home Link China.



1. 研究范围区位图

1. Location of the study area

2. 居民认为小区内活动空间存在的问题
  3. 居民认为小区内植物绿化存在的问题
2. Residents' opinions on existing activity space in communities
  3. Residents' opinions on existing greening condition in communities

之外还有铺地材质不舒适 (32.87%)、青年活动场地少 (31.49%)，以及遮阳不足 (30.66%) 等体验度与舒适性较差的问题 (图2)。

绝大多数居民对小区的绿化持不满意态度 (85.64%)。约半数居民认为小区内植物数量少 (48.34%)、种类少 (40.33%)，以及绿地面积不足 (44.48%) (图3)。因此，在社区后续IGS的改造中，需要重视增加植物数量与种类，但同时也要注意平衡种植密度与郁闭度，以及绿地与硬质活动场地比例。

随后，研究对社区居民对现有IGS的认知进行了调研。研究提取了北太平庄街道老旧社区中具有改造潜力的6种典型IGS——自行车随意摆放区域、无人管理的空地、杂物堆积的角落、废弃的仓库/车棚、墙间的夹缝区域，以及无人管理的绿地，并就6类空间改造的迫切程度进行意见收集。统计结果表明，居民认为小区内最需要改造的区域为自行车随意摆放的空地 (27.90%)，其次是无人管理的绿地 (20.17%) (图4)。

#### 4.3.2 对IGS的评价与治理意向

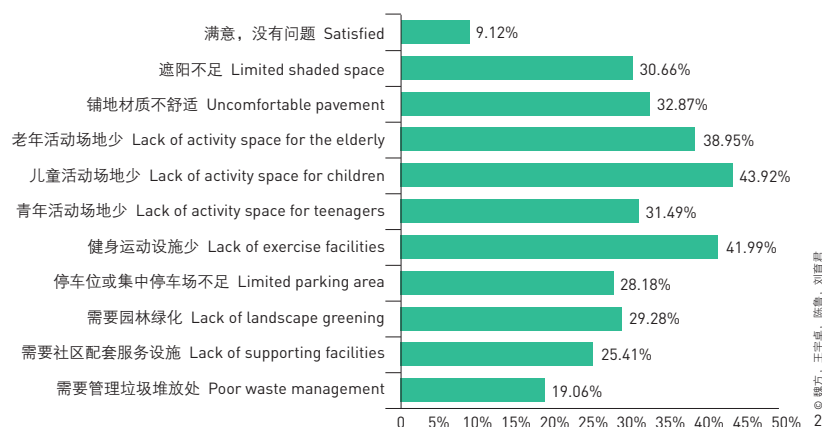
关于评价与治理意向的问卷调查结果显示，绝大多数居民 (87.53%) 意识到其小区内及周边存在IGS，并且大多数居民 (81.03%) 愿意进入IGS进行活动；近半数居民 (44.99%) 愿意在工作日使用这类空间进行活动，这也体现出IGS在使用时段方面的优势：公众一般选择周末与节假日前往公园等正式绿地进行游憩活动，而IGS在日常生活中的使用频率更高。居民对IGS的使用具有一定的认同感，表明改造后的IGS容易被居民接受。在对IGS的评价方面，居民们认为存在较多垃圾 (51.76%)、空间狭小 (46.07%)，以及有安全隐患 (44.44%) 是IGS的主要问题，其潜在优点主要包括可以进行休闲活

pointed out the shortage of plant quantity (48.34%) and diversity (40.33%), as well as the poor green space coverage (44.48%) (Fig. 3). Increasing plant quantity and species, balancing the planting and canopy density, and adjusting the green space ratio to hard pavement should be paid attention to in future IGS renovation practice.

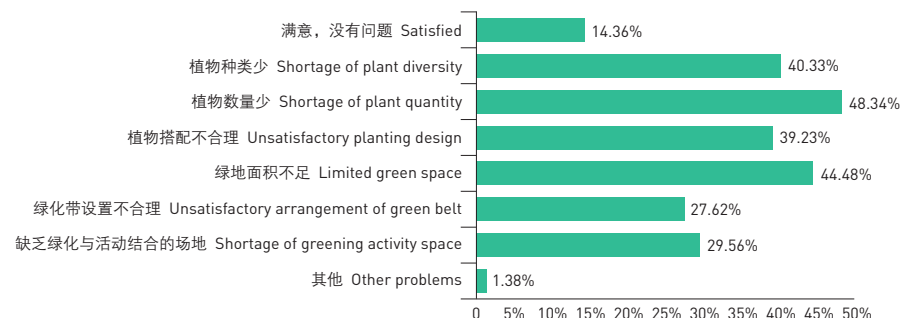
To investigate residents' awareness of the existing IGS, the research selected 6 typical IGS's in the study area: spaces occupied by disordered bicycle parking; unattended vacant spaces; cluttered corner; derelict warehouses / bicycle sheds; strip between walls; and unattended green spaces, and collected residents' opinions on the renovation priority. Spaces occupied by disordered bicycle parking (27.9%) and unattended green space (20.17%) were voted as the problems should be first addressed (Fig. 4).

#### 4.3.2 IGS Evaluation and Governance Opinions

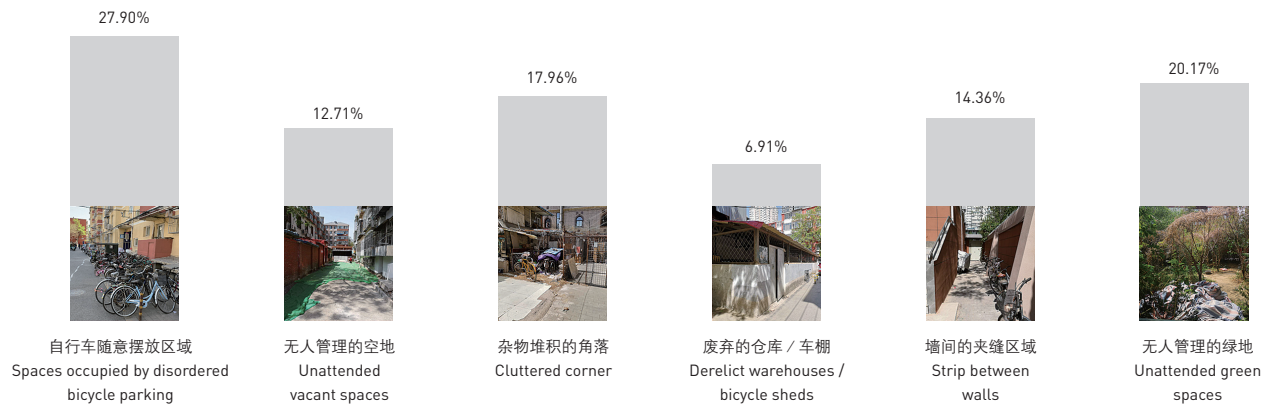
The collected evaluation and governance opinions indicate that most residents have been aware of the IGS in and around their communities (87.53%), and are willing to make use of them (81.03%); about half of the residents (44.99%) are likely to use IGS on weekdays, suggesting a potentially high visit frequency of IGS in people's daily life, who are more likely to visit formal green spaces (e.g. parks) only on weekends or holidays. The survey result suggests a high acceptance by the residents of the IGS renovation. The evaluation on IGS helped identify the existing major problems, including poor waste management (51.76%), limited space (46.07%), and safety hazard (44.44%), and potential advantages such as relaxation



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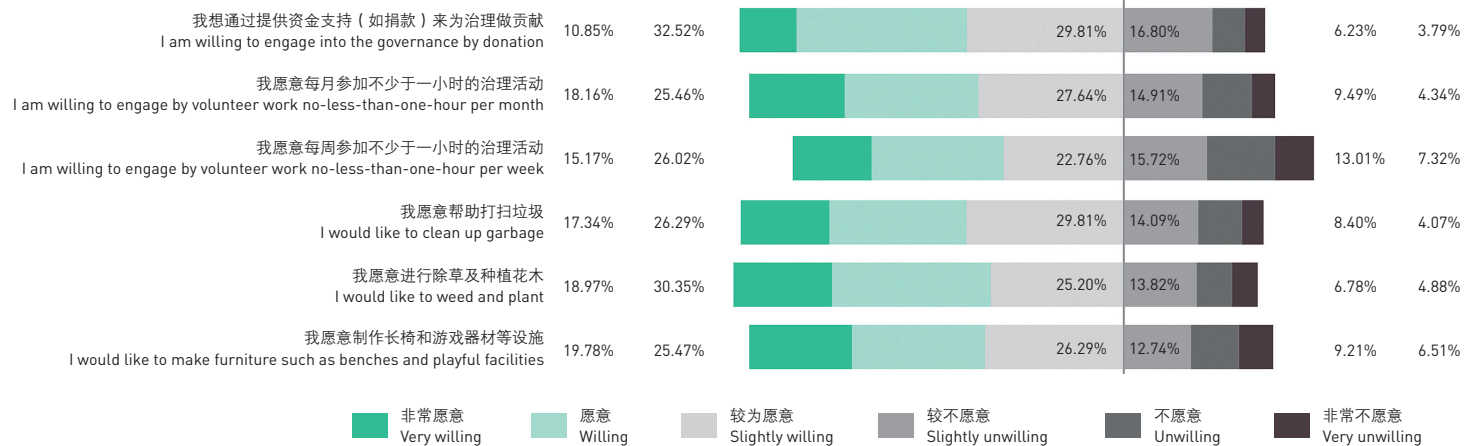
4. 居民对小区中现有IGS的认知
5. 居民对现有IGS的积极-消极感知
4. Residents' awareness of the existing IGS in communities
5. Residents' positive and negative perceptions of existing IGS

问题	选项	结果占比
Question	Items	Voting percentage [%]
您所居住的小区内部或周边是否存在与图4类似的非正式绿地? Have you found any IGS looks like the ones in Figure 4 inside or around your community?	大量 Yes, there are a lot of them	19.24
	有一些 Yes, there are some of them	68.29
	无 No	12.47
您是否愿意在与图4类似的非正式绿地中开展游憩活动? Would you like to make use of the IGS like the ones in Figure 4?	愿意在周末及节假日使用 Yes, I am more likely to use it on weekends and holidays	36.04
	愿意在工作日空闲时使用 Yes, I am more likely to use it on weekdays	44.99
	不愿意 No	18.97
您认为图4所示非正式绿地会造成怎样的问题(可多选)? What problems do you think the IGS in Figure 4 would pose [select all that apply]?	难以进入(如:有栅栏) Hard to access (with fences)	26.56
	空间狭小 Lack of space	46.07
	有危险的动植物 Danger caused by plants and animals	30.62
	有安全隐患 Safety hazard	44.44
	存在较多垃圾 Poor waste management	51.76
	与其他使用者发生争执 Conflict with other users	22.49
	会招来一些流浪汉 Homeless people	17.62
	会成为有害生物的繁殖地 Pests	27.37
	儿童少年玩耍引发噪音 Noise from children and youth	34.66
	空间隐蔽会引发犯罪 Crimes	23.58
	易引发火灾 Fire risk	18.97
杂草丛生 Plant overgrown	29.00	
乱涂乱画 Graffiti	13.01	
您认为图4所示非正式绿地具有哪些潜在功能和用途(可多选)? What advantages and potential functions do you think the IGS in Figure 4 have [select all that apply]?	离家近 Close to home	49.32
	不拥挤 Comfortable user density	47.43
	没有使用规定(如禁止遛狗、禁止轮滑等) Free to walk dog, roller skating, and other marginalized activities	30.35
	可以种菜 Planting vegetables	21.14
	可以进行休闲活动,放松心情 Relaxation opportunity	53.12
	花草树木赏心悦目 Scenery	42.82
	可以让孩子玩耍 Children play spaces	33.60
	可以成为动植物栖息地 Animal and plant habitats	29.81
	提供体验自然的场所 Accessing to nature	36.31
	营造舒适的小气候 Comfortable microclimate	34.15
提升生物多样性 Enhancing biodiversity	25.75	
植物可以净化空气 Air cleaning by plants	33.33	

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6. 居民对非正式绿地的共建共治意愿

6. Residents' governance opinions on IGS



动放松心情（53.12%）、离家近（49.32%），以及不拥挤（47.43%）（图5）。

在对IGS的共建共治意愿上来看，居民参与IGS治理的意愿较强。更多人愿意通过捐款的方式参与IGS的治理（73.18%）；大多数人愿意每月参加不少于一小时的治理活动（71.26%），但是当参与治理活动的时间增至每周不少于一小时，居民的意愿有所下降（63.95%）。在治理内容方面，大多数居民愿意参与除草及种植花木的工作（74.52%）、打扫垃圾（73.44%）、制作长椅和游戏器材等设施（71.54%）等具体的治理活动（图6）。

#### 4.3.3 对基于不同IGS改造方式的景观场景的偏好

基于字面叙述的改造方案会因为主观理解上的差异，而对调查结果产生影响，因此研究采用改造方案可视化的手段<sup>[23]</sup>，并且尽可能使所有图片在光线、背景、透视和色彩等方面保持一致<sup>[24]</sup>。

研究以迪特尔·林克和托马斯·阿恩特<sup>[23]</sup>以及罗伯特·凡·东根和哈利·J·P·蒂默曼斯的相关调查为参考<sup>[24]</sup>，将植物丰富度、绿地率、植物生长阶段（以树木冠幅大小表示）、种植方式，以及设施类型这5类环境要素作为本次研究的定性自变量进行分析<sup>[25]</sup>。研究在尽可能控制其他变量的前提下，将植物丰富度和绿地率分为低、中、高、极高4个等级；用树木冠幅极小、小、中、大4类来表示植物生长阶段；将种植方式分为行列种植、花钵种植、自然式种植、垂直绿化4类；将设施类型分为儿童活动型、健身型、装饰型、休憩型4类（图7）。研究采用李克特量表，请居民对上述20个场景进行评分，评分范围从“很不喜欢”（=1）到“很喜欢”（=5），从而得到公

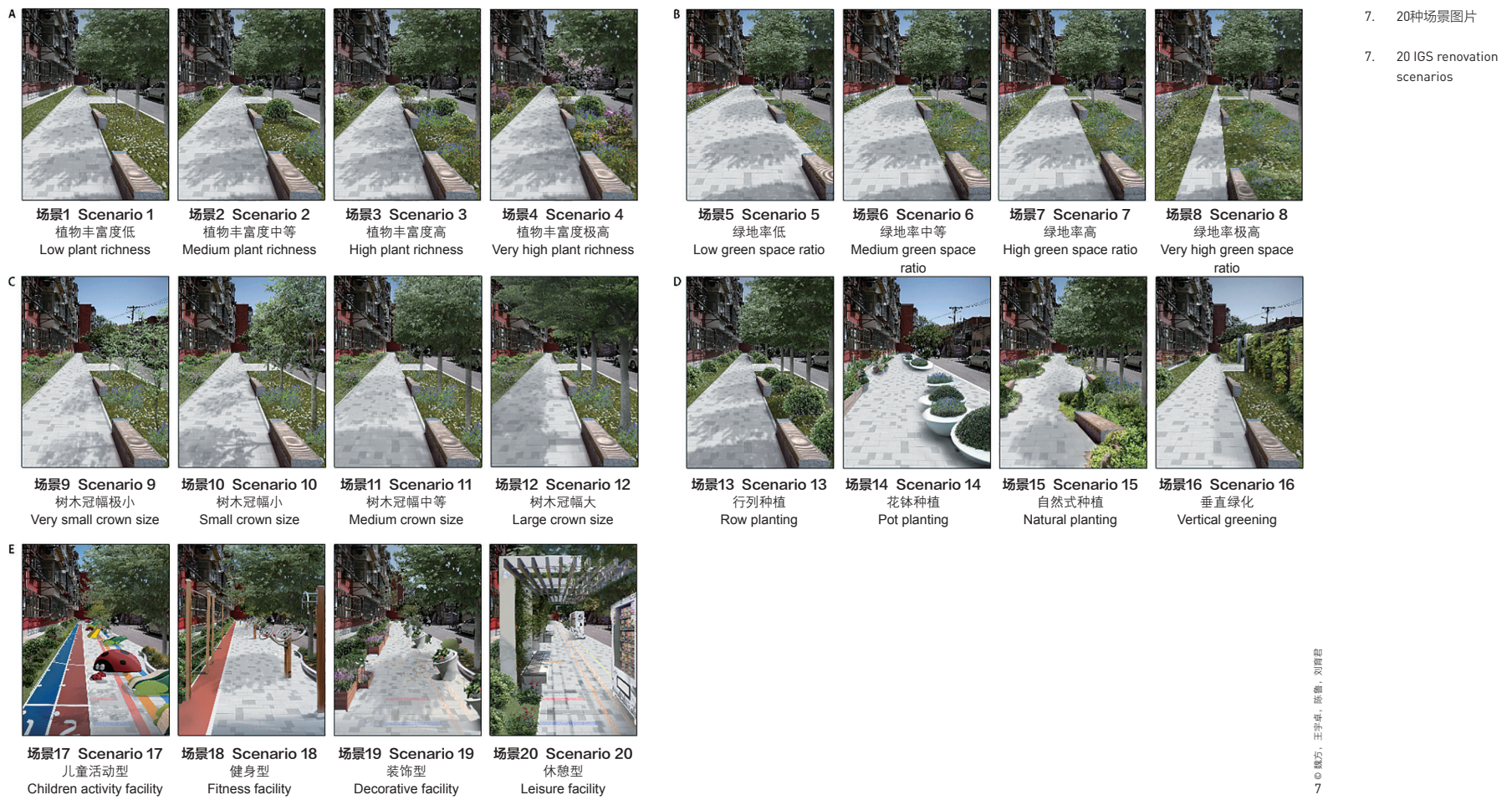
opportunity (53.12%), close to home (49.32%), and comfortable user density (47.43%) (Fig. 5).

The questionnaire also investigated the residents' willingness to participate in the co-renovation and co-governance of IGS: 73.18% of them are willing to engage in the governance by donation; Most residents are willing to engage by volunteer work no-less-than-one-hour per month (71.26%), but their willingness retreats when the volunteer work is scheduled weekly (63.95%). Weeding and planting (74.52%), cleaning up garbage (73.44%), and furniture making such as benches and playful facilities (71.54%) are the top three volunteer work types what the residents would like to do (Fig. 6).

#### 4.3.3 Preference for Alternative IGS Renovation Scenarios

This study visualized the renovation proposals to avoid residents' understanding differences by textual interpretation<sup>[23]</sup>. All the visualized materials are represented in the same lighting, background, angle of view, and color<sup>[24]</sup>.

The study selected 5 environmental factors from prior works conducted by Dieter Rink and Thomas Arndt<sup>[23]</sup>, and Robert Van Dongen and Harry J. P. Timmermans<sup>[24]</sup>, namely plant richness, green space ratio, plant growth condition (by crown size), planting pattern, and facility type, and set them as qualitative independent variables<sup>[25]</sup>. Specifically, the species richness of plants and the green space ratio are identified into 4 levels: low, medium, high, and very high; the crown size is rated by very small, small, medium, and large; the planting pattern is identified in forms of row planting, pot planting, natural planting, and vertical greening; and the facility types include children activity, fitness, decorative, and leisure ones (Fig. 7). Residents were asked to rate each of the 20 scenarios referring to the Likert Scale (the score ranges from 1 to 5 according to their affection; 1 means "very dislike" and 5 for



众对IGS的改造场景的偏好。

结果表明, 随着植物丰富程度以及冠幅数值的升高, 居民的评分也逐渐增高; 居民对于绿地率没有明确的偏向性; 在种植方式上, 更多居民更偏好行列种植 (3.83), 而最不受欢迎的是花钵种植 (3.46); 而在设施类型上, 休憩型设施的平均分最高 (3.99) (表1)。可以认为, 受访者偏好于更高的树冠覆盖率、更丰富的植物种类, 以及更完善的休憩型设施; 对于人工化与自然式的植物种植方式, 或者是绿地率的偏好则较为模糊。然而, 由于种植方式与设施类型这两类场景涉及到的种类较多, 本研究仅选用了几组代表性场景, 且无法避免受访者对形式、颜色等的个人偏好, 故评分也可能会受到影响。

#### 4.3.4 对不同景观场景的活动偏好与积极—消极感知

研究还对受访者在这20个场景中开展的活动类型的偏好, 以及产生的积极或消极感知 (即因变量) 进行了统计 (表2)。其中, 活动类

“very like”) to collect public preference for IGS renovation.

The survey result reveals that the mean score raises with increasing plant richness and crown size; it also reveals that there was no clear preference for the green space ratio; row planting (3.83) and pot planting (3.46) are the most and the least preferred planting patterns respectively; and leisure facility (3.99) is the most preferred facility type (Table 1). It can be found out that the respondents enjoy higher tree canopy coverage, richer plants species, and more complete leisure facility system, while the preference for artificial / natural planting and the green space ratio is not clear. However, due to the wide variety of alternatives, the research only visualized several typical combinations of planting pattern and facility type, and the survey result might be impacted by personal preferences on shape, color, etc.

#### 4.3.4 Activity Preference for Different Renovation Scenarios and the Corresponding Positive / Negative Perceptions

The results of residents' activity preference for the 20 renovation scenarios and their positive / negative perceptions are shown in Table 2. Optional 6 types of activity include children's

表1: 居民对各空间场景的偏好分布  
Table 1: Residents' preference for the scenarios

不同植物丰富度 Scenarios of different plant richness	场景1 Scenario 1	场景2 Scenario 2	场景3 Scenario 3	场景4 Scenario 4
很不喜欢 Very dislike	2.65%	1.20%	1.45%	2.17%
不喜欢 Dislike	5.30%	5.30%	7.71%	6.51%
一般 Neutral	28.43%	32.05%	24.82%	17.35%
喜欢 Like	47.23%	44.82%	42.89%	40.72%
很喜欢 Very like	16.39%	16.63%	23.13%	33.25%
<b>平均分 Average score</b>	<b>3.69</b>	<b>3.70</b>	<b>3.79</b>	<b>3.96</b>

不同绿地率 Scenarios of different green space ratio	场景5 Scenario 5	场景6 Scenario 6	场景7 Scenario 7	场景8 Scenario 8
很不喜欢 Very dislike	2.17%	1.21%	1.93%	4.10%
不喜欢 Dislike	8.43%	6.27%	5.06%	8.43%
一般 Neutral	26.75%	33.49%	29.64%	24.82%
喜欢 Like	43.86%	43.13%	46.26%	35.42%
很喜欢 Very like	18.79%	15.90%	17.11%	27.23%
<b>平均分 Average score</b>	<b>3.69</b>	<b>3.66</b>	<b>3.72</b>	<b>3.73</b>

不同树木冠幅 Scenarios of different crown size	场景9 Scenario 9	场景10 Scenario 10	场景11 Scenario 11	场景12 Scenario 12
很不喜欢 Very dislike	2.65%	1.21%	1.21%	2.41%
不喜欢 Dislike	11.08%	5.78%	5.78%	7.47%
一般 Neutral	29.64%	34.22%	27.95%	22.41%
喜欢 Like	39.52%	40.24%	49.16%	40.72%
很喜欢 Very like	17.11%	18.55%	15.90%	26.99%
<b>平均分 Average score</b>	<b>3.57</b>	<b>3.69</b>	<b>3.73</b>	<b>3.82</b>

不同种植方式 Scenarios of different plant pattern	场景13 Scenario 13	场景14 Scenario 14	场景15 Scenario 15	场景16 Scenario 16
很不喜欢 Very dislike	0.96%	4.58%	4.10%	2.89%
不喜欢 Dislike	5.54%	16.39%	10.36%	6.02%
一般 Neutral	25.30%	27.71%	24.09%	26.51%
喜欢 Like	46.27%	31.08%	39.76%	43.13%
很喜欢 Very like	21.93%	20.24%	21.69%	21.45%
<b>平均分 Average score</b>	<b>3.83</b>	<b>3.46</b>	<b>3.65</b>	<b>3.74</b>

不同设施类型 Scenarios of different facility type	场景17 Scenario 17	场景18 Scenario 18	场景19 Scenario 19	场景20 Scenario 20
很不喜欢 Very dislike	5.54%	0.97%	1.69%	1.45%
不喜欢 Dislike	9.40%	9.88%	7.71%	4.82%
一般 Neutral	22.41%	28.43%	29.88%	19.52%
喜欢 Like	39.04%	40.72%	39.28%	41.92%
很喜欢 Very like	23.61%	20.00%	21.44%	32.29%
<b>平均分 Average score</b>	<b>3.66</b>	<b>3.69</b>	<b>3.71</b>	<b>3.99</b>

表2: 居民对各个场景的活动偏好与积极-消极感知  
 Table 2: Activity preference for different IGS renovation scenarios and the corresponding positive / negative perceptions

		场景1 Scenario 1	场景2 Scenario 2	场景3 Scenario 3	场景4 Scenario 4	场景5 Scenario 5	场景6 Scenario 6	场景7 Scenario 7	场景8 Scenario 8	场景9 Scenario 9	场景10 Scenario 10
活动偏好 Activity preference	AP1 儿童活动 Children's activities	23.76%	23.06%	20.71%	30.82%	24.47%	23.29%	19.29%	22.59%	18.82%	24.47%
	AP2 休息停留 Staying to have a rest	26.12%	29.88%	25.18%	33.18%	22.12%	24.00%	23.06%	22.59%	23.76%	21.65%
	AP3 体验自然 Enjoying the nature	21.41%	27.76%	31.29%	48.94%	22.12%	23.53%	22.35%	41.41%	26.35%	25.41%
	AP4 跳广场舞 Square dancing	24.00%	24.71%	17.88%	21.18%	44.24%	30.59%	20.94%	19.06%	21.65%	22.82%
	AP5 散步 Wandering	31.06%	34.35%	31.29%	36.94%	25.41%	23.76%	23.29%	39.06%	24.24%	24.24%
	AP6 健身 Fitness	20.00%	21.41%	20.00%	20.24%	20.47%	18.82%	22.12%	23.06%	16.94%	22.59%
积极感知 Positive perceptions	PP1 景色优美 Scenic landscape	9.82%	20.78%	12.79%	49.77%	9.59%	12.10%	9.59%	16.21%	8.22%	13.24%
	PP2 特色鲜明 Distinctive landscape	5.94%	11.64%	8.90%	18.04%	7.31%	8.90%	5.94%	9.82%	5.71%	7.08%
	PP3 鸟类栖息 Observed bird habitats	12.10%	18.49%	19.63%	46.12%	7.99%	11.42%	6.62%	29.91%	5.94%	10.50%
	PP4 宜人小气候 Comfortable microclimate	9.13%	23.29%	18.72%	42.01%	9.59%	14.16%	10.05%	18.26%	6.85%	12.79%
	PP5 适合健身 Suitable for physical activities	8.68%	15.75%	7.31%	15.07%	17.58%	12.56%	9.36%	7.31%	8.45%	8.90%
	PP6 舒压放松 Physical and mental relaxation	7.76%	16.67%	13.24%	34.93%	7.99%	10.05%	10.05%	21.69%	7.31%	7.99%
	PP7 空间舒适 Comfort	9.36%	21.23%	15.30%	32.19%	13.01%	13.47%	10.96%	15.75%	7.53%	11.19%
消极感知 Negative perceptions	NP1 易被枝条划伤 Scratches	8.90%	11.87%	16.44%	21.92%	7.31%	7.53%	7.53%	24.66%	13.47%	11.87%
	NP2 蚊虫叮咬 Insect bites	13.70%	16.21%	28.08%	36.07%	7.99%	7.99%	9.82%	32.19%	7.08%	10.27%
	NP3 流浪汉聚集 Homeless people	12.10%	18.26%	13.70%	15.30%	9.59%	12.33%	10.05%	14.61%	7.76%	9.59%
	NP4 流浪动物聚集 Stray cats and dogs	7.31%	17.81%	18.26%	25.80%	11.42%	12.10%	8.45%	22.60%	6.62%	9.36%
	NP5 废弃物堆积 Waste	21.92%	22.15%	16.21%	15.98%	18.72%	20.55%	11.87%	15.75%	13.24%	12.33%
	NP6 噪音污染 Noise	12.79%	16.44%	11.19%	10.27%	12.56%	16.89%	8.90%	10.27%	10.73%	12.10%

续表见下页 / continued

表2: 居民对各个场景的活动偏好与积极-消极感知(续)  
 Table 2: Activity preference for different IGS renovation scenarios and the corresponding positive / negative perceptions (continued)

		场景11 Scenario 11	场景12 Scenario 12	场景13 Scenario 13	场景14 Scenario 14	场景15 Scenario 15	场景16 Scenario 16	场景17 Scenario 17	场景18 Scenario 18	场景19 Scenario 19	场景20 Scenario 20
活动偏好 Activity preference	AP1 儿童活动 Children's activities	18.35%	26.82%	25.88%	33.18%	27.76%	26.82%	72.24%	40.71%	24.71%	46.12%
	AP2 休息停留 Staying to have a rest	27.53%	34.59%	34.12%	26.12%	35.29%	27.53%	23.06%	32.47%	28.00%	57.65%
	AP3 体验自然 Enjoying the nature	23.53%	26.12%	33.18%	28.47%	39.06%	33.88%	25.65%	25.41%	36.00%	30.82%
	AP4 跳广场舞 Square dancing	22.12%	22.35%	19.53%	43.53%	21.41%	28.00%	20.71%	34.59%	24.94%	34.12%
	AP5 散步 Wandering	25.41%	27.76%	24.94%	29.18%	36.47%	28.94%	28.24%	27.76%	30.82%	35.29%
	AP6 健身 Fitness	21.41%	21.88%	21.18%	24.71%	23.06%	24.71%	46.82%	72.24%	21.18%	34.82%
积极感知 Positive perceptions	PP1 景色优美 Scenic landscape	7.99%	15.53%	18.49%	29.68%	20.55%	18.04%	33.11%	23.52%	19.41%	41.32%
	PP2 特色鲜明 Distinctive landscape	5.71%	4.79%	5.48%	25.34%	18.72%	10.96%	65.75%	38.13%	22.15%	51.83%
	PP3 鸟类栖息 Observed bird habitats	9.13%	25.34%	25.34%	10.73%	34.47%	21.00%	13.70%	11.42%	17.35%	25.34%
	PP4 宜人小气候 Comfortable microclimate	10.05%	18.26%	23.74%	14.61%	24.20%	18.72%	14.16%	17.58%	20.55%	37.21%
	PP5 适合健身 Suitable for physical activities	6.16%	9.13%	8.90%	20.55%	8.90%	17.12%	51.60%	61.87%	11.87%	19.86%
	PP6 舒压放松 Physical and mental relaxation	9.36%	10.27%	14.38%	22.60%	22.83%	18.72%	29.68%	27.40%	21.23%	45.43%
	PP7 空间舒适 Comfort	9.13%	14.16%	19.63%	25.34%	20.55%	18.04%	25.80%	25.34%	16.89%	45.89%
消极感知 Negative perceptions	NP1 易被枝条划伤 Scratches	9.36%	19.41%	16.67%	9.13%	38.81%	9.59%	13.47%	17.58%	16.89%	21.23%
	NP2 蚊虫叮咬 Insect bites	12.56%	15.98%	23.06%	6.62%	39.27%	21.46%	10.05%	9.13%	13.70%	23.29%
	NP3 流浪汉聚集 Homeless people	8.90%	12.56%	15.30%	15.30%	20.78%	22.60%	16.21%	21.23%	14.84%	44.29%
	NP4 流浪动物聚集 Stray cats and dogs	8.22%	8.22%	22.60%	13.93%	34.25%	20.32%	17.35%	10.96%	17.35%	33.56%
	NP5 废弃物堆积 Waste	7.31%	10.27%	10.05%	19.63%	16.67%	13.24%	11.87%	13.47%	17.81%	23.52%
	NP6 噪音污染 Noise	5.25%	5.48%	4.79%	28.77%	6.16%	5.94%	44.06%	48.17%	16.89%	30.37%

型包括儿童活动（AP1）、休息停留（AP2）、体验自然（AP3）、跳广场舞（AP4）、散步（AP5）、健身（AP6）6种类型；积极感知包括美景感知——景色优美（PP1）、特色鲜明（PP2），生物多样性感知——鸟类栖息（PP3），自然生态感知——宜人小气候（PP4），游憩娱乐感知——适合健身（PP5），以及情绪恢复性感知——舒压放松（PP6）、空间舒适（PP7）5种类型、7个分项；消极感知包括自然威胁——易被枝条划伤（NP1）、蚊虫叮咬（NP2），社会威胁——流浪汉聚集（NP3）、流浪动物聚集（NP4），污染威胁——废弃物堆积（NP5）、噪音污染（NP6）三种类型、6个分项。研究运用卡方检验函数对5类环境要素自变量与19个因变量进行了分析。通过计算卡方值 $X^2$ 以及p值检验环境要素与被调查者活动偏好及感知之间的关系。

居民活动偏好卡方检验结果（表3）表明，种植方式和设施类型对大部分居民活动偏好均有一定影响，前者仅对AP6、后者仅对AP5无明显影响；树木冠幅只对AP1产生影响，但非常显著（ $p < 0.01$ ）；植物丰富度的变化会显著影响AP1、AP2、AP3（ $p < 0.01$ ）和AP4（ $p < 0.05$ ）；不同的绿地率对应的AP3、AP4和AP5也显著不同（ $p < 0.01$ ）；种植方式的变化会显著影响AP2、AP3、AP4和AP5（ $p < 0.01$ ）。

居民积极感知卡方检验结果（表4）表明，植物丰富度与种植方式的变化对设定的7项积极感知均有显著影响（ $p < 0.05$ ）；绿地率变化，PP1、PP4、PP5和PP6差异非常显著（ $p < 0.01$ ）；树木冠幅非常显著地影响了PP1、PP4和PP7（ $p < 0.01$ ）；而设施类型对除PP3外的其他6项积极感知均有非常显著的影响（ $p < 0.01$ ）。

居民消极感知卡方检验结果（表4）表明，与积极感知相似，植物丰富度与种植方式变化对应的6项消极感知均有一定差异；绿地率对NP1、NP4、NP5及NP6有非常显著的影响（ $p < 0.01$ ）；树木冠幅显著影响NP1、NP5和NP6（ $p < 0.05$ ）；此外，设施类型的不同也会对所有消极感知造成显著影响（ $p < 0.05$ ）。

## 5 总结与讨论

### 5.1 中国城市老旧社区IGS改造实践的启发

空地、棕地、社区街道中的剩余空间等IGS是城市景观和居民日常生活不可或缺的一部分，也是城市中具有潜力的“模糊空间”，其社会文化与生态发展契机是相关研究与实践的关注重点。本研究通过较大样本量的系列问卷调查，收集了社区居民对IGS的看法、评价和治理意愿，并且利用R-Studio软件对IGS的改造偏好、使用偏好及公众积极—消极感知进行了研究。研究表明，IGS将成为城市老旧社区中重要的绿地补充，且本文的研究结果能够在一定程度上为中国城市IGS的改造策略与治理模式提供方向与建议。

从分析结果中可以发现，大部分居民对所在社区中的IGS的使用现状及其优缺点有所了解。在治理意愿方面，居民支持对IGS进行治理，但是参与积极性因活动时长与活动类型而异——以往居民参与绿地治理的实践经验也表明，如果只是简单地将这些任务交给居民，而没有

表3：居民使用活动偏好卡方检验结果  
Table 3: Chi-Squared Test result of residents' activity preference

		植物丰富度 Plant richness	绿地率 Green space ratio	树木冠幅 Crown size	种植方式 Planting pattern	设施类型 Facility type
活动偏好 Activity preference	AP1 儿童活动 Children's activities	13.575***	3.609	13.003***	6.695*	195.253***
	AP2 休息停留 Staying to have a rest	8.425**	1.234	1.980	5.884**	16.789***
	AP3 体验自然 Enjoying the nature	80.987***	56.609***	1.103	10.729***	15.26***
	AP4 跳广场舞 Square dancing	7.181*	82.664***	0.177	74.913***	29.215***
	AP5 散步 Wandering	4.463	35.725***	1.862	14.037***	7.061
	AP6 健身 Fitness	0.358	2.666	5.073	2.008	238.007***

注

\*代表 $p < 0.1$ ，\*\*代表 $p < 0.05$ ，\*\*\*代表 $p < 0.01$ 。

NOTE

\* means  $p < 0.1$ , \*\* means  $p < 0.05$ , and \*\*\* means  $p < 0.01$

activities (AP1), staying to have a rest (AP2), enjoying the nature (AP3), square dancing (AP4), wandering (AP5), and fitness (AP6). Residents' positive perception was surveyed by 5 categories, namely perception of scenery—scenic landscape (PP1), and distinctive landscape (PP2); perception of biodiversity—observed bird habitats (PP3); perception of natural ecology—comfortable microclimate (PP4); perception of recreation—suitable for physical activities (PP5); and perception of emotional recovery—physical and mental relaxation (PP6) and comfort (PP7). Residents' negative perception was investigated by 3 categories, namely possible dangers from natural environment—scratches (NP1) and insect bites (NP2); dangers from social nuisance—homeless people (NP3), and stray cats and dogs (NP4); dangers from pollution—waste (NP5) and noise (NP6). Through Chi-Squared Test by calculating the Chi-Squared values ( $X^2$ ) and p-values, the research analyzed the correlations between environmental factors (as 5 independent variables) and the respondents' activity preference and perception (as 19 dependent variables).

Chi-Squared Test result of residents' activity preference (Table 3) indicates that planting pattern and facility type have a significant or marginal influence on residents' activity preference, except AP6 and AP5 respectively; the crown size

表4: 居民使用感知卡方检验结果  
Table 4: Chi-Squared Test result of residents' positive / negative perceptions

		植物丰富度 Plant richness	绿地率 Green space ratio	树木冠幅 Crown size	种植方式 Planting pattern	设施类型 Facility type
积极感知 Positive perceptions	PP1 景色优美 Scenic landscape	245.046***	12.263***	18.456***	22.878***	61.354***
	PP2 特色鲜明 Distinctive landscape	35.379***	5.279	2.124	77.695***	185.477***
	PP3 鸟类栖息 Observed bird habitats	13.421***	3.632	1.850	13.227***	1.854
	PP4 小气候好 Comfortable microclimate	140.172***	19.12***	29.151***	16.752***	79.213***
	PP5 适合健身 Suitable for physical activities	23.838***	25.473***	3.251	38.314***	332.403***
	PP6 舒压放松 Physical and mental relax	122.591***	46.963***	2.943	13.167***	65.280***
	PP7 空间舒适 Comfort	79.334***	4.411	11.416***	7.861**	97.701***
消极感知 Negative perceptions	NP1 易被枝条划伤 Scratches	33.614***	93.674***	20.469***	169.041***	9.3018**
	NP2 蚊虫叮咬 Insect bites	6.922*	5.704	0.845	20.820***	45.607***
	NP3 流浪汉聚集 Homeless people	7.190*	6.835*	6.280*	12.360***	134.867***
	NP4 流浪动物聚集 Stray cats and dogs	53.069***	42.612***	2.238	53.779***	77.086***
	NP5 废弃物堆积 Waste	10.018**	13.553***	9.460**	17.913***	25.677***
	NP6 噪音污染 Noise	8.769**	15.067***	21.409***	174.342***	116.654***

注  
\*代表 $p < 0.1$ , \*\*代表 $p < 0.05$ , \*\*\*代表 $p < 0.01$ 。

NOTE  
\* means  $p < 0.1$ , \*\* means  $p < 0.05$ , and \*\*\* means  $p < 0.01$ .

only affects AP1, but very significantly ( $p < 0.01$ ); plant richness has a significant impact on AP1, AP2, AP3 ( $p < 0.01$ ), and AP4 ( $p < 0.05$ ); AP3, AP4, and AP5 vary as the green space ratio changes ( $p < 0.05$ ); and change in planting pattern significantly impacts AP2, AP3, AP4, and AP5 ( $p < 0.01$ ).

Chi-Squared Test result of residents' positive perception (Table 4) reveals that changes of plant richness and planting pattern have significant impact on each item ( $p < 0.05$ ); the green space ratio significantly influences PP1, PP4, PP5, and PP6 ( $p < 0.01$ ); the crown size has a strongly significant impact on PP1, PP4, and PP7 ( $p < 0.01$ ); and facility type has a very significant influence over all the other positive perceptions except that of PP3 ( $p < 0.01$ ).

Chi-Squared Test result of residents' negative perceptions (Table 4) evidences that, similar to that of positive perceptions, changes in plant richness and planting pattern significantly or marginally correspond to the differences of all the negative perceptions; the green space ratio significantly influence NP1, NP4, NP5, and NP6 ( $p < 0.01$ ); the crown size has a significant impact on NP1, NP5, and NP6 ( $p < 0.05$ ); the differences in facility type can also significantly change all negative perceptions ( $p < 0.05$ ).

## 5 Conclusion and Discussion

### 5.1 Suggestions for IGS Renovation in Old Residential Communities in Chinese Cities

IGS, an integral part of urban landscape and people's daily life, as well as "ambiguous space" in the city, has been explored in the research and practice that highlights its socio-cultural and ecological significance. Based on a large-scale questionnaire survey, the research acquired residents' opinions, evaluation, and willingness to participate in IGS governance, and investigated their preference for IGS renovation, activity, and the positive / negative perception of IGS scenarios with R-studio. This study demonstrates the potential of IGS as an important component that complements urban green spaces in old town and communities, and offers suggestions for the future IGS renovation strategies and governance modes in Chinese cities.

The main findings of this research evidence that: 1) Most residents have been aware of the existing IGS in communities, as well as the advantages and disadvantages; 2) Generally, residents support and would like to participate in IGS governance, though their motivation varied according to the different frequency and type of volunteer activities—This corroborates the failure from previous practice experience in green space governance that simply assigned tasks to residents but lacked

街道与居委会等上级组织提供必要的支持，则很容易失败<sup>[22]</sup>。所以，对IGS治理活动的组织和安排仍有待完善。在改造偏好方面，可以看出居民对IGS的不同改造方式的评价有所差异：植物丰富度较高、树冠覆盖率较大、休憩型设施较完善的空间更受居民青睐。目前的改造实践也表明，相较于将IGS改造成为完全人工控制的绿地，寻求人工化管理与粗放自然之间的平衡具有重要意义。

研究结果中某些环境因素对居民积极—消极感知有显著影响。在之后的改造实践中，为了提升居民的使用体验，应尽可能增加场地内的植物丰富度，但同时需要注意植物的选择与建植方式，以保证居民使用时的安全体验。在改造时还应控制绿地率，在方便居民开展体育活动的同时降低居民的其他消极感知。此外，合理选择休憩设施类型亦会有效提升居民的积极感知。

## 5.2 中国城市老旧小区IGS改造的难点及展望

中国城市老旧小区IGS改造的各个阶段的难点各不相同：在前期进行改造方案策划时，需要针对老旧小区人口结构的特殊性，考虑在IGS改造中增加针对老年人等特定人群的功能。与此同时，也需要注重与外部环境的整体绿地布局相融合；在改造过程中，由于老旧小区改造涉及建设、规划、城管、房管、街道、水务、财政等多个政府部门或单位的管理权责，以及居民的群体或个人权益，如何在多方利益相关者之间进行协调也是必须要面对的难题；在后期治理上，由于老旧小区居民参与意识仍有待提升，且缺乏专业治理经验，因此仍需探索一套合理有效、可行性强的治理方式。

近年来，中国各级政府都把老旧小区改造视为重要的民生工程<sup>[26]</sup>，获得了极大的关注。随着城镇化进程的推进，城市老旧小区改造宜居建设评价指标体系也日益完善。针对目前老旧小区的具体问题——如公共服务与基础设施缺项较多或老化严重，管理匮乏带来的机动车和非机动车存放问题，私搭乱建现象严重，公共环境狭小且品质较差

necessary supports from local neighborhood committees and other official organizations<sup>[22]</sup>, and more efforts are needed to improve the organization and arrangement of governance modes and programs; 3) In terms of preference for IGS renovation, residents prefer the green spaces with richer plant species, higher tree canopy coverage, and more complete leisure facility system—This confirms current practice that the optimization of IGS needs to emphasize the balance between programmed management and natural succession, comparing with a complete transformation into a fully managed green space.

This research also found that several selected environmental factors have a significant impact on residents' positive / negative perceptions. To upgrade users' experience, future renovation practice should pay more attention to increasing plant richness, while selecting proper plant species and planting patterns to guarantee residents' safety. An appropriate green space ratio can not only encourage residents' physical activities but also alleviate negative perception. Moreover, a sound setting of leisure facilities can also enhance residents' positive perception.

## 5.2 Challenges and Opportunity of IGS Renovation in Old Residential Communities in Chinese Cities

The practice of IGS renovation in old residential communities faces different challenges in each stage: In the primary planning stage, planners and designers should consider the local demographic structure and the specific demands of vulnerable groups such as the elderly, and enhance the integration with larger-scale green space systems. In the implementation stage, coordination among various stakeholders—including government departments or agencies of construction, planning, urban management, housing management, street management, water management, finance, etc., and residents with different rights, responsibilities, and interests should be strengthened. In the following governance stage, suitable, effective, and feasible governance methods are needed to increase community members' participation consciousness and foster their governance knowledge and methods.

In recent years, the renewal of old residential communities is promoted in China as an important livelihood initiative program by governments at all levels<sup>[26]</sup> and has received a wide public attention. The evaluation system of old urban community renewal and livability enhancement is keeping evolving along with the urbanization in China. To address specific problems in old residential communities—e.g., the shortage and deterioration of amenities and infrastructure, parking problems due to the deficiency in management, illegal squatting and construction, and cramped and poor public spaces—the once neglected IGS

等——IGS作为被忽视的资源，将成为提升景观品质、提高居民生活质量的重要资源，其改造中的难点问题也有望随着政策的推进以及居民环境意识的提高而被逐个化解。

本研究的统计分析结果表明，可以采取调整绿地率、挑选种植方式、确定设施类型等物质环境改造措施，构建使居民更为满意的共享空间，由此衍生出的一系列的研究与实践问题包括：怎样的植物郁闭度能够兼顾空间的野趣与可进入性；如何通过设施升级与空间重组激活场地等。同时，后续研究也应进一步关注治理措施维护层面，探讨如何通过自下而上的治理过程对抗公共空间改造的士绅化等问题<sup>[20]</sup>。未来，期待更多针对不同类别或不同地理可达性的IGS改造的补充研究，进而为公众生活环境的优化提供更具针对性的建设依据。**LAF**

will play an important role in improving the quality of landscape and residents' life. More efforts in the promotion of policy and public environmental consciousness are expected to respond to such challenges.

The statistical analysis results of this study prove the possibility of creating sharing spaces that satisfy more residents through the regeneration of physical environment and with measures such as adjusting the green space ratio and adopting proper planting patterns and facility types. This leads to follow-up research and practice subjects like the correlation between canopy density and the wilderness and accessibility of a natural space, and how to activate a site through facility upgrade and spatial reorganization. Future studies should also pay attention to exploring bottom-up governance roadmaps to address issues such as the gentrification of public spaces<sup>[20]</sup>. Future research on IGS renovation with varied focuses on different types or geographical accessibility is also expected, so as to provide targeted guidelines for the optimization of urban living environment. **LAF**

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