

云南体育公园游憩机会谱构建与应用研究

THE CONSTRUCTION AND APPLICATION OF RECREATION
OPPORTUNITY SPECTRUM FOR SPORTS PARKS IN YUNNAN PROVINCE周翠云^{1*}, 聂真新²Cuiyun Zhou^{1*}, Zhenxin Nie²^{1,2}泰国格乐大学^{1,2}Krirk University, Thailand

Received: March 14, 2025 / Revised: December 23, 2025 / Accepted: January 9, 2026

摘要

研究目的: 在全民休闲时代, 云南省体育公园规划面临与地域特色及游客体验脱节的问题。为此, 本研究基于游憩机会谱 (ROS) 理论, 构建适用于云南地域特色的体育公园游憩环境评价体系, 旨在推动其从“单一运动场地”向“复合游憩空间”的精准升级。

研究设计/方法/途径: 本研究采用文献分析、专家咨询与实地调研相结合的方法, 构建包含 3 个准则层与 18 项指标的评价体系。通过实地数据收集, 运用聚类分析将其科学划分为三类, 并系统归纳各类特征与问题。

研究结果: 构建了云南体育公园游憩环境评价体系, 将其划分为滨河型、郊野型与城市型三类, 并形成对应的“游憩机会清单”与“现存问题清单”。结果显示, 三类公园在生态、活动、设施及文化等方面各具特点与短板, 为针对性优化提供了实证依据。

创新性与价值: 理论上, 拓展了 ROS 理论在西南民族地区的应用, 构建了首个云南特色体育公园评价体系。实践上, 提出的游憩机会谱与“双清单”工具为管理提供了可操作的诊断与差异化对策, 助力公园特色化升级与公众游憩质量提升。

关键词: 体育公园 游憩机会谱 游憩环境 游憩体验

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Abstract

Purpose: In the age of nationwide leisure, planning sports parks in Yunnan Province faces challenges in aligning with local characteristics and meeting visitor experience expectations. To address this issue, the study used the Recreation Opportunity Spectrum (ROS) theory to develop an evaluation system customized to Yunnan's regional context for assessing the recreational environment of sports parks. The goal is to support their targeted transformation from “single-purpose sports venues” into “multifunctional recreational spaces”.

Study Design/Methodology/Approach: This research employed an integrated approach that combined literature analysis, expert consultation, and field research to construct an evaluation framework comprising three criterion layers and 18 specific indicators. Using systematic on-site data collection, cluster analysis was used to categorize the cases into three distinct groups, followed by a comprehensive summary of the characteristics and challenges associated with each type.

Findings: A system for evaluating the recreational environment of sports parks in Yunnan was developed, classifying them into three types: riverside, suburban, and urban. Corresponding “recreation opportunity profiles” and “existing problem inventories” were developed. The results revealed that each park type has unique characteristics and shortcomings in ecological features, activity offerings, facility provision, and cultural integration, offering an empirical foundation for targeted optimization strategies.

Originality/Value: Theoretically, this study extended the application of the Recreation Opportunity Spectrum (ROS) framework in the multi-ethnic regions of Southwest China and established the first sports park evaluation system tailored to Yunnan's specific context. In practice, the proposed ROS-based tool and dual-list approach provide actionable diagnostic methods and differentiated management strategies, thereby enhancing park distinctiveness and improving the quality of public recreational experiences.

Keywords: Sports Parks, Recreation Opportunity Spectrum, Recreational Environment, Recreational Experience

引言

《“健康中国 2030”规划纲要》确立了到 2030 年建成覆盖城乡的全民健身公共服务体系的目标,明确构建县、乡、村三级公共体育设施网络,推进健身步道、自行车道、全民健身中心、体育公园及社区多功能运动场等设施建设,打造城市社区“15 分钟健身圈”,推动公共体育设施免费或低收费开放,促进经常参与体育锻炼人数达到 5.3 亿。同时,鼓励符合条件的公共及企事业单位体育设施向社会开放。近年来,全民健身服务体系的建设与发展成为政府之倡导,社会之趋势,群众之需求。建设全民健身服务体系对于全民健康提升、健康中国战略目标实现具有相当的价值贡献。然而,生活水平的改善衍射到具体行为中,使得单一的运动场所已不能完全满足于人们的体育参与感知需求。为此,国家层面陆续出台多项指导文件,持续推进体育

公园等综合性场地设施的建设。National Development and Reform Commission et al. (2021) 联合印发《关于推进体育公园建设的指导意见》，明确提出到 2025 年，全国新建或改扩建约 1000 个体育公园，并对包括云南省在内的多个地区明确了新增建设任务。体育公园作为融合生态、运动与休闲功能的重要载体，正逐步成为完善全民健身设施网络、提升公众参与体验的关键举措。体育公园的建设不仅解决了群众“健身去哪儿”的问题，也为云南打造“健康生活目的地牌”提供了新机遇。合理的规划设计与管理不仅能满足游客多元化的娱乐需求，还对了解体育公园使用者的休闲偏好、优化游憩资源配置，以及评估资源现状具有重要意义。若管理者对游憩资源评估不当，缺乏对使用者环境行为的深入研究，可能导致游憩需求与资源供给不匹配，影响游客体验。

为此，体育公园需要建立有效的游憩需求管理框架，以促进可持续发展、提升游客体验，并协调资源与需求之间的关系。如何建设体育公园，如何对体育公园游憩环境进行合理的管理，创造和配置合适的游憩机会，成为亟待解决的重要课题。当前，大多数相关研究集中于单一方面，缺乏对体育公园游憩管理等多维度的综合探讨，而 ROS 理论恰好能将不同的游憩环境与游客的体验结合，为各类游客提供多样化的休闲体验。在体育公园系统的研究中引入了游憩机会谱（ROS）理论，不仅丰富了体育公园合理规划和管理理论依据，同时为体育公园的规划与管理提供了科学依据。

研究目的

如今，户外锻炼、放松身心、亲近自然、拓展视野、提升自我满足感，已成为大众重要的休闲方式，体育公园也逐渐成为户外健身和游乐的热门选择。为满足群众日益增长的健身需求并提升生活质量，中国政府提出推进体育公园建设的指导意见，要求各地积极落实创建工作，体育公园的建设推动全民健身休闲产业发展。因此，本文希望借助游憩机会谱理论，分析体育公园的特点，率先探讨其在体育公园中的应用，为管理者提供发展指导，并为游客提供更精细、高品质的服务建议，具体如下：

1. 识别与确立游憩环境因子，改进游憩环境适宜性指标的筛选体系与分类方法，构建了体育公园游憩环境适宜性评价指标体系。
2. 采用聚类分析法划分出云南体育公园的游憩环境类别。
3. 基于体育公园环境因子和游憩环境类别，构建起云南体育公园游憩机会谱。
4. 基于游憩机会谱，对云南体育公园的游憩资源进行全面梳理，为管理者提供发展指导，并为游客提供更精细、高品质的服务建议。

文献综述

有关游憩机会谱（ROS）的研究现状

1. 游憩机会谱（ROS）理论的发展历程

游憩机会谱（Recreation Opportunity Spectrum, ROS）理论起源于 20 世纪中后期的美国，其发展演进与户外游憩资源管理的实践需求密切相关。该理论最初由美国林务局（U.S. Forest Service）主导开发，旨在为国有林地等区域的游憩资源规划与管理提供系统框架（Warzecha et al., 2001）。

其理念雏形可追溯至 1960 年代。1962 年，美国户外游憩资源调查委员会便倡导建立游憩用地分级制度，以优化资源配置。随后，Wagar (1963) 首次从管理实践角度提出了类似 ROS 的构想，建议通过划分不同类型的营地为游客提供多样化的体验选择。尽管理念先行，但 ROS 的全面推行始于 20 世纪 70 年代末。National Forest Management Act of 1976 (2014) 的推动下，建立统一的 ROS 框架成为明确要求，以期帮助土地管理者提供丰富的游憩机会。

在理论成型阶段，学者们逐步确立了其核心构成要素与分类体系。Brown et al. (1978) 的研究团队率先提出了五个核心评价要素，包括到达难易度、场地规模、通行条件、游客密度及管理强度，并据此将游憩环境划分为从“原始无人区”到“城市区”的六大类型，奠定了 ROS 分类的基础。此后，Clark 和 Stankey (1979) 进一步构建了一个更为完善的理论框架，他们从自然环境、生态特征、社会交互和管理活动四个维度出发，提出了“六类四标”法，使游客能够依据个人偏好选择相应的游憩体验类型，增强了理论的适用性。

至 1980 年代，ROS 理论最终从概念走向了标准化操作。U.S. Department of Agriculture, Forest Service (1982) 正式发布了《ROS 使用者指南》，将适合游憩的区域系统性地划分为乡村、城市、原始、半原始等六种类型，并在全美范围内的林地开展资源调查与分类工作。此举标志着 ROS 从一个学术构想发展成为一套完整的、可应用于实践的资源管理体系。

2. 游憩机会谱（ROS）理论的框架与构成要素

游憩机会谱的构建遵循一个核心逻辑，即个体在偏好的环境（包括自然条件、社会氛围及管理方式）中参与感兴趣的游憩活动，以获得理想的体验。游憩机会谱由活动、环境和体验三个关键要素组成，并划分出六种从城市到原始区域的游憩机会类型：原始、半原始无机动车、半原始有机动车、通路自然区、乡村及城市。每个类别依据环境特征、管理强度、游客互动程度、人为影响程度、区域规模及偏远程度等因素进行界定（见表 1）。

Table 1 Descriptions of the Environmental Settings for the Six-Class Sequence of the Recreation Opportunity Spectrum (U.S. Department of Agriculture, Forest Service, 1982)

Land Type	Description
Primitive	A substantial natural setting that is largely unmodified. Interactions between users are low, with minimal evidence of the presence of other users. Management restrictions and controls are minimally evident. The use of motorized vehicles is prohibited within the area.
Semi-primitive Non-motorized	The area is characterized by a natural setting, moderate to large in scale. User interactions are low, although there is frequent evidence of the presence of other users. Management controls over the site are minimal, but certain restrictions are in place. Motorized vehicle use is prohibited within the area.
Semi-primitive Motorized	The area is a moderate to large, predominantly natural setting. The level of user concentration is relatively low, but encounters with other users are frequent. Management controls over the site are minimal but certain restrictions are present. Motorized vehicle use is permitted within the area.
Roaded Natural	The area is a predominantly natural setting. Evidence of human presence is moderate but largely compatible with the natural environment. User interactions range from low to moderate, and encounters with other users are common. Practices for resource modification and utilization are evident but generally compatible with the natural setting. Standard constructed roads and facilities are provided for motorized vehicle use.
Rural	The area is characterized by a modified natural environment, where utilization and modification practices are implemented to enhance specific recreational activities and maintain vegetation and soil. Evidence of human presence is prominent, and interactions among users are increasing. A considerable number of facilities are provided for visitor use, designed to support specific recreational activities. Less frequented areas exhibit a moderate visitor density. Facilities and parking areas are provided to accommodate intensive motorized vehicle use.
Urban	The setting is predominantly urban, though some natural elements may be present in the background. Modification and utilization practices are applied to enhance specific recreational experiences. Vegetation primarily consists of non-native species and is regularly maintained or trimmed. Human influence is highly evident at the recreation site, with facilities and parking provided for intensive motor vehicle use. Public transit systems provide access to the recreational location.

Remarks: Adapted from ROS Users Guide (U.S. Department of Agriculture, Forest Service, 1982).

3. 游憩机会谱（ROS）理论的进一步完善

游憩机会谱（ROS）理论最初由 Brown et al.(1978)、Clark 和 Stankey(1979) 提出，采用了 5 指标法和 6 指标法等分类方法。随后，美国农业部林务局提出了 7 指标法，并在实践中对其进行了修订。90 年代起，学者们主张根据不同环境条件调整 ROS 的应用，以适应不同游憩空间类型。More et al. (2003) 提出应将 ROS 进行地域化修订。ROS 理论的应用范围逐渐拓展，从大规模国家公园到小型自然区域及人工城市区域，其指标和标准也不断细化，为了更好地适应不同类型的休闲空间。

ROS 理论经过多年发展已经形成一套成熟的分析框架。研究发现,游客的满意程度实际上和选择的游玩项目、所处的自然条件、周围人的互动以及管理方式密切相关。比如有调查显示,当露营地人数达到某个临界值时,露营者的体验感受会出现明显变化 (Manning, 2011)。这些研究成果为 ROS 分类管理方法提供了科学依据。

基于 ROS 理论,经过持续发展,衍生出多个专业应用版本。上世纪 90 年代,有研究者将原始理论延伸至旅游领域,创建了升级版评估框架——ECOS 和 TOS。TOS 增加了游客互动、设施配套、交通便利性等 6 个新评估项,特别适合自然景区规划使用 (Butler & Waldbrook, 1991)。ECOS 在 ROS 和 TOS 的基础上建立在生态旅游领域,学者们又提出强调自然保护的新标准,通过控制游客影响程度和设置干扰指标,形成专门针对生态敏感区的管理方案 (Boyd & Butler, 1996)。这些升级版理论都继承并拓展了原始框架的核心思想,只是根据具体应用场景调整了评估重点 (Fennell & Dowling, 2003)。

体育公园的研究现状

Xie et al. (2003) 在《乡村景观规划设计的相关问题探讨》中指出,日本将体育公园定义为“运动公园”,并将其归类为城市基础公园类型之一。要求面积达到 15 m², 并需均衡分布。例如,日本山口市体育公园植被茂密,绿草如茵,园内种植了各种花卉,同时还设有大型运动场。这座公园曾承办全国运动会,兼具休闲和健身功能,深受市民的喜爱。

Xu (2013) 在《芬兰体育公园印象》中的研究显示,芬兰皮尔科拉体育公园由室内综合运动中心与面积相当于标准足球场的硬化场地共同构成。该运动中心包含游泳、冰球及球类等多元化运动场馆,其独特之处在于将自然生态景观与现代体育设施有机融合。研究强调,这座始建于 1965 年的市政项目由赫尔辛基市政府直接投资运营,其建设初衷源于芬兰社会深厚的全民运动传统。数据显示,尽管赫尔辛基常住人口仅 50 万,该公园年接待健身人群却突破百万人次。

Zhao (2010) 在《关于美国体育公园的研究》中构建了系统的分类学研究框架,通过对全美 68 个样本公园的实证调查,将体育公园划分为综合型、专项运动型 (含球类/赛车/射击等)、季节限定型 (冰雪/滑行) 以及群体适配型 (家庭/青年/社区) 共 9 大类别,研究表明美国体育公园通过“空间——服务——文化”三重维度的协同创新,成功塑造出全民共享的运动生态圈。这种以“运动民主化”为内核的发展模式,不仅实现了 90% 市民步行 15 分钟可达体育设施的城市规划目标,更催生出体育旅游、运动康复等衍生产业,其“体育赋能城市”的实践经验对我国新型城镇化建设具有方法论启示。

在现代欧洲,体育公园随处可见,为不同年龄和需求的居民提供了在优美环境中游憩的空间。通过对欧洲体育公园的研究发现,夏季黄昏和节假日是公园人流量的高峰期。体育公园的规划设计通常以大片林中空地和草地为基础,再结合综合设施和安静的休息区域,满足人们的多样化需求。

Zhang (2008) 在《中国体育公园规划初探》对中国体育公园的发展现状进行了详细总结: 我国体育公园建设呈现显著的空间供给失衡特征, 其发展进程凸显出三重结构性矛盾: 首先在数量维度, 当前人均体育公园存量规模 (不足 0.6 个/10 万人) 显著低于《全民健身设施建设指南》国际标准; 其次在建设模式上, 赛事驱动型占比超 68%, 导致设施功能配置与日常健身需求错位; 再者标准化建设滞后引发同质化现象。

Jiang (2021) 在《生态体育视角下城市体育公园发展路径研究》从生态体育视角提出城市体育公园需协调自然、社会与经济生态矛盾, 建议完善配套设施、加强政策供给及智慧化建设, 将生态体育理念需融入规划, 推动集约化与可持续化发展。

Hu et al. (2022) 在《城市体育公园高质量发展: 基本内涵、现实动因与推进路径》提出高质量发展的现实动因包括“全民健身需求倒逼提质增效”及“绿色低碳理念重塑发展样态”, 推进路径涵盖用地模式创新、服务场景重构及多主体共享等, 得出需通过政策引导与社会资本结合, 打造健康环保的公共空间。

游憩机会谱 (ROS) 在中国的研究与应用

自本世纪初, 中国学者开始引入 ROS 理论, 国内研究呈现三大特征: 1) 理论移植阶段 (2001-2005 年) 以概念引介为主, 北京大学团队完成首轮理论译介; 2) 方法改良时期 (2006-2010 年) 聚焦自然景观适配, 林业院校团队在森林、湖泊等生境建立评估模型; 3) 创新拓展期 (2011 年至今) 形成跨学科研究态势, 在地质公园、生态敏感区等场域探索出具有中国特色的 CECOS 框架 (Huang et al., 2006)。ROS 研究网络已形成三大核心集群: 1) 以景观生态学为基础的自然保护区研究; 2) 融合旅游地理学的目的地规划研究; 3) 侧重管理科学的资源评估研究。这些研究在方法论层面呈现出从定性描述向空间计量分析的范式转型。尽管 ROS 理念和框架在中国取得一定进展, 但其理论研究和本土化应用仍需进一步深入。

研究方法

文献资料法

本研究通过“谷歌学术”、“中国知网 CNKI”、“维普期刊全文数据库”、“万方数据库”以及图书馆等电子检索手段检索“体育公园”“游憩机会谱”“游憩体验”等关键词搜索相关文献, 归纳总结分析有关游憩机会谱理论的相关资料, 为撰写论文、梳理学习技术路线提供理论依据。

实地调研法

通过实地考察云南各体育公园, 整理并分析其游憩环境资源的分布情况, 梳理游憩地的资源现状与游客活动特征, 以揭示其整体使用规律。

问卷调查法

本研究主要面向体育公园游憩者进行调查，以获取相关数据和分析依据。首先将初选的 30 个环境因子指标编制了预调查问卷《体育公园游憩环境适宜性评价指标调查表》，采用随机抽样，共收集 150 份样本数据，有效问卷 141 份，有效率达 94%。然后根据预调查问卷筛选出的 18 项指标设计了《体育公园游憩环境调查问卷》，调查采取随机抽样方式，在公园的主要活动区域入口处，于工作日和周末进行发放，覆盖不同年龄、性别和活动偏好的游客。共发放 1200 份，回收 1180 份，保留 1170 份有效问卷，样本有效率达 97.5%。

数据统计分析方法

本研究运用了变异系数法、因子分析法、聚类分析法等多种统计分析方法，对收集的数据进行深入解析。

研究结果

ROS 理论在体育公园范围适宜性验证

当前，游憩机会谱（ROS）理论在体育公园场景的应用研究尚未见报道。由于体育公园具有功能复合性（如运动、社交、生态等多重定位）、用户需求异质性（不同年龄、文化背景群体）以及环境设计技术门槛高等特性，亟需通过系统性验证确保 ROS 框架在该场景的科学适配。本研究通过结构化问卷，重点分析游憩者对体育公园环境要素的优先级认知。问卷采用李克特五级量表（“非常重要”至“完全不重要”），量化用户实际体验数据，进而验证 ROS 核心假设——“游憩环境特征直接影响体验质量”的适用性。

Table 2 Statistics on the Importance of the Recreational Environment in Sports Parks (n = 1170)

Recreational Environment Importance	Frequency	%
Very Important	508	43.4
Important	488	41.7
Neutral	113	9.7
Slightly Important	61	5.2
Not Important	0	0
Total	1170	100

通过表 2 可知，43.4% 受访者认为体育公园环境质量“重要”，41.7% 更强调其“非常重要”，反映超 85% 用户明确感知环境对体验的显著性影响。值得注意的是，仅 9.7% 持“一般”态度，5.2% 认为“较不重要”，且无受访者选择“完全不重要”。数据表明，体育公园

用户普遍认同环境要素的核心价值。该结论为游憩机会谱（ROS）理论的系统化应用提供了实证支撑，其“环境——体验”关联机制可指导体育公园规划设计与服务优化，助力构建需求导向的高质量游憩空间。

云南体育公园游憩环境适宜性评价指标体系的构建

变异系数法筛选指标

在确保指标体系具备科学性、独立性和完备性的基础上，并充分吸收相关理论与实践成果，初步选取了地形形态多样性、水体质量、植被情况、可达性、活动项目丰富度、运动设施、导示系统等 30 个评价指标，并据此建立了预选评价体系，采用变异系数法筛选指标。本研究将初选的 30 个指标编制了预调查问卷《体育公园游憩环境适宜性评价指标调查表》，在工作日及休息日时段对体育公园使用者进行随机抽样，共收集 150 份样本数据，有效问卷 141 份，有效率达 94%。经过变异系数法筛选得出（如表 3），声环境质量、地形形态多样性、景观美景度、景点数量、独处机会、与其他游憩者相遇机会、偏远程度、其他游客干扰、娱乐设施、停车管理、商品购物、员工服务等指标的变异系数大于等于 0.25，因此予以剔除。最终确定 18 项云南体育公园游憩环境适宜性评价指标层的评价因子，分别为水体质量、空气质量、植被情况、生物多样性、拥挤程度、可达性、活动项目丰富度、地方特色、休息设施、运动设施、环卫设施、照明设施、导示系统、警示系统、科普系统、治安维护、清洁维护、植物养护。

Table 3 Coefficient of Variation

Evaluation Indicator	Mean	Standard Deviation	Coefficient of Variation
Water Quality	4.00	0.66	0.16
Air Quality	3.80	0.81	0.21
Acoustic Environment Quality	3.90	1.06	0.27
Topographic Diversity	3.63	1.19	0.33
Vegetation Status	4.04	0.94	0.23
Biodiversity	4.04	0.92	0.23
Landscape Scenic Beauty	4.04	1.08	0.27
Number of Attractions	3.63	0.97	0.27
Opportunity for Solitude	3.78	1.16	0.31
Encounter with Other Visitors	3.61	1.03	0.29
Perceived Crowding	3.78	0.87	0.23
Degree of Remoteness	3.39	0.97	0.29
Accessibility	3.69	0.89	0.24
Diversity of Recreational Activities	3.80	0.86	0.23

Table 3 Coefficient of Variation (Cont.)

Evaluation Indicator	Mean	Standard Deviation	Coefficient of Variation
Distinctive Local Character	3.82	0.86	0.22
Interference from Other Visitors	3.33	1.15	0.34
Seating/Resting Facilities	3.75	0.94	0.25
Recreation Facilities	3.92	0.98	0.25
Sports Facilities	3.90	0.90	0.23
Sanitation Facilities	3.90	0.91	0.23
Lighting Facilities	3.84	0.91	0.24
Signage and Wayfinding System	4.18	0.93	0.22
Safety and Warning System	3.92	0.96	0.24
Interpretation and Education System	4.08	0.93	0.23
Security and Patrol	4.22	0.90	0.21
Cleaning and Maintenance	4.02	0.95	0.24
Landscape Maintenance	4.06	0.95	0.23
Parking Management	3.80	1.15	0.30
Retail and Shopping	3.20	0.91	0.28
Staff Service Quality	3.27	0.86	0.26

因子分析法确定环境因子

根据预调查问卷筛选出的 18 项指标设计了《体育公园游憩环境调查问卷》。采取随机抽样方式，在公园的主要活动区域入口处进行发放，覆盖不同年龄、性别和活动偏好的游客。共发放 1200 份，回收 1180 份，保留 1170 份有效问卷，样本有效率达 97.5%。将收集到的问卷数据利用 SPSS 27.0 进行信度检验，Cronbach α 系数为 0.905，这表明问卷具有较高的内部一致性。对筛选的 18 项游憩游憩环境变量进行 KMO 统计量分析和 Bartlett 球形检验，KMO = 0.811，而 Bartlett 球形检验的结果为 27012.198 (df = 153, $p < 0.001$)，达到了显著性水平。这表明存在共同因素，适合进行因子分析。

本文运用了主成分法来进行因子分析，并以特征根大于 1 作为筛选公因子的依据。为便于解读这些因子，进一步采用最大方差法对其进行正交旋转。表 4 显示，最终提取了 3 个公因子，其累计方差贡献率达到 71.878%，远高于 50% 的标准，完全符合社会科学调研的要求。同时，这表明所保留的题项通过了结构效度检验，具有良好的构念效度。

Table 4 Rotated Component Matrix

Evaluation Indicator	Component		
	F1	F2	F3
Sanitation Facilities	0.900		
Cleaning and Maintenance	0.897		
Lighting Facilities	0.897		
Security and Patrol	0.894		
Sports Facilities	0.893		
Landscape Maintenance	0.892		
Interpretation and Education System	0.821		
Seating/Resting Facilities	0.819		
Signage and Wayfinding System	0.755		
Safety and Warning System	0.643		
Diversity of Recreational Activities		0.896	
Accessibility		0.870	
Perceived Crowding		0.852	
Distinctive Local Character		0.780	
Vegetation Status			0.834
Water Quality			0.794
Biodiversity			0.768
Air Quality			0.734

基于主成分分析法，我们依据各因子中环境变量的组合特征提取了三个公因子，分别命名为 F1 管理环境、F2 社会环境和 F3 自然环境，从而构建了体育公园游憩环境适宜性评价体系的准则层。

云南体育公园评价指标体系的构建

通过科学的筛选和归纳，明确了各指标的涵义及其相互联系，确立了指标层和准则层，基于因子分析建立了云南体育公园游憩环境适宜性评价指标体系（见图 1）。

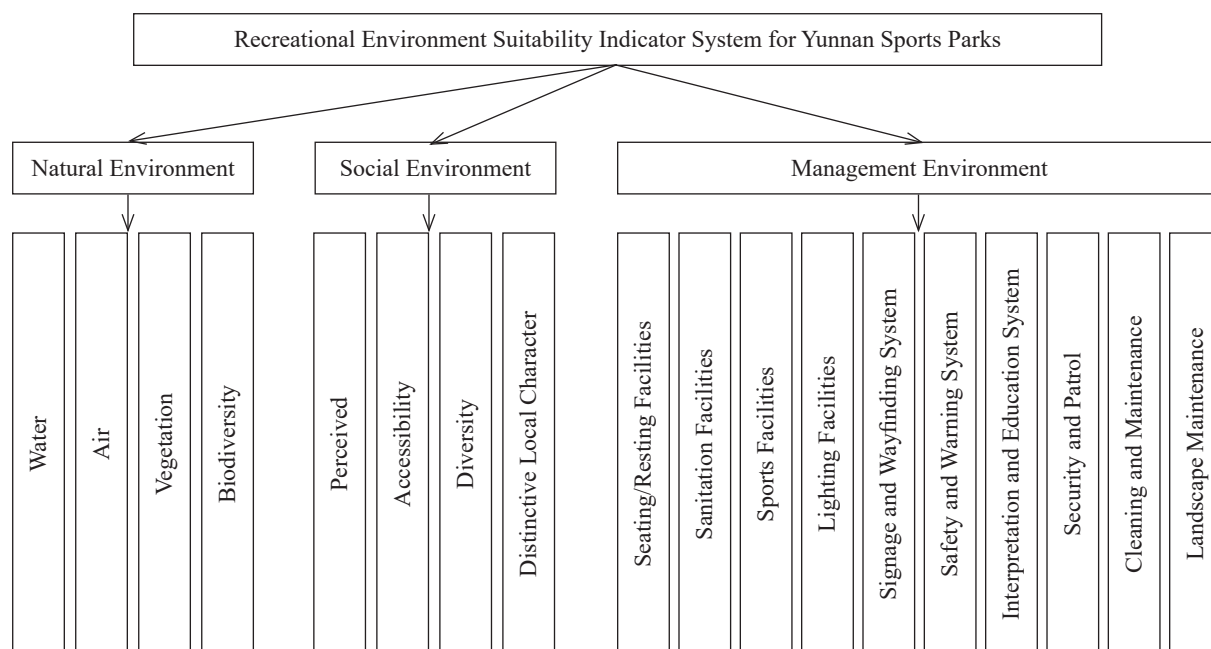


Figure 1 Recreational Environment Suitability Indicator System for Yunnan Sports Parks

云南体育公园游憩环境类型划分

云南体育公园种类繁多，其定位和功能侧重各不相同，导致游憩环境的特征也呈现出显著差异。如果采用统一的权重标准进行评价，将难以确保评价的科学性和客观性。因此，本研究利用各体育公园游憩环境适宜性评分数据，通过聚类分析方法，实现科学合理的类别划分。

Table 5 Average Indicator Scores by Sports Park

List	Haigeng Cultural and Sports Park	Wujiatang Sports Park	Zhongji Lake Sports Park	Shansongyuan Sports Park (Dianzhong New Area)	Qujing Cultural and Sports Park	Wujiaba Sports Park
Water Quality	4.09	4.10	3.98	3.92	3.92	4.02
Air Quality	3.20	3.43	3.30	3.45	3.44	3.40
Vegetation Status	3.87	3.97	3.91	3.83	3.93	3.90
Biodiversity	3.66	3.78	3.63	3.60	3.60	3.76
Perceived Crowding	2.35	2.45	2.61	2.38	2.52	2.57
Accessibility	2.19	2.20	2.33	2.19	2.21	2.27
Diversity of Recreational Activities	2.35	2.39	2.54	2.38	2.41	2.57

Table 5 Average Indicator Scores by Sports Park (Cont.)

List	Haigeng Cultural and Sports Park	Wujiatang Sports Park	Zhongji Lake Sports Park	Shansongyuan Sports Park (Dianzhong New Area)	Qujing Cultural and Sports Park	Wujiaba Sports Park
Distinctive Local Character	2.61	2.78	2.66	2.67	2.65	2.75
Seating Facilities	2.63	2.63	2.72	2.33	2.54	2.42
Sports Facilities	2.77	2.62	2.79	2.37	2.56	2.51
Sanitation Facilities	2.62	2.61	2.64	2.20	2.48	2.40
Lighting Facilities	2.65	2.52	2.68	2.23	2.49	2.40
Signage and Wayfinding System	2.53	2.47	2.54	2.17	2.27	2.36
Safety and Warning System	3.04	2.94	2.88	2.64	2.83	2.80
Interpretation and Education System	2.68	2.63	2.72	2.33	2.54	2.44
Security and Patrol	2.76	2.62	2.79	2.37	2.56	2.53
Cleaning and Maintenance	2.62	2.61	2.64	2.20	2.48	2.42
Landscape Maintenance	2.71	2.52	2.68	2.23	2.49	2.42

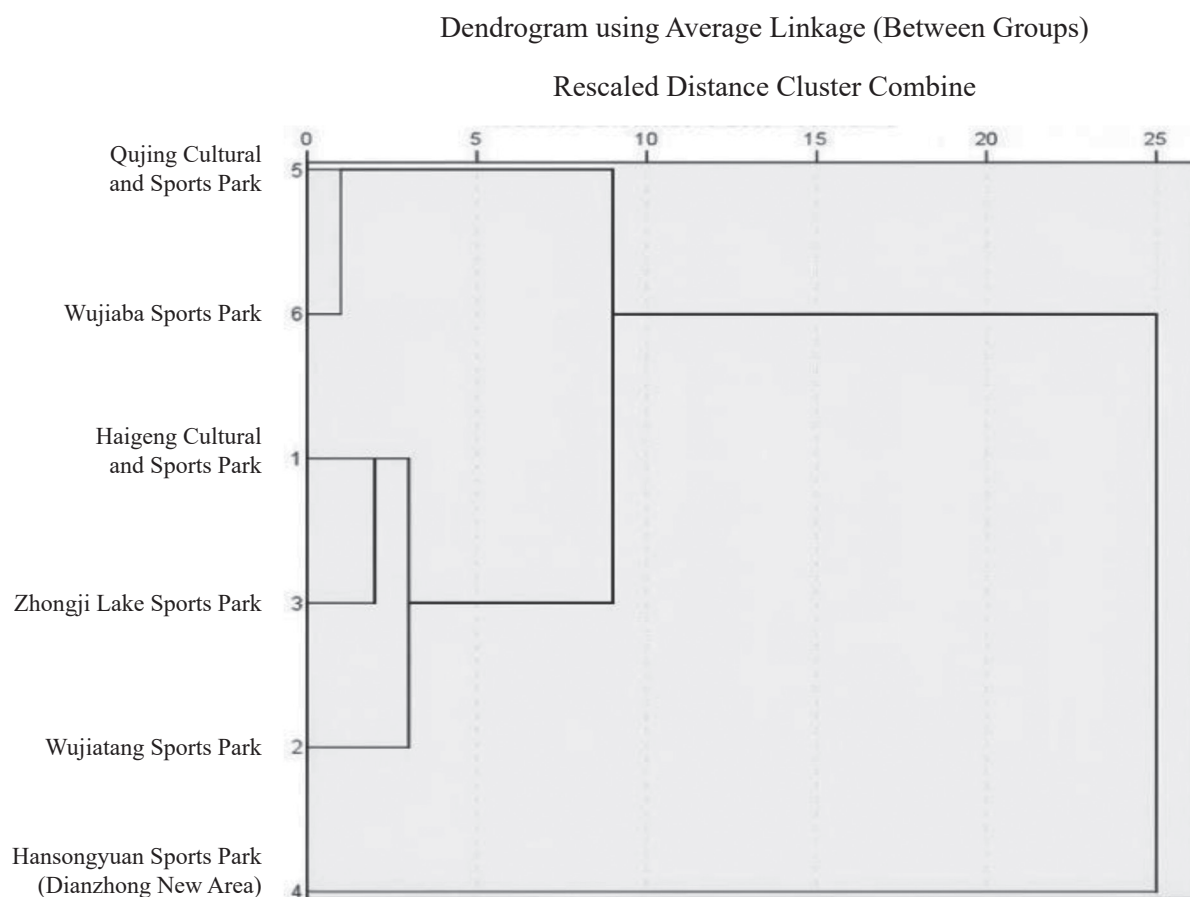


Figure 2 Sports Park Cluster Dendrogram

根据聚类图谱（图 2）显示，当距离系数为 2.5 时，这 6 个体育公园可分为 3 个主要类别。综合考虑各公园的特点与功能，分类结果具体为：第一类为滨河型体育公园，包括海埂文化体育公园、五甲塘体育公园和中济海体育公园；第二类为郊野型体育公园，即滇中新区的杉松园体育公园；第三类为城市型体育公园，涵盖曲靖市文化体育公园和巫家坝体育公园。

云南体育公园游憩机会谱构建

根据美国林业局 ROS 使用者指南，再结合云南体育公园实际情况和优化结果，再结合云南体育公园游憩环境适宜性评价指标体系和游憩活动调查，对三种游憩环境类型的云南体育公园进行以下总结，最终形成了基于游憩环境类型、游憩人群及游憩活动、游憩资源的体育公园游憩机会谱，如下表 6 所示：

Table 6 Recreation Opportunity Spectrum (ROS) for Sports Parks in Yunnan Province

Environmental Setting Type	Park	User Profile & Recreational Activities	Recreational Resources
Riverside	Haigeng Cultural and Sports Park	Children: roller skating, rock climbing and other parent-child activities, flying kites, visiting exhibitions, trampoline jumping. Middle-aged and young people: running, walking, cycling, playing in the water, rowing, taking photos, picnicking, camping, playing musical instruments, watching the water and seagulls. The elderly: walking, sitting and resting, square dancing, playing chess and cards, Qigong and boxing, practicing singing and singing.	Natural Landscape Resources: Dianchi Lake scenery, ecological vegetation, west mountain sleeping beauty, and gull-watching. Cultural Landscape Resources: cloud-viewing dock, sea-viewing corridor, and sculpture landscapes. Sports Facilities: land-based venues (rock climbing wall, speed roller skating rink, walking trails, cycling paths), water sports facilities, camping and sightseeing areas, waterside recreation zones, and children's play areas (temporary). Supporting Services: parking lots, dining options (restaurants, snack stalls).
	Wujiatang Sports Park	Children: wooden slides, seesaws, rocking horses, kite flying. Middle-aged and young adults: running, cycling, basketball, football, tennis, table tennis, using multi-functional fitness equipment, camping, picnicking, photography. Seniors: strolling, flower viewing, water appreciation, square dancing, sitting and resting, smart self-service fitness testing, using multi-functional fitness equipment.	Natural Resources: Dianchi Lake's scenic beauty, lush vegetation, biodiversity, artificial lakes, and ponds. Cultural Landscapes: smart facility landscapes and leisure facilities. Sports Facilities: multi-purpose courts, tennis courts, futsal fields, ping-pong tables, smart basketball courts, intelligent walking paths, and comprehensive fitness zones. Smart Sports Facilities: AI recognition systems, self-service fitness testing, sports data feedback and guidance, and smart basketball court functionalities. Children's Play: interactive play equipment and science-themed walls. Supporting Services: parking lots, rest areas, sanitation facilities, professional lighting, fencing, and smart access control systems.

Table 6 Recreation Opportunity Spectrum (ROS) for Sports Parks in Yunnan Province (Cont.)

Environmental Setting Type	Park	User Profile & Recreational Activities	Recreational Resources
	Zhongji Lake Sports Park	Children: play areas including sandpits, slides, climbing frames, merry-go-rounds, children's sightseeing non-rail mini-trains, happy duck roller coaster, pedal boats, and cartoon-themed electric boats. Youth: ball games like basketball and soccer, cycling, jogging, water activities such as paddling, and picnics or camping. Seniors: relaxation activities like sitting, flower viewing, water appreciation, walking, chess or card games, Qigong and martial arts, vocal exercises, and square dancing.	Natural Landscape Resources: lakes and wetlands, biodiversity, vegetation landscapes, and snow mountain views. Cultural Landscape Resources: rock formations and sculptures, traditional architectural-style buildings. Sports Facilities: ball game fields (basketball courts, soccer fields), roller skating and skateboarding areas, cycling paths, and fitness trails. Recreational Facilities: children's play areas, camping sites, and water-based attractions. Special Events: sports competitions, folk cultural activities, and themed festivals. Supporting Services: park city stations equipped with benches, pavilions, rest areas, sanitation facilities, and parking lots.
Semirural	Shansongyuan Sports Park (Dianzhong New Area)	Children: slide, swing, climbing frame, etc. Middle-aged and young adults: basketball courts, soccer fields, tennis courts, etc. ball games and fitness equipment: fitness training, jogging, camping, picnics, photography, sitting to relax, reading to unwind. Seniors: sitting to rest, admiring flowers and water, walking, playing chess or cards, practicing Qigong or martial arts, vocal exercises, square dancing, and using fitness equipment.	Natural Landscape Resources: green spaces and biodiversity. Cultural and Educational Resources: sports culture exhibitions and health awareness campaigns. Fitness Facilities: ball game venues (basketball courts, soccer fields, tennis courts), multi-purpose fitness equipment, running tracks, leisure plazas, and age-friendly recreational zones. Supporting Services: complimentary facilities (rest areas, locker rooms, restrooms), leisure plazas (seated benches, pavilions), and parking lots.
Urban	Qujing Cultural and Sports Park	Children: slide, climbing frame, trampoline, sandpit, swing, and exhibition visits. Young adults: basketball, tennis, badminton, football, running/ walking, rock climbing, cycling, multi-functional fitness equipment, water play, and exhibition visits. Seniors: strolling, flower viewing, water appreciation, exhibition visits, square dancing, Qigong/ Kung Fu, and meditation.	Natural Landscape Resources: green spaces and water features. Cultural Facilities: museums, libraries, science museums, and art galleries; cultural plazas (central and themed). Sports Facilities: ball courts, athletic fields, climbing walls, hiking trails, and bike lanes; fitness equipment (aerobic, strength, and functional training devices); children's play areas and fitness zones. Water Sports Center: accompanying services include dining, retail, and sanitation facilities.

Table 6 Recreation Opportunity Spectrum (ROS) for Sports Parks in Yunnan Province (Cont.)

Environmental Setting Type	Park	User Profile & Recreational Activities	Recreational Resources
	Wujiaba Sports Park	Children: slides, seesaws, swings, and visiting exhibitions. Middle-aged and young adults: basketball, tennis, badminton, football, and other ball games. The elderly: walking, square dancing, Qigong and martial arts, and using fitness equipment.	Natural Recreation Resources: green landscape, trees and vegetation, water landscape, legal culture micro landscape. Sports And Fitness Resources: ball sports venues (basketball, tennis, badminton, football), children’s play areas. Supporting Service Resources: commercial streets, parking facilities.

云南体育公园游憩现存问题及管理建议

基于游憩机会谱（ROS）框架，本研究系统识别了云南体育公园不同环境类型下的用户特征、活动偏好及资源配置。为实现体育公园的精准化管理，本节将对游憩现存问题进行清查，并提出相应的管理建议，以此推动云南体育公园系统的差异化运营与可持续发展。

Table 7 Inventory of Recreational Issues and Management Recommendations for Yunnan Sports Parks

Environmental Setting Type	Deficiencies	Management Measures
Natural Environment	Water body management and maintenance	1. Upgrade the water circulation facilities in the park, rationally plan the water flow path, and improve the water flow. 2. Clean the sediment and debris at the bottom of the water body regularly to keep it clean.
	Plant maintenance and management	1. Plan the park’s greenery layout rationally to increase vegetation coverage. 2. Pay attention to plant combinations and arrangements to create layered and colorful landscapes. 3. Install barriers and warning signs to protect vegetation. 4. Place prominent eco-signs in the park to guide visitors to care for plants and avoid littering.
	Biodiversity is being destroyed	1. Ecological restoration of the damaged habitats in the park, such as wetland and forest. 2. Scientific plan of introducing new species, planning and constructing ecological corridors, strengthening the approval and supervision of introducing alien species.

Table 7 Inventory of Recreational Issues and Management Recommendations for Yunnan Sports Parks (Cont.)

Environmental Setting Type	Deficiencies	Management Measures
Social Environment	The tourist season and holidays are overcrowded, and the design of some areas is not reasonable, resulting in crowded activity areas.	The online reservation system for holidays and time-limited admission will be introduced to reduce crowding.
	Inadequate public transport connectivity and parking difficulties for private vehicles	Collaborate with the bus company to optimize bus routes around the park and establish bus stops nearby, enabling visitors to reach the park directly. Plan parking lots strategically, increase parking capacity, and improve traffic flow around the parking areas.
	Lacking the characteristic elements of Yunnan, the park fails to highlight its regional cultural features.	Deeply excavate and display local culture, fully integrate Yunnan ethnic culture and Dianchi culture elements.
	The road planning is not perfect, and there is no convenient barrier-free passage.	Add accessible ramps, lifts and signage to make it easier for older people and people with disabilities to access the park.
Management Environment	Insufficient and uneven distribution of recreation facilities, especially in more active areas	According to the tourist flow and demand in different areas of the park, facilities such as benches and pavilions are added in the popular activity areas and other areas where tourists gather.
	Insufficient sanitation or untimely cleaning	Increase the number of health facilities in a reasonable way, optimize their distribution, and strengthen health management.
	Warning signs are missing, and directional signs are unclear.	Establish a sign update mechanism to promptly update relevant directional and warning signs.
	The number of science facilities in the park is limited and the forms are relatively simple.	Combined with the natural resources and cultural characteristics of the park, the popular science can be carried out in various forms such as park broadcast, electronic display screen and interactive mini program to increase the fun and interaction of popular science.
	Insufficient cleaning staff and untimely cleaning	During peak tourist seasons or before major events, make advance arrangements for cleaning staff deployment. Meanwhile, enhance their training and management to boost work efficiency and service quality. Install sufficient classified trash bins to guide visitors in proper waste sorting, thereby improving waste processing efficiency.
	Insufficient security personnel and low patrol frequency in the park, with potential security risks in some areas	Enhance the deployment of security personnel and install modern surveillance systems. Increase the frequency of security patrols, with a focus on monitoring areas with weaker public safety.

讨论

ROS 理论在体育公园中的适配性拓展

本研究首次将游憩机会谱理论应用于体育公园这一特定场景，突破了传统上以荒野游憩或一般性城市绿地为主导的应用范畴。结果表明，ROS 框架通过“自然环境——社会环境——管理环境”三维度的解构，能够有效解析体育公园在生态基底、运动功能与服务配套等方面的复合性特征。

体育公园分类管理的科学性与实践价值

通过聚类分析划分的滨河型、郊野型、城市型体育公园，与欧美“都市运动空间分级体系”存在显著差异。传统“一刀切”管理模式已难以适应需求分异，而基于 ROS 的差异化策略（如滨河型推行预约制、郊野型强化生态教育）可实现资源供给精准匹配。

研究局限与未来方向

本研究的样本范围目前主要覆盖云南主要城市群的体育公园，尚未充分纳入山地型、边境口岸型等具有特殊地理与人文背景的案例。后续研究可延伸至滇西生态屏障区等典型区域，进一步探索在生态敏感地区实现运动功能与生态保护相协调的可持续发展模式。作为本研究的核心创新，我们发现传统 ROS 的六分法及其通用指标在评价体育公园时存在明显局限。例如，标准 ROS 指标体系中未充分考虑体育设施的专业化程度（如球类场地是否符合赛事规格、健身路径是否满足全龄需求），也难以有效评估地方民族文化元素（如民族体育设施、节庆活动嵌入）对游憩体验的深刻影响。为此，本研究在保留 ROS 核心框架的基础上，新增了“设施专业化水平”、“民族文化表征度”与“智慧服务集成度”三类特色指标，初步形成了更贴合中国体育公园实际的本土化评价工具。

总结

本研究通过实证调研与理论分析，验证了游憩机会谱（ROS）理论在体育公园场景中的适用性。超过 85% 的使用者认为游憩环境质量对其体验具有显著影响，说明 ROS 所强调的“环境——体验”关联机制在体育公园中依然成立。研究进一步将云南体育公园划分为滨河型、郊野型与城市型三类，分别对应不同的功能定位与游憩特征，反映出体育公园在复合功能与使用者需求方面的异质性，也为差异化资源配置提供了科学依据。然而，调查也揭示出当前云南体育公园在自然生态维护、社会服务配套与运营管理效率等方面仍存在一系列问题，如水体维护不足、公共交通衔接不畅、文化特色缺失、设施分布不均及管理粗放等。

建议

基于上述研究发现，本文提出以下系统性建议：

在规划层面，应推动分类施策与融合发展。滨河型公园可加强水岸生态修复，引入智慧水上运动项目与民族文化主题景观；郊野型公园宜构建“生态+研学”模式，设计自然教育步道与低碳露营设施；城市型公园则应注重“体育+文化”融合，植入本土民族体育元素，优化高密度空间利用。

在运营层面，建议建立“分时预约——动态定价”系统以调控游客流量，并依据“15分钟服务圈”原则优化休息、卫生与急救设施布局。同时，通过开发体育公园文化IP、举办民族体育赛事与非遗工坊，增强场所的文化吸引力与社会凝聚力。

在技术与管理机制上，可搭建集成环境监测、游客行为分析与设施运维的“公园大脑”平台，推广光伏健身器材与雨水花园等绿色技术，并建立政府——社区——企业三方共治机制，引入专业运营团队与公众监督，提升管理效能与可持续性。

在政策保障方面，建议制定《云南省体育公园分级分类建设标准》，将体育公园管理纳入地方政府绩效考核体系，并推动高校成立专项研究中心，加强ROS理论培训与复合型管理人才培养，为体育公园的长期高质量发展提供制度与人才支撑。

References

- Boyd, S. W., & Butler, R. W. (1996). Managing ecotourism: An opportunity spectrum approach. *Tourism Management*, 17(8), 557-566. [https://doi.org/10.1016/S0261-5177\(96\)00076-3](https://doi.org/10.1016/S0261-5177(96)00076-3)
- Brown, P. J., Driver, B. L., & McConnell, C. (1978). The opportunity spectrum—Concept and behavioral information in outdoor recreation resource supply inventories: Background and application. In *Integrated Inventories of Renewable Natural Resources: Proceedings of the Workshop* (pp. 73-84). ScholarWorks at University of Montana. https://scholarworks.umt.edu/forest_pubs/31
- Butler, R. W., & Waldbrook, L. A. (1991). A new planning tool: The tourism opportunity spectrum. *Journal of Tourism Studies*, 2(1), 2-14.
- Clark, R. N., & Stankey, G. H. (1979). *The recreation opportunity spectrum: A framework for planning, management, and research* (Gen. Tech. Rep. PNW-GTR-098). U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. <https://research.fs.usda.gov/treesearch/6014>
- Fennell, D. A., & Dowling, R. K. (2003). Ecotourism policy and planning: Stakeholders, management and governance. In D. A. Fennell, & R. K. Dowling (Eds.), *Ecotourism policy and planning* (pp. 331-344). CABI Publishing.
- Hu, R. C., Li, M., Wang, T., & Zhang, Y. (2022). High-quality development of urban sports parks: Basic connotation, practical motivations, and promotion pathways. *Journal of Sports and Health Science*, 15(4), 112-125. [in Chinese]

- Huang, X., Bao, J. G., & Wall, J. (2006). Construction of China's Ecotourism Opportunity Spectrum (CECOS). *Geographical Science*, 26(5), 629-634. <https://doi.org/10.3969/j.issn.1000-0690.2006.05.019> [in Chinese]
- Jiang, X. H. (2021). Research on the development path of urban sports parks from the perspective of ecological sports. *Journal of Sports Science*, 12(3), 45-60. [in Chinese]
- Manning, R. E. (2011). *Studies in outdoor recreation: Search and research for satisfaction* (3rd ed.). Oregon State University Press.
- More, T. A., Bulmer, S., Henzel, L., & Mates, A. E. (2003). *Extending the recreation opportunity spectrum to nonfederal lands in the northeast: An implementation guide* (Gen. Tech. Rep. NE-309). U.S. Department of Agriculture, Forest Service, Northeastern Research Station. <https://doi.org/10.2737/NE-GTR-309>
- National Development and Reform Commission, General Administration of Sport of China, Ministry of Natural Resources, Ministry of Water Resources, Ministry of Agriculture and Rural Affairs, National Forestry and Grassland Administration, & Agricultural Development Bank of China. (2021, October 23). *Guiding opinions on promoting the construction of sports parks*. The State Council of the People's Republic of China. https://www.gov.cn/zhengce/zhengceku/2021-10/30/content_5647758.htm [in Chinese]
- National Forest Management Act of 1976. (2014, February 7). *Congress*. Public Law 94-588.
- U.S. Department of Agriculture, Forest Service. (1982). *ROS users guide*. Forest Service.
- Wagar, J. A. (1963). *Campgrounds for many tastes*. Intermountain Forest & Range Experiment Station, Forest Service, U.S. Department of Agriculture.
- Warzecha, C., Manning, R., Lime, D., & Freimund, W. (2001). Diversity in outdoor recreation: Planning and managing a spectrum of visitor opportunities in and among parks. *The George Wright Forum*, 18(3), 99-111.
- Xie, H. L., Liu, L. M., & Li, L. (2003). Discussion on issues related to rural landscape planning and design. *Chinese Landscape Architecture*, 19(3), 39-41. <https://doi.org/10.3969/j.issn.1000-6664.2003.03.011> [in Chinese]
- Xu, Y. W. (2013). Impressions of sports parks in Finland. *Sports Goods and Technology*, (9), 24-25. <https://doi.org/10.3969/j.issn.1006-8902.2013.09.008> [in Chinese]
- Zhang, Y. J. (2008). *A preliminary study on the planning of sports parks in China* [Master's thesis]. Huazhong Agricultural University. [in Chinese]
- Zhao, D. (2010). *Research on sports parks in the United States* [Master's thesis]. Soochow University. [in Chinese]



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