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

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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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中国城市老旧社区非正式绿地改造及其公众感知研究

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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[1]. 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[2]~[5]. 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[6]. Existing formal green spaces can hardly meet citizens' diverse and growing needs for convenient access and sharing modes[7]. 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[8], and of ambiguity with regard to land tenure, maintenance regime, use, regulation, and legitimacy (of renewal)[9]. 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.”[10] 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”[9].

Informal green space (IGS), also known as “urban wildscapes” or “leftover spaces”[9], is a natural urban landscape that is often neglected in city. Ruprecht 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[9]. 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。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。在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）。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2.7 hm²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，26项已经成功执行。通过在线工具和实践进行宣传，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。

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.

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。相比较而言，老旧社区的绿地普遍面临着数量不足、质量不高、建设参与或财产所有者作为绿地空间用于农业、林业、园艺或环保保护。”The vegetation within such spaces is rarely managed by the owner, and any use for recreational purposes is informal and temporary. 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 replies 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. 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. For example, “596 Acres” Fund transformed 2.7 hm² 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.

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. Since the green spaces in most earlier-built communities suffer from the insufficiency in quantity, quality, and public engagement, and a mismatch with public

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度不高、与人群使用需求不符等问题，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，而老旧小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，由于老旧小区缺乏管理，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，老旧小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到公共空间改造的过程中来，实现小区管理/治理形式多元化。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。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、茶儿胡同12号院改造，以及三庙社区花园改造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）政策已取得了阶段性成果。由于IGS具备激活消极或碎片化绿地的潜力，因此，无论是对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小区改造项目中，IGS不可避免地成为了改造重点之一。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，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，此次研究旨在通过多方案的公众感知比较研究，探索其在老旧社区改造中的实践应用，为城市绿色空间的可持续发展提供理论支持和实践指导。

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. 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. 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%。这片5.17km²的街道区域辖37个社区居委会，总人口201,614人（2010年）[21]，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[18]；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结果显示，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%）；除此之外，85.64%的居民对小区的绿化情况表示不满。约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%）不足，以及老年活动场地不足（38.95%）；除此

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...
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动 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. 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
Item

结果占比
Voting percentage (%)

| 选项 | 题目 | 结果占比 |
|------|------|----------|
| 是 | Yes, there are a lot of them | 19.24 |
| 有些 | Yes, there are some of them | 68.29 |
| 否 | No | 12.47 |

| 选项 | 题目 | 结果占比 |
|------|------|----------|
| 是 | Yes, I am more likely to use it on weekends and holidays | 36.04 |
| 否 | No | 64.99 |

| 选项 | 题目 | 结果占比 |
|------|------|----------|
| 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 | 44.46 |
| 存在较多垃圾 Poor waste management | 51.76 |
| 与其他使用者发生争吵 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 |
| 空间宽敞会引发犯罪 Crimes | 23.58 |
| 易引发火灾 Fire risk | 18.97 |
| 杂草丛生 Plant overgrown | 29.00 |
| 凌乱不雅 Graffiti | 13.01 |

| 选项 | 题目 | 结果占比 |
|------|------|----------|
| 是 | Yes, it is more likely to use it on weekdays | 53.12 |
| 否 | No | 46.88 |

| 选项 | 题目 | 结果占比 |
|------|------|----------|
| 靠近家 Close to home | 49.32 |
| 舒适单元 Comfortable user density | 47.63 |
| 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 |
| 有放松休闲活动，放松心情 Relaxation opportunity | 53.12 |
| 花草树木赏心悦目 Scenery | 42.82 |
| 可以让孩子们玩耍 Children play spaces | 33.60 |
| 可以成为动物栖息地 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 |
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 (23). All the visualized materials are represented in the same lighting, background, angle of view, and color (24).

The study selected 5 environmental factors from prior works conducted by Dieter Rink and Thomas Arndt (23), and Robert Van Dongen and Harry J. P. Timmermans (24), namely plant richness, green space ratio, plant growth condition (by crown size), planting pattern, and facility type, and set them as qualitative independent variables (25). 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 sore ranges from 1 to 5 according to their affection; 1 means “very dislike” and 5 for...
4.3.4 Activity Preference for Different Renovation Scenarios and the Corresponding Positive / Negative Perceptions

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 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

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。

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。
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 | 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% | 16.62% | 23.13% | 33.25% |
| 平均分 Average score | 3.69 | 3.70 | 3.79 | 3.96 |

| 不同绿地率 | 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 | 26.79% | 33.69% | 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% |
| 平均分 Average score | 3.66 | 3.66 | 3.72 | 3.73 |

| 不同树木冠幅 | 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% | 27.99% | 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% |
| 平均分 Average score | 3.57 | 3.69 | 3.73 | 3.82 |

| 不同设施类型 | 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% |
| 平均分 Average score | 3.83 | 3.46 | 3.65 | 3.74 |
### Table 2: Activity preference for different IGS renovation scenarios and the corresponding positive / negative perceptions

| Scenario | Activity preference | Positive perceptions | Negative perceptions |
|----------|---------------------|----------------------|----------------------|
| 1        | Children activities | Scenic landscape     | Scratches            |
| 2        | Staying to have a rest | Distinctive landscape | Insect bites          |
| 3        | Enjoying the nature | Observed bird habitats | Homeless people      |
| 4        | Square dancing      | Comfortable microclimate | Stray cats and dogs |
| 5        | Wandering           | Suitable for physical activities | Waste            |
| 6        | Fitness             | Comfort              | Noise                |
| 7        |                            |                       |                      |
| 8        |                            |                       |                      |
| 9        |                            |                       |                      |
| 10       |                            |                       |                      |
### 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)

| 活动偏好 | Activity preference | 风景优美 | Scenic landscape | 离合腰 | Distinctive landscape | 青鸟栖息 | Observed bird habitats | 宜人小气候 | Comfortable microclimate | 适合健身 | Suitable for physical activities | 形体放松 | Physical and mental relaxation | 空间舒适 | Comfort |
|----------|---------------------|----------|--------------------|-------|----------------------|----------|----------------------|-------------|-------------------------|---------|----------------------------|----------------|-----------------------------|---------|------|
| 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 | 20.51% | 27.76% | 24.96% | 29.18% | 39.67% | 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% | 44.82% | 72.24% | 21.21% | 34.82% |

| 积极感知 | Positive perceptions | 10.05% | 18.26% | 23.76% | 14.61% | 24.20% | 18.72% | 14.14% | 17.58% | 20.55% | 37.21% |
|----------|---------------------|-------|--------|--------|--------|-------|--------|-------|--------|-------|--------|
| PP1 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% |
| PP2 适性休息 | Physical and mental relaxation | 9.36% | 10.27% | 14.38% | 22.60% | 22.83% | 18.72% | 29.68% | 27.40% | 21.23% | 45.43% |

| 消极感知 | Negative perceptions | 9.13% | 14.16% | 19.63% | 25.34% | 20.55% | 18.04% | 25.80% | 25.34% | 14.29% | 65.89% |
|----------|---------------------|-------|--------|--------|-------|-------|--------|-------|--------|-------|--------|
| NP1 易被枝条划伤 | Scratches | 9.36% | 19.61% | 16.67% | 9.13% | 38.81% | 9.59% | 13.47% | 17.58% | 16.89% | 21.23% |
| NP2 易被昆虫叮咬 | Insect bites | 12.56% | 15.98% | 23.06% | 6.62% | 39.27% | 21.46% | 10.05% | 9.13% | 13.70% | 23.29% |

| NP3 被流浪动物聚集 | Stray cats and dogs | 8.22% | 8.22% | 22.60% | 13.93% | 34.25% | 20.32% | 17.35% | 10.94% | 17.35% | 33.56% |

| NP4 被流浪动物聚集 | Homeless people | 8.90% | 12.56% | 15.30% | 15.30% | 20.78% | 22.60% | 16.21% | 21.23% | 14.84% | 44.29% |

| NP5 空间舒适 | Comfort | 7.31% | 10.27% | 10.05% | 19.63% | 16.47% | 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）、健康（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——舒适小气候（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）；空间适用（PP7）5种类型，7个分项；消极感知包括自然威胁——易被枝条刮伤（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）3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$\chi^2$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）；而设施类型的差异对所有其他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问卷调查，收集了社区居民对IGS的看法、评价和治理意愿，并利用R-Studio软件对IGS的改造偏好、使用偏好及公众积极与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 ($\chi^2$) 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

| 植物丰富度 Plant richness | 阶地率 Green space ratio | 树木冠幅 Crown size | 种植方式 Planting pattern | 设施类型 Facility type |
|--------------------------|------------------------|-------------------|--------------------------|------------------------|
| AP1 儿童活动 Children's activities | 13.575*** | 3.609 | 13.003*** | 6.967* | 195.253*** |
| AP2 休息活动 Staying to have a rest | 8.425** | 1.234 | 1.980 | 5.886** | 16.789*** |
| AP3 体验自然 Enjoying the nature | 80.987*** | 56.609*** | 1.103 | 10.729*** | 15.256*** |
| AP4 跳广场舞 Square dancing | 7.181* | 82.664*** | 0.177 | 7.417*** | 29.215*** |
| AP5 散步 Wandering | 4.463 | 35.725*** | 1.862 | 14.037*** | 2.666 |
| AP6 健身 Fitness | 0.358 | 2.466 | 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.
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，很容易失败。所以，对IGS治理活动的组织和安排仍有待完善。在改造过程中，可以看出居民对IGS的不同改造方式的评价有所差异：植物丰富度高、树冠覆盖率大、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，相对于将IGS改造成为完全人工控制的绿地，寻求人工化管理与自然生长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 中国城市老旧社区IGS改造的难点及展望

中国城市老旧社区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，需要针对老旧社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，由于老旧社区改造涉及建设、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，由于老旧社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社区改造视为重要的民生工程，获得了极大的关注。随着城镇化进程的推进，城市老旧社区改造宜居建设评价指标体系也日益完善。针对目前老旧社区的具体问题——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，以及老旧社区的人口结构特殊性，改造中增加针对老年人等特定人群的功能，需要加强整合与更大规模的绿地系统的融合，以及与外部环境的联系，以满足居民对绿地和公共空间的需求。在改造过程中，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，由于老旧社区改造涉及建设、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，由于老旧社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。

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 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，可以采取调查绿地率、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：怎样的植物配置密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土绅化等问题。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

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