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REVIEW

Whose Landscape Is Protected? Rethinking Recreational Planning through Land Justice, Rural Revitalization, and Ecological Integrity

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ABSTRACT

Protected landscapes have traditionally been designed as ecological sanctuaries, yet the question of whose interests they ultimately serve remains unresolved. This paper rethinks recreational planning through a justice-centered lens that integrates land rights, rural revitalization, and ecological integrity. Drawing from comparative experiences across Africa, Asia, Latin America, Europe, and North America, it examines how access, benefit-sharing, and governance shape both human and environmental outcomes. The analysis challenges exclusionary fortress conservation models that privilege biodiversity at the expense of community rights and introduces the Justice–Recreation–Ecology (JRE) framework as a holistic alternative. The JRE framework situates justice as the ethical foundation, recreation as the social mediator, and ecology as the biophysical boundary for sustainable landscape governance. To operationalize this, the study develops measurable Key Performance Indicators (KPIs) across justice (participation, benefit retention, recognition of indigenous knowledge), recreation (visitor satisfaction, equitable access, and digital inclusion), and ecology (biodiversity intactness, restoration area, and ecosystem stability). It also explores the transformative potential of land informatization tools like GIS, remote sensing, and blockchain for transparent, participatory, and accountable monitoring. By embedding distributive, procedural, and recognition justice into recreational planning, the paper demonstrates that inclusive stewardship can simultaneously sustain biodiversity, empower communities, and revitalize rural economies. Consequently, reimagining protected land-

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scapes through justice-oriented recreational planning transforms them from exclusionary spaces into shared socio-ecological commons capable of nurturing both resilience and belonging.

Keywords: Recreational Planning; Protected Landscapes; Land Justice; Rural Revitalization; Ecological Integrity; Participatory Governance; Key Performance Indicators (KPIs); Land Informatization

1. Introduction

Protected landscapes have historically been celebrated as sanctuaries of ecological resilience, yet they remain deeply political spaces where questions of access, benefit, and belonging are contested [1–4]. While conservation planning has emphasized biodiversity protection and ecological restoration, less attention has been given to the social and distributive dimensions of land use, particularly in relation to recreation [5–7]. The issue is not merely about managing visitors or tourism flows but about asking a deeper question: *whose landscape is being protected, and for whom?* This inquiry opens space for rethinking recreational planning through the lenses of land justice, rural revitalization, and ecological integrity. Recreation in protected landscapes has long carried dual meanings. On one hand, it provides cultural, spiritual, and economic value, contributing to human well-being and rural livelihoods [8–11]. On the other hand, it generates ecological pressures, ranging from habitat disturbance to carbon emissions linked with mass tourism [12]. Traditional models of conservation, particularly fortress-style approaches, have often resolved this tension by restricting access by separating local communities from landscapes in the name of ecological integrity [3,4]. While such exclusionary models may succeed in limiting human impact, they reproduce inequities by displacing communities, erasing indigenous rights, and narrowing the meaning of "protection" to one aligned with external or elite interests [1,8–11,13]. For example, restrictions on access to grazing land or water resources often reinforce patterns of marginalization.

However, over the past two decades, new paradigms of land management have emerged that place equity at the center of protected landscape governance. Co-management and community-based recreational planning models attempt to balance conservation with local benefit-sharing, integrating indigenous knowledge systems and participatory decision-making [14–17]. These approaches challenge the assumption that conservation and human use are incompatible, instead highlighting the potential for landscapes to serve simultaneously as ecological refuges, cultural commons, and economic lifelines. In rural contexts, particularly in the Global South, recreational landscapes have been mobilized as engines for revitalization, enabling diversification of income, preservation of cultural heritage, and empowerment of marginalized groups [18]. Nevertheless, significant tensions remain. Equity in recreational planning cannot be measured only by the presence of community partnerships or benefit-sharing schemes. It requires robust attention to land justice, a framework that emphasizes not just access and benefit, but recognition, representation, and rights over ecological decision-making [19]. In this sense, justice becomes a key performance indicator in its own right, shaping how landscapes are planned, used, and restored. Integrating land justice into recreational planning reframes landscapes as living infrastructures: spaces where ecological resilience, cultural continuity, and livelihood security intersect. Recent studies on environmental democracy and planetary justice further reinforce this intersection of equity and ecology in protected area governance [18,20].

At the same time, technological advances such as remote sensing, GIS mapping, and blockchain open possibilities for transparent monitoring of recreational pressures and revenue distribution [21–25]. These tools, when applied equitably, can support inclusive land governance by ensuring accountability in access and benefit-sharing. However, technology without justice risks reinforcing exclusion if data control remains concentrated in elite institutions or state authorities. Thus, the challenge is not simply technical, but fundamentally political. Consequently, this paper advances the argument that recreational planning must be reimagined as a justice-centered practice, one that deliberately aligns ecologi-

cal integrity with equitable access and rural revitalization. In addressing this challenge, the study synthesizes global models and develops measurable indicators of justice, recreation, and ecological outcomes, providing a framework for inclusive and accountable landscape governance. The guiding question of whose landscape is protected thus serves not merely as a critique but as an entry point for re-envisioning protected landscapes as shared, resilient, and socially just spaces.

2. Theoretical Background

2.1. Land Justice and Protected Landscapes

The concept of land justice has gained prominence as scholars and practitioners increasingly recognize that land is not simply a material resource but a foundation for cultural identity, livelihoods, and power relations (**Figure 1**). Land justice concerns the equitable distribution of land rights, access, and benefits, as well as the recognition of cultural and historical attachments to land [4,16,19]. It expands traditional land governance frameworks by embedding considerations of fairness, identity, and belonging into discussions that might otherwise focus narrowly on ecological or economic outcomes. In the context of protected landscapes, land justice becomes especially urgent. Protected areas have often been created under exclusionary models that prioritized biodiversity conservation at the expense of resident or neighboring communities [10,11,14]. These fortress conservation strategies removed communities from their ancestral territories, undermined indigenous knowledge systems, and eroded local livelihoods. Even when outright eviction did not occur, regulations frequently restricted access to grazing land, water, and forest resources, reinforcing patterns of marginalization [8,14,26].

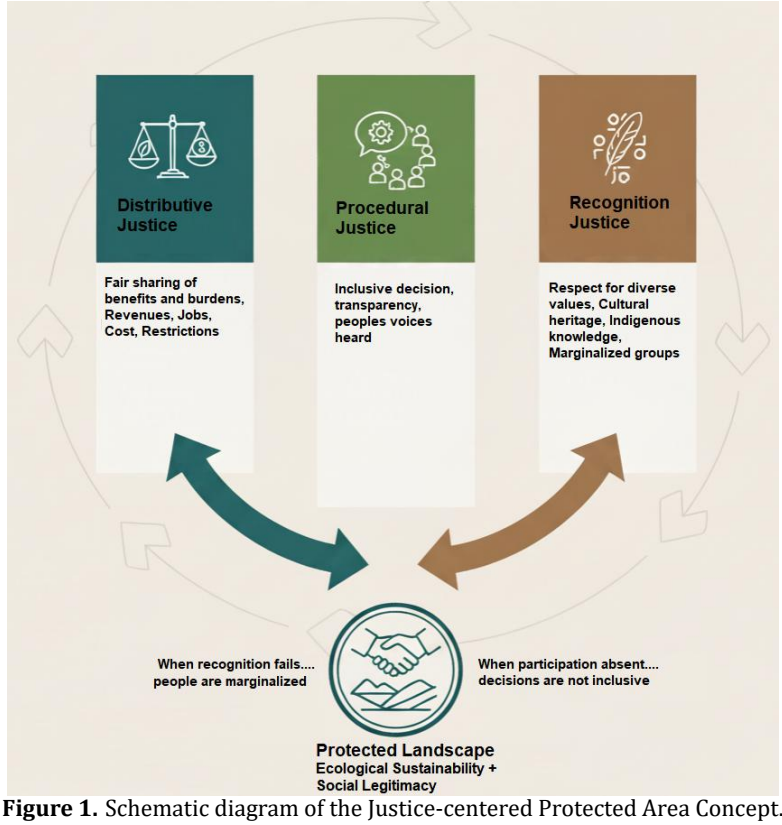

Figure 1. Schematic diagram of the Justice-centered Protected Area Concept.

Source: Schlosbeerg [27].

This diagram illustrates the core conceptual pillars of the justice-centered approach: distributive, procedural, and recognition justice, which are fundamental to ethical land governance.

The justice challenge here is multidimensional. Distributive justice refers to the fair sharing of benefits

and burdens arising from conservation and recreation, whether revenues from eco-tourism reach local households or whether costs such as restricted access fall disproportionately on the poor[28,29]. Procedural justice highlights who participates in decisions, whose voices are heard, and whether planning processes are transparent[30,31]. Recognition justice emphasizes respect for diverse cultural values, indigenous ecological knowledge, and historically marginalized groups[32,33]. These three pillars interconnect: when recognition fails, communities may be excluded from participation, and when participation is absent, distributive outcomes are typically inequitable. A justice-centered approach to protected landscapes thus reframes these territories as arenas of negotiation, where ecological sustainability must be pursued alongside social legitimacy. As scholars such as Paul Mmahi and Usman[17] and Borrini-Feyerabend et al.[34] argue, conservation cannot be socially sustainable if it is achieved by denying rights or concentrating power. Instead, land justice provides the normative foundation for reconceptualizing recreational planning as not merely about managing visitor flows but about rebalancing historical injustices and redistributing opportunities in ways that strengthen both human well-being and ecological resilience. These insights form the ethical foundation upon which later sections of this paper build the Justice–Recreation–Ecology framework.

2.2. Theories of Recreational Planning

Recreational planning has historically been framed through ecological and managerial paradigms. Early approaches emphasized the concept of carrying capacity, where the central question was how many visitors a site could accommodate before ecological degradation occurred[35]. Although groundbreaking, this framework treated visitors as homogeneous and reduced complex social dynamics into numbers. It privileged ecological thresholds over human experiences and rarely engaged with questions of equity or cultural difference. Subsequent innovations sought to improve this model. The Limits of Acceptable Change (LAC) system (**Figure 2**) recognized that some ecological and social change is inevitable, shifting the focus from preventing change altogether to defining acceptable thresholds through planning and monitoring[36]. The U.S. National Park Service's Visitor Experience and Resource Protection (VERP) framework further expanded this by balancing ecological integrity with visitor satisfaction[37]. These models marked a conceptual shift toward adaptive management, integrating social dimensions into recreation planning.

Figure 2. Schematic diagram of the Limit of Acceptable Change (LAC).

The diagram represents the Limits of Acceptable Change (LAC) framework, a management tool that defines acceptable ecological and social conditions in recreational areas before determining necessary management actions.

However, while these frameworks acknowledged visitor diversity, they often failed to recognize local residents as legitimate land users. For instance, subsistence activities such as gathering firewood, hunting, or fishing are commonly prohibited within protected areas, even though they may form part of local cultural heritage. Such exclusions reveal a deeper blind spot: recreational planning has often been shaped by the preferences of global and urban elites, privileging hiking, wildlife viewing, or photography while marginalizing rural livelihoods [38]. This exclusionary framing produces an epistemic injustice, that is, one in which local ways of relating to the land are made invisible or illegitimate. Justice-oriented recreational planning must therefore move beyond managing visitors and consider multiple publics such as local communities, domestic tourists, international visitors, and even non-human species whose needs are equally implicated in recreational dynamics. By doing so, recreational planning becomes less about regulating flows and more about designing inclusive landscapes of belonging.

2.3. Protected Landscapes as Multifunctional Spaces

The conception of protected landscapes has evolved over the past three decades, particularly under the IUCN's Category V framework, which emphasizes the interaction of people and nature over time [39]. Unlike strictly protected areas where human activity is minimized, Category V landscapes acknowledge that human presence can be compatible with conservation, and indeed, that cultural practices are integral to ecological resilience. This recognition has spurred the idea of landscape multifunctionality being the understanding that landscapes simultaneously provide ecological, economic, cultural, and recreational services [40]. A protected landscape may serve as a biodiversity refuge, a recreational destination, a cultural heritage site, and a source of rural livelihoods. This multifunctional framing reflects the realities of rural regions where agriculture, tourism, and conservation intersect.

From a planning perspective, multifunctionality complicates governance but also enriches opportunity. For instance, cultural festivals within protected landscapes can sustain local traditions while attracting visitors. Community-led agro-tourism can generate income while maintaining sustainable agricultural practices [41]. Nature-based recreation, such as hiking or birdwatching, can coexist with cultural-spiritual uses if properly managed. However, without justice frameworks, multifunctionality risks sliding into commodification, where landscapes are primarily valued for the economic returns of tourism. Condon [42] cautions that without safeguards, revenues often accrue to external investors, while communities bear the social and ecological costs. Thus, integrating land justice into multifunctionality requires designing governance systems that distribute benefits equitably, protect local decision-making rights, and recognize cultural as well as ecological values.

2.4. Justice as a Framework for Recreational Planning

Integrating justice into recreational planning redefines both the purpose and ethical grounding of protected landscapes. Historically, recreation within conservation areas was perceived as a potential threat to ecological integrity, tolerated only when carefully contained [43]. A justice-oriented perspective challenges this utilitarian separation by positioning recreation as a vehicle for inclusive governance, equitable benefit sharing, and ecological co-stewardship. In this view, protected landscapes are not passive conservation zones but dynamic socio-ecological systems that sustain biodiversity, livelihoods, and cultural identity simultaneously [1]. Justice thus becomes a structuring principle that guides how landscapes are used, who benefits, and whose voices shape management decisions. This justice-based framework rests on three interconnected pillars (**Figure 3**). The first pillar, normative justice, anchors recreational planning in the principles of distributive, procedural, and recognition justice [27]. Distributive justice ensures that benefits from recreation, such as tourism revenue, employment, and infrastruc-

ture, are shared fairly among local communities and state agencies. Procedural justice emphasizes inclusive decision-making, where communities actively participate in setting recreational priorities, not merely as beneficiaries but as co-managers[16]. Recognition justice deepens this inclusion by valuing local cultural and Indigenous worldviews about nature, ensuring that conservation policies respect traditional knowledge systems and spiritual ties to land[31]. Collectively, these dimensions transform protected landscapes from exclusionary conservation spaces into platforms of environmental democracy.

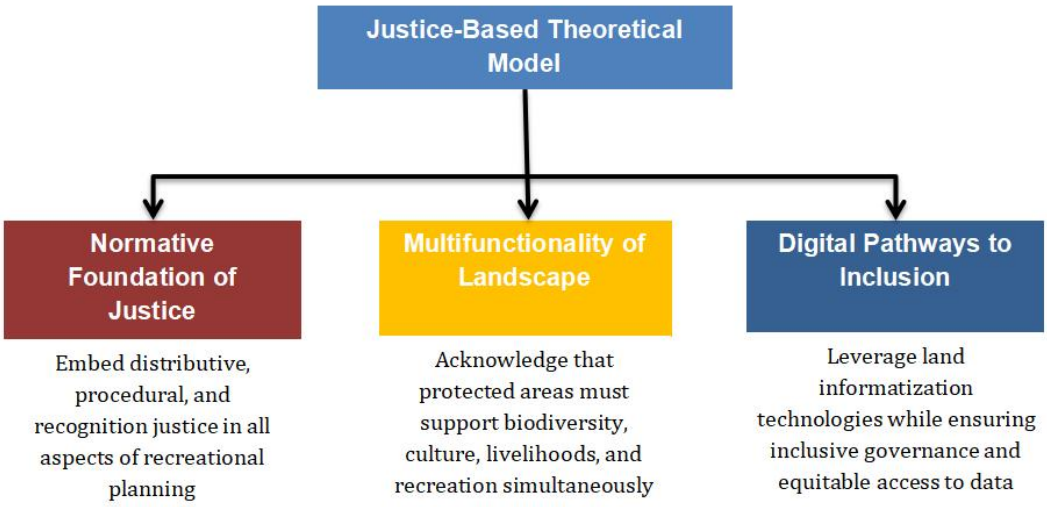

Figure 3. A Schematic diagram of the Justice-based theoretical model.

This diagram synthesizes the three key theoretical components—Justice (Normative Foundation), Landscape Multifunctionality, and Digital Pathways to Inclusion—that structure the paper's justice-based planning model.

The second pillar, multifunctionality of landscapes, expands the scope of recreational planning to embrace overlapping ecological, economic, and cultural functions. Landscapes are increasingly understood as multifunctional entities where recreation coexists with conservation, livelihood generation, and heritage preservation[40]. This perspective challenges the historical divide between people and parks by proposing that ecological integrity and human use can be complementary rather than conflicting goals[15]. In practice, multifunctionality involves integrating recreation with sustainable resource use, agro-ecological activities, and cultural heritage programs that reinforce the connection between biodiversity protection and community well-being. For instance, participatory models in Nigeria's national parks have demonstrated that co-managed tourism can improve ecological outcomes while generating local income, provided governance systems remain transparent and inclusive[5]. Thus, multifunctionality operationalizes justice by ensuring that recreational landscapes serve both ecological resilience and social continuity.

The third pillar, digital pathways to inclusion, captures the transformative role of technology in achieving equitable monitoring and participation. Land informatization tools such as Geographic Information Systems (GIS), remote sensing, and blockchain technologies enable more transparent, data-driven governance of recreational spaces[22]. When designed collaboratively, these tools democratize access to environmental data, allowing communities to visualize land-use patterns, track tourism revenues, and monitor ecological change[24]. Blockchain applications, for example, can ensure transparent revenue sharing among stakeholders and reduce corruption in park management. However, the justice implications of digital technologies depend on how inclusively they are implemented. Externally controlled data infrastructures risk reinforcing existing power asymmetries, while co-created systems can enhance local autonomy and trust[21]. Ethical digital governance, therefore, requires participatory design, open access, and commu-

nity training to ensure that technology amplifies, rather than erases, local voices [44].

These three pillars, namely normative justice, multifunctionality, and digital inclusion, are deeply interwoven. Normative justice establishes the ethical rationale for fairness; multifunctionality provides the spatial and ecological context for reconciling diverse land uses; and digital inclusion offers the technological mechanisms to embed transparency and accountability in planning processes. Together, they recast recreational planning as a reflexive, ethical, and adaptive governance practice rather than a technocratic exercise. By embedding justice within both the normative and operational dimensions of planning, protected landscapes evolve from contested terrains into shared spaces of stewardship and coexistence [28]. Ultimately, justice-oriented recreational planning calls for a paradigm shift from managing visitor pressure to cultivating socio-ecological harmony. It acknowledges that the legitimacy of conservation lies not only in ecological success but also in fairness, participation, and cultural respect [45]. As digital tools, multifunctional land-use models, and participatory ethics converge, the future of recreational planning will depend on its capacity to align ecological sustainability with distributive and procedural justice, creating landscapes that are both environmentally resilient and socially equitable. This framework also resonates with emerging discourses on planetary justice and environmental democracy, which extend local equity principles to global ecological governance. Integrating insights from recent scholarship (e.g., Darwish et al. [46]; Sikor [19]) would strengthen the paper's alignment with these contemporary debates and emphasize its contribution to the expanding moral geography of sustainability.

2.5. Land Informatization and Digital Pathways to Justice

The rise of digital technologies is reshaping land governance, with significant implications for recreational planning in protected landscapes. Land informatization refers to the digitization of land-related data, including mapping, monitoring, and management systems [47]. Tools such as Geographic Information Systems (GIS), remote sensing, drones, and blockchain have opened new possibilities for transparency, accountability, and participation [21–25]. For instance, remote sensing can track ecological change in real time, allowing managers to monitor recreational impacts such as trail erosion, deforestation, or pollution (**Table 1**). Participatory GIS enables communities to map cultural and spiritual landscapes, ensuring that these are considered in planning decisions [20,48]. Drones can monitor illegal activities such as poaching or encroachment, while blockchain systems can facilitate transparent revenue-sharing agreements in tourism ventures [24,48]. These technologies can serve justice if deployed inclusively. Participatory GIS, for example, has been used to document sacred sites and customary land boundaries, thereby strengthening community claims against external encroachment [24]. Similarly, blockchain-enabled tourism models can ensure that local households receive direct payments from visitors, bypassing exploitative intermediaries.

Table 1. Roles of Land Informatization Tools in Equitable Monitoring of Protected Landscapes.

Tool	Primary Function	Equity Contribution	Practical Applications	Key Limitations
Geographic Information Systems (GIS)	Integrates spatial data on land use, biodiversity, and visitor distribution to support planning and decision-making.	Enhances procedural justice by enabling transparent mapping of access zones, land tenure, and benefit-sharing areas.	Participatory mapping of community-use zones; visualizing equitable access to recreational spaces; tracking infrastructure impacts.	Data ownership and technical capacity gaps may marginalize local users; requires ongoing capacity building for inclusive use.
Remote Sensing (RS)	Provides real-time environmental data through satellite imagery for habitat monitoring, land-cover change, and visitor impacts.	Supports distributive justice by ensuring all stakeholders access objective ecological data to inform shared management decisions.	Monitoring deforestation and habitat degradation; detecting overuse of trails or visitor congestion; verifying conservation benefits.	High costs and limited accessibility to high-resolution imagery; interpretation often dominated by external experts.

Table 1. *Cont.*

Tool	Primary Function	Equity Contribution	Practical Applications	Key Limitations
Blockchain Technology	Creates decentralized, tamper-proof systems for recording land transactions, benefit-sharing, and conservation payments.	Strengthens recognition and procedural justice by ensuring transparent tracking of tourism revenues and community entitlements.	Recording local benefit distribution; verifying eco-tourism contracts; certifying ethical supply chains within protected areas.	Technological complexity and digital literacy barriers; requires governance frameworks to align with local legal systems.
Integrated Informatization Framework	Combines GIS, RS, and blockchain for multi-scalar ecological and socio-economic monitoring.	Promotes restorative justice by integrating environmental data with social equity indicators to correct historical imbalances in resource access.	Comprehensive monitoring dashboards linking ecological data with community participation metrics; equitable reporting systems.	Interoperability issues among technologies; risks of digital exclusion if local stakeholders are not meaningfully engaged.

However, caution is warranted. Digital technologies can also reinforce inequalities if control over data remains centralized. The pervasive use of "conservation tech" raises specific, critical concerns: Wealthier actors with technical expertise may dominate decision-making, while marginalized communities are excluded from shaping how data is collected or used [49]. This risk extends to issues like algorithmic bias in resource allocation or monitoring, and the threat of data colonialism, where external entities extract and control local information for profit or power [49]. This risk extends to issues like algorithmic bias in resource allocation or monitoring, and the pervasive threat of data colonialism, where external entities extract and control local ecological and social information for profit or centralized power. Surveillance technologies may also intrude on privacy or criminalize traditional practices under the guise of conservation. Thus, the justice potential of informatization depends not on the tools themselves but on the governance frameworks that determine access, control, and accountability. Consequently, land informatization should be understood not as a panacea but as a set of tools that can amplify justice when embedded within equitable institutions. There is also a need for future studies to evaluate how open-source digital platforms and community data cooperatives can enhance distributive and procedural justice across regions. Combining technology with participatory governance will ensure that recreational planning in protected landscapes is both scientifically rigorous and socially legitimate. This hybrid approach, where digital precision meets local knowledge, offers the most promising pathway toward justice-centered recreational planning in the 21st century.

2.6. Reframing Recreational Planning through the Justice–Recreation–Ecology (JRE) Framework

The convergence of scholarship on land justice, multifunctional landscapes, and digital governance has reshaped how protected landscapes are conceptualised and managed. These debates reject the notion of landscapes as inert ecological spaces and instead recognise them as dynamic socio-ecological systems continually shaped by power, identity, and knowledge [50]. Within this evolving paradigm, recreational planning must transcend its traditional function as a technical exercise in visitor management and become a justice-oriented practice that acknowledges historical exclusions, redistributes benefits, and recognises plural relationships with land [51]. The Justice–Recreation–Ecology (JRE) framework (**Figure 4**) provides a holistic approach through which this transformation can be achieved. It integrates three interlinked dimensions of justice, recreation, and ecology, with each informing and constraining the others. Justice provides the ethical foundation, recreation serves as the mediating practice, and ecology anchors the system within biophysical limits. Collectively, these dimensions form a conceptual architecture for reimagining recreational planning as an ethical, adaptive, and participatory process that aligns ecological stewardship with social legitimacy [52].

Figure 4. Conceptual framework for Justice-Recreation-Ecology Triangle for planning in protected landscape.

The Justice–Recreation–Ecology (JRE) framework illustrates the conceptual relationship where Justice provides the ethical foundation, Recreation serves as the socio-economic mediator, and Ecology defines the biophysical limits for sustainable protected landscape governance.

At its normative core, the framework is grounded in the principles of distributive, procedural, recognition, and restorative justice. Distributive justice concerns how economic and ecological benefits, such as tourism income or infrastructure investments, are fairly shared among stakeholders (e.g., park agencies, local communities, and visitors). Procedural justice calls for participatory governance, ensuring that decisions about recreational access, infrastructure, and resource use include local and Indigenous voices[53]. Recognition justice acknowledges diverse cultural meanings and the historical contexts of land use, while restorative justice seeks to repair past exclusions and displacements associated with conservation policies[54]. Together, these forms of justice transform recreation from an act of consumption into a shared social responsibility that connects enjoyment with fairness, inclusion, and accountability[55]. The recreation dimension of the JRE framework redefines access to natural spaces as a socio-ecological right rather than a privilege. Recreational participation promotes physical health, well-being, and environmental awareness, but access remains uneven across class, gender, and geography. Research on African and Asian protected areas shows that local communities often face restrictions or receive minimal benefits from tourism revenues, leading to resentment and disengagement[1,7]. Reframing recreation as a right demands equitable access policies, affordable entry systems, and benefit-sharing mechanisms that empower host communities. In this sense, recreation becomes a vehicle for co-stewardship, where residents, managers, and visitors collaborate in sustaining ecological and cultural values. Successful examples include participatory tourism models in Namibian conservancies and Nepal's Annapurna region, where communities design visitor routes and share management authority, enhancing both legitimacy and conservation outcomes[15,18].

The ecological dimension anchors recreational plan-

ning within the material limits of ecosystems. While recreation generates economic opportunities, it can also accelerate land degradation, habitat disturbance, and carbon emissions [12,36]. Ecological integrity, therefore, defines the boundary within which justice and recreation can operate. Adaptive management strategies such as the Visitor Experience and Resource Protection (VERP) framework and Limits of Acceptable Change Models illustrate how recreation can be balanced with biodiversity goals [35,37]. Furthermore, integrating remote sensing and GIS-based monitoring enhances transparency in tracking visitor impacts, land-use change, and ecosystem recovery [22–25]. Yet, technology must serve inclusive governance; without equitable access to data, digital systems risk reinforcing epistemic inequality and "data colonialism." Hence, local capacity building and community-based monitoring are essential for ensuring that technological innovation aligns with social inclusion [47,48]. The JRE framework also foregrounds the multifunctionality of landscapes, recognising that protected areas simultaneously serve ecological, cultural, and economic purposes [54]. This challenges the legacy of fortress conservation that privileged ecological purity over human presence, proposing instead that biodiversity protection and human well-being can coexist through participatory management in multifunctional models such as European cultural landscapes or park buffer zones, where agriculture, heritage, and recreation interweave, producing both livelihood opportunities and ecosystem services [9,40,41]. By embracing multifunctionality, planners can integrate recreation with conservation finance, cultural revitalisation, and local empowerment rather than treating them as competing objectives.

Finally, the digital dimension of inclusion provides a contemporary frontier for justice-based recreational planning. Land informatization technologies such as GIS, remote sensing, and blockchain enable transparent monitoring, traceable benefit flows, and participatory spatial mapping [22–25,48]. When embedded in inclusive frameworks, these tools enhance procedural and distributive justice by democratizing access to information and ensuring that communities can verify how tourism revenues or conservation incentives are managed. However, equitable digitalisation also requires ethical safeguards—policies to prevent technological exclusion and ensure that local knowledge remains central to governance decisions [47]. These dimensions are not discrete but interwoven. Justice shapes how multifunctionality is defined and contested; digital technologies influence how participation and accountability are structured; and ecological constraints continually redefine what forms of recreation are sustainable. Together, they constitute a justice-based theoretical architecture through which recreational planning becomes ethical, reflexive, and adaptive. This integrated framework repositions protected landscapes as arenas of co-stewardship, where ecological sustainability is inseparable from social legitimacy and cultural continuity [56]. It challenges technocratic planning paradigms that measure success by visitor numbers or revenue and instead promotes qualitative outcomes—equity, participation, and ecological resilience. Through the JRE lens, recreational planning emerges not as a peripheral managerial task but as a central instrument for building just and sustainable socio-ecological futures.

3. Global Trends in Recreational Planning for Protected Landscapes

Recreational planning in protected landscapes has evolved through diverse regional pathways shaped by ecological priorities, governance systems, and sociocultural values. While the overarching goal remains the reconciliation of conservation with human use, the means of achieving this balance vary widely across continents. In some regions, planning emphasizes community empowerment and livelihood diversification; in others, it prioritizes heritage protection, legal innovation, or data-driven management. These contrasting approaches reflect not only ecological realities but also deeper questions of justice, inclusion, and legitimacy in environmental governance. As illustrated in **Table 2**, regional models ranging from Africa's community-based conservancies to North America's technology-mediated visitor systems reveal both the promise and the paradox of integrating recreation within conservation agendas. Each model demonstrates how institutional design,

cultural context, and political economy shape the extent to which recreational landscapes serve as spaces of equity and ecological stewardship. The discussion that follows draws on these comparative insights to analyse how global experiences can inform a justice-oriented reimagining of recreational planning as one that treats access, participation, and sustainability as interdependent pillars of protected area governance.

Table 2. Regional Models of Recreational Planning in Protected Landscapes.

Region	Dominant Approach	Case Study	Key Strengths	Key Challenges
Africa	Community-based conservancies	Namibia's Communal Conservancies	Wildlife recovery, local revenue generation	Elite capture, fragile legitimacy
Asia	Heritage-based & participatory	Nepal's Annapurna Conservation Area	Strong community reinvestment, rural revitalization	Ecosystem strain from mass trekking
Latin America	Rights-based approaches	Ecuador's Rights of Nature framework	Legal innovations, indigenous empowerment	Implementation gaps, uneven tourism flows
Europe	Multifunctional landscapes	UK Lake District	Integrated farming–recreation model	Mass tourism pressures, cultural dilution
North America	Technology-driven visitor management	U.S. National Parks	Reservation systems, monitoring apps	Procedural inequities, overcrowding persists

3.1. Africa—From Exclusion to Negotiated Access

Protected landscapes in Africa have long been shaped by a colonial legacy of exclusion, where conservation was framed as the removal of local populations to create pristine spaces for wildlife and elite recreation [57]. Early national parks such as Kruger in South Africa or Serengeti in Tanzania embodied this fortress model, which sidelined indigenous communities and treated land primarily as an ecological and recreational resource for outsiders [58]. Over the past three decades, however, Africa has experienced a shift toward negotiated models that seek to reconcile conservation with local rights and livelihoods. Community-based natural resource management (CBNRM) in Namibia, Kenya's conservancies, and co-management initiatives in South Africa represent attempts to embed justice into recreational planning, albeit unevenly [59]. Recreational planning in this context is often intertwined with ecotourism, which is promoted as both a conservation financing mechanism and a driver of rural development. For example, Namibia's communal conservancies have generated significant revenues by linking wildlife tourism to community rights over land, leading to increases in wildlife populations and local incomes [60]. Current studies show that these conservancies generate millions in annual income and employ thousands of locals, strengthening local autonomy and conservation [60]. Similarly, Kenya's Maasai Mara conservancies have created partnerships between landowners, tourism operators, and conservation NGOs, offering a model where local households receive lease payments while landscapes are maintained for both wildlife and tourism [61]. Yet these arrangements are not free from challenges. Elite capture, where wealthier landowners benefit disproportionately, and governance struggles, where participation is more rhetorical than real, undermine the distributive and procedural justice dimensions of these initiatives [62].

In terms of recreational planning, African landscapes often carry dual burdens: on one hand, the demand to accommodate international tourists seeking wilderness experiences; on the other, the need to provide access for local communities who view these spaces as ancestral territories and sources of subsistence. The failure to balance these claims can produce ecological overstrain and social tensions. For instance, in Uganda's Bwindi Impenetrable National Park, gorilla tourism provides substantial revenue, yet restrictions on forest use have intensified resource conflicts with neighboring communities [63]. Such tensions highlight the precarious balance between ecological restoration goals and local justice claims. Therefore, the future of African recreational planning lies in transcending the binary of exclusion versus inclusion and adopting hybrid models that integrate land protection, ecological restoration, and cultural continuity. Approaches such as payments for ecosystem services, participatory mapping, and digital monitoring of visitor flows are emerging, but their success hinges on robust governance frameworks

and transparent benefit-sharing[48]. Africa's contribution to global debates is its ongoing experimentation with justice-centered models of land use in protected landscapes.

3.2. Asia—Heritage, Participation, and Overuse

Asia's protected landscapes reveal the tensions of rapid modernization, deep cultural traditions, and intense recreational demand. Unlike Africa's fortress legacy, Asia's parks and reserves are often linked to spiritual and cultural heritage, which complicates the binaries of exclusionary conservation. The Annapurna Conservation Area (ACA) in Nepal exemplifies this model. Here, local communities are actively engaged in governance, and revenues from trekking permits are reinvested into rural infrastructure, schools, and conservation projects[64]. The ACA model, which covers over 7600 sq km and employs thousands of locals, represents one of Asia's most successful participatory models for revenue reinvestment and rural revitalization[64]. Recreational planning is thus positioned not only as ecological management but as a vehicle for rural revitalization, embedding conservation within broader development agendas. However, Asia faces unique pressures of scale. The region's burgeoning middle class, especially in countries like China and India, has generated a surge in domestic tourism. National parks such as Zhangjiajie in China or Jim Corbett in India attract millions of visitors annually, overwhelming fragile ecosystems[65]. The ecological carrying capacity of trails, temples, and mountain ecosystems is frequently exceeded, leading to vegetation loss, waste accumulation, and habitat disturbance. This underscores the paradox of participatory planning: while it democratizes access, it often accelerates ecological strain when not coupled with strict visitor management systems.

Justice dimensions in Asia are complex. Procedural justice is often advanced through participatory planning models, yet distributive justice remains uneven. Communities may benefit from tourism, but benefits are not equitably distributed across gender, caste, or ethnic lines[66]. Recognition justice is particularly salient, as many protected landscapes are intertwined with indigenous or sacred geographies. For instance, in Bhutan, the integration of Gross National Happiness into conservation policy explicitly acknowledges cultural and spiritual values, creating a holistic model of recreational planning[67]. Yet even here, commercialization risks diluting traditional practices and transforming heritage into commodified attractions. Also, technological innovations are beginning to play a role in mitigating overuse. In India, digital ticketing systems and geofencing have been introduced in tiger reserves to control visitor numbers. In China, remote sensing is increasingly used to monitor ecological degradation in heavily visited areas[68]. However, these tools often reflect top-down governance logics, raising questions about procedural fairness and inclusivity. Thus, Asia contributes to global trends by demonstrating the possibilities and pitfalls of heritage-based and participatory models of recreational planning. While culturally grounded approaches foster local legitimacy, without robust ecological safeguards, they risk undermining the very landscapes they seek to protect. The region thus highlights the need for integrated frameworks that unite heritage recognition with strict ecological limits and distributive equity.

3.3. Latin America—Rights-Based Pathways to Land and Recreation

Latin America represents one of the most radical reimaginings of recreational planning in protected landscapes, driven by legal innovations and indigenous rights movements. Ecuador's 2008 Constitution enshrined the Rights of Nature, granting ecosystems legal standing and reshaping the basis for conservation and recreation alike[69]. This rights-based approach reframes landscapes not merely as resources for human enjoyment or economic gain but as entities with intrinsic value. Recreational planning, under such frameworks, must navigate obligations to both people and ecosystems. Indigenous-led tourism initiatives illustrate how rights discourses materialize in practice. In Bolivia, the Chalalán Ecolodge, run by the Quechua-Tacana people, integrates ecotourism with cultural preservation and biodiversity protection[70]. Similarly, in Brazil's Xingu Indigenous Territory, community-driven tourism projects foreground indigenous cosmologies and re-

sist extractive pressures [71]. These models foreground recognition justice by embedding indigenous values and knowledge into recreational planning, while also supporting distributive justice through local control of revenues. Nevertheless, rights-based frameworks encounter formidable challenges. Implementation is uneven, and competing economic imperatives, especially extractive industries, often override legal commitments to ecosystems and communities [72]. Moreover, tourism flows are spatially uneven: while some regions like Costa Rica's Monteverde Cloud Forest thrive as ecotourism hubs, others remain marginalized, limiting the redistributive potential of recreation-based economies.

Latin America's approach underscores the importance of restorative justice, as many initiatives are framed as responses to historical dispossession and exploitation. In Colombia, post-conflict conservation programs seek to transform former conflict zones into ecotourism destinations, aiming to reconcile ecological restoration with social healing [73]. However, these projects often face difficulties in ensuring local participation and avoiding new inequalities. By foregrounding justice as a legal and cultural imperative, Latin America expands the conceptual horizons of recreational planning. Instead of viewing landscapes primarily through managerial or developmental lenses, it insists on ethical obligations to nature itself. This offers a provocative contrast to technocratic models elsewhere and resonates with global debates about rights, justice, and sustainability as indicated in **Table 3**.

Table 3. Dimensions of Land Justice in Recreational Planning.

Justice Dimension	Key Questions	Example Practice	Limitations
Distributive Justice	Who benefits economically from recreation?	Revenue-sharing in Maasai Mara Conservancies	Benefits skewed to landowners, not laborers
Procedural Justice	Who participates in decision-making?	Community councils in Nepal's Annapurna region	Risk of tokenism, unequal representation
Recognition Justice	Whose cultural values are acknowledged?	Indigenous-led eco-tourism in Xingu, Brazil	Tourism can commodify culture
Restorative Justice	How are historical injustices addressed?	Post-colonial land reforms in South Africa	Implementation often slow, contested

3.4. Europe—Multifunctional Landscapes Under Pressure

Europe's protected landscapes are deeply embedded in lived cultural landscapes rather than wilderness ideals. Areas such as the UK's Lake District, France's Regional Natural Parks, and Spain's cultural landscapes of olive groves and terraced vineyards exemplify a multifunctional approach where conservation, recreation, and agriculture coexist [74]. This multifunctionality offers a distinct model: rather than separating people from nature, landscapes are managed as socio-ecological mosaics where recreation is integrated with cultural heritage and rural economies. Recreational planning in Europe is often sophisticated, supported by strong institutional frameworks and regional planning instruments. Visitor quotas, zoning systems, and heritage management plans attempt to reconcile mass tourism with ecological and cultural protection [75]. Yet despite these tools, Europe faces significant pressures from overtourism. The Lake District receives several million of visitors annually, producing congestion, pollution, and rising housing costs for local residents [76], while in the Mediterranean landscapes, climate change is compounding pressures, with heatwaves intensifying visitor impacts on fragile ecosystems.

Justice in Europe often manifests through distributive and recognition dimensions. Rural communities benefit economically from tourism, yet inequities persist in who controls tourism-related businesses. Recognition justice emerges in debates over cultural commodification: local traditions risk being repackaged for tourists, leading to tensions over authenticity and ownership [77]. Procedural justice is bolstered by strong participatory planning traditions, though bureaucratic complexities can limit genuine community influence. Technological innovations such as digital visitor monitoring, smart mobility apps, and remote sensing are increasingly used to manage flows, but they raise questions of privacy and accessibility [78]. Furthermore, Eu-

rope's landscapes are not immune to ecological challenges. Mountain regions such as the Alps face erosion and biodiversity decline due to both tourism and climate pressures. The European model thus demonstrates the promise of multifunctionality but also the risks of saturation in high-demand landscapes.

3.5. North America—Technology, Access, and Inequities

North America's recreational planning is dominated by national parks, which symbolize democratic access to nature yet struggle with issues of overcrowding, equity, and ecological stress. The U.S. National Park System, with over 300 million annual visits, exemplifies the paradox: while framed as "America's best idea," parks are often overcrowded, underfunded, and unevenly accessible [35]. Canada faces similar tensions, with Banff and Jasper National Parks overwhelmed by mass tourism while other parks remain under-visited. Technological solutions are central to North American approaches. Digital reservation systems, visitor monitoring apps, and GIS-based carrying capacity analyses have been deployed to regulate visitor flows. For example, Yosemite and Rocky Mountain National Parks have introduced timed-entry systems to limit congestion, while remote sensing monitors trail erosion and habitat disturbance [79]. These innovations highlight North America's contribution to global trends: the embrace of land informatization for recreational planning.

However, technology does not resolve underlying justice issues. Procedural justice is undermined when reservation systems privilege those with reliable internet access and flexible schedules, often excluding marginalized groups [80]. Recognition justice remains contested, as indigenous peoples continue to struggle for greater involvement in managing ancestral lands that were appropriated for park creation. Restorative justice efforts such as co-management agreements in Canada represent steps forward, but systemic inequities persist. Moreover, ecological pressures are acute as climate change intensifies wildfire risks in western parks and threatens biodiversity in iconic landscapes like Yellowstone. Thus, recreational planning is not just grappling now with only visitor flows but also with shifting baselines of ecosystem health [81]. North America's lesson for global practice is that technological sophistication cannot substitute for structural equity. Without embedding justice into digital governance systems, recreational planning risks deepening inequalities while managing symptoms rather than causes.

3.6. Comparative Insights Across the Regions

Viewed through the Justice–Recreation–Ecology (JRE) framework, global patterns of recreational planning in protected landscapes reveal how justice, ecological integrity, and human enjoyment remain deeply interconnected yet persistently imbalanced. Across regions, different governance models such as community conservancies in Africa, heritage-based participation in Asia, rights-based frameworks in Latin America, multifunctional cultural landscapes in Europe, and technology-led visitor systems in North America reflect distinct historical legacies and socio-political contexts. Despite these variations, a shared dilemma persists: achieving a sustainable equilibrium between access, stewardship, and fairness in socio-ecological systems [82].

From the justice perspective, three interdependent dimensions, namely, distributive, procedural, and recognition, continue to define both the potential and limitations of recreational governance. Africa's community-based conservancies, for instance, exemplify distributive justice through local revenue-sharing systems that return a portion of tourism income to rural households, strengthening conservation incentives. Yet procedural justice remains fragile where elite capture restricts participation or traditional hierarchies dominate decision-making processes. In Asia, participatory and heritage-driven initiatives, such as those in Nepal's Annapurna region, foreground recognition justice by embedding local culture, religion, and livelihoods within conservation and recreation planning. However, these efforts are strained by mass trekking and infrastructural pressures that threaten fragile mountain ecosystems. These cases illustrate that recognition justice without ecological limits risks perpetuating short-term inclusivity at the cost of long-term resilience [83].

In Latin America, rights-based approaches, most

notably Ecuador's Rights of Nature framework, represent a bold attempt to institutionalize restorative justice, where ecosystems are recognized as legal subjects with intrinsic value. Yet, despite this legal innovation, implementation remains inconsistent. Governance gaps and limited local capacity have led to uneven enforcement, reflecting how procedural justice depends on institutional strength and political legitimacy. Similarly, European multifunctional landscapes, like the UK's Lake District, demonstrate distributive and recognition dimensions of justice through integration of farming, recreation, and conservation. While this multifunctionality revitalizes rural economies and sustains cultural traditions, it also generates new ecological risks, such as habitat fragmentation, soil compaction, and carbon-intensive visitation [84].

Through the recreation lens, regional contrasts also expose a persistent paradox. Recreation is often promoted as a tool for funding conservation and enhancing public awareness, yet it remains a source of ecological and social pressure. In North America, for instance, technology-driven visitor management systems such as digital reservation platforms, trail sensors, and real-time data dashboards illustrate how innovation can enhance procedural equity by distributing visitor loads more fairly. However, these systems also raise ethical and access concerns, particularly when digital literacy or connectivity becomes a new barrier to participation. Likewise, in Africa and Latin America, elite-oriented ecotourism has restored wildlife populations and generated revenue, but often excludes local residents from decision-making and access. Conversely, over-participation in parts of Asia and Europe demonstrates that inclusion without ecological oversight can also erode sustainability. The JRE framework, therefore, positions recreation not merely as an economic or leisure function but as a co-stewardship practice, where participation must be matched with ecological accountability [85].

The ecological dimension of the JRE triangle underscores how environmental integrity both enables and constrains justice and recreation. Each regional model demonstrates that ecological resilience is not an automatic by-product of inclusive governance and it requires explicit management of thresholds, feedbacks, and cumulative impacts. For example, multifunctional landscapes in Europe demonstrate how over-visitation accelerates biodiversity loss and undermines local ecological carrying capacities. Similarly, the reliance on wildlife-based tourism in African conservancies has sometimes produced species recovery without broader ecosystem restoration, reflecting a narrow ecological focus. The paradox is that justice-oriented and participatory planning processes, while socially progressive, can inadvertently intensify ecological strain when growth in access outpaces ecosystem capacity [86].

The fourth and increasingly decisive factor is digital and legal innovation, which cuts across the justice–recreation–ecology nexus. In North America, technologies such as GIS-based mapping, blockchain for benefit tracking, and citizen-science monitoring platforms are enhancing transparency and adaptive management. In Latin America, constitutional recognition of nature's rights provides a complementary legal basis for ecological justice. Yet both technology and law remain tools, not solutions, whose effectiveness depends on contextual legitimacy. Without local trust, institutional capacity, and participatory oversight, technological precision can devolve into exclusionary control, while legal frameworks may remain symbolic. Thus, equitable recreational planning requires that digital governance systems be co-designed with communities and embedded within culturally grounded institutions [87].

Across all regions, a forward-looking task is the development of integrated indicators capable of capturing the interdependencies among justice, recreation, and ecology (**Table 4**). Such indicators must go beyond ecological metrics like biodiversity or habitat quality to include procedural and distributive dimensions such as equity in benefit-sharing, local representation, and recognition of Indigenous landscapes. Measurable justice–recreation–ecology indicators would allow for comparative assessment of planning approaches and foster adaptive learning across regions. The JRE triangle, illustrated in **Figure 3**, thus serves both as a diagnostic tool and a design principle for planners and policymakers. It emphasizes that protected landscapes are not static territories but evolving socio-ecological systems where justice,

recreation, and ecology must remain in continuous dialogue [88]. These cross-regional contrasts highlight the importance of adaptive justice indicators that respond to ecological thresholds and cultural contexts.

Table 4. KPIs for Justice–Recreation–Ecology Triangle.

JRE Dimension	KPI	Unit of Measurement	Recommended Frequency	Responsible Institution
Justice	Benefit Retention Rate	Percentage (%) of revenue retained locally (measured against total revenue)	Annually	Park Authority/Local Government, Economic Audit Agency
	Participation Rate	Percentage (%) of key stakeholder groups (disaggregated by gender/age/ethnicity) in planning meetings/surveys	Biannually	Park Authority/NGOs, Local Community Council
	Recognition of Knowledge	Binary (Y/N) on formal citation/incorporation of IEK in the current management plan	Every 5 Years (Plan Review)	Park Authority, Academic Partners
Recreation	Equitable Access Index (EAI)	Composite score (0–100) based on demographic data (income, distance travelled, social inclusion)	Biannually	Park Authority/ Sociological Researchers
	Digital Inclusion Score	Percentage (%) of users who access services via low-tech alternatives (vs. online-only)	Annually	Park Authority/IT Department
	Conflict Rate	Number of documented conflicts (social/ecological) per 1000 visitor days	Quarterly	Park Authority/Ranger Patrols
Ecology	Biodiversity Intactness Index	Relative species richness/abundance (e.g., Shannon index, compared to baseline)	Annually/ Biennially	Park Authority/Ecological Research Unit
	Ecosystem Restoration Area	Area (in hectares) under active restoration (e.g., reforesting, trail remediation)	Annually	Park Authority/Conservation NGOs
	Ecological Footprint per Visitor	Kilograms of CO_2e per visitor (including travel, waste, water)	Annually	Park Authority/Sustainability Consultants

4. Key Performance Indicators

4.1. Translating the Framework into Key Performance Indicators

The strength of the Justice–Recreation–Ecology Triangle lies not only in its conceptual elegance but in its capacity for translation into measurable Key Performance Indicators (KPIs). While ecological monitoring is relatively well established, encompassing biodiversity indices, habitat quality assessments, and ecological footprint measures [89], systematic justice-oriented indicators remain underdeveloped in recreational planning. Addressing this gap is therefore essential to operationalize justice alongside recreation and ecology. For justice, three clusters of KPIs are particularly salient. First are distributive indicators, such as the percentage of tourism revenue retained by local communities, or the proportion of employment in recreational enterprises sourced locally [90]. Second are procedural indicators, such as the frequency of community consultations, representation of marginalized groups in governance boards, and transparency of decision-making processes [91]. Third are recognition indicators, which assess the extent to which indigenous and cultural practices are formally incorporated into recreational planning [92]. Together, these metrics move justice from a normative principle into a practical dimension of evaluation.

Recreation, meanwhile, requires indicators that balance quantity and quality. Visitor numbers remain important but insufficient alone. Complementary KPIs include visitor satisfaction indices, diversity of recreational activities available, and accessibility measures such as affordability and transport connectivity [6,7,92]. Digital reservation systems can be assessed for equity of access, particularly whether they exclude technologically marginalized groups [93]. These KPIs reveal not only how landscapes are used but also who benefits from their recreational value. Ecological indicators also remain indispensable, with KPIs such as species richness, habitat fragmentation rates, carbon sequestration potential, and pollution or litter indices [94–98]. Importantly,

ecological KPIs should be interpreted in relation to justice and recreation metrics. For example, if biodiversity improves but local communities lose access to subsistence resources, justice is compromised. Conversely, high visitor numbers that degrade habitats undermine both recreation quality and ecological integrity.

The challenge is the integration of these KPIs into recreational planning processes. A single KPI framework risks reductionism, but dashboards that display multiple indicators can offer balanced monitoring. Land informatization technologies like remote sensing, GIS, and blockchain for revenue tracking can facilitate transparency and real-time monitoring [22,48]. However, equity must be safeguarded with a clear definition of who controls data, and whose indicators are prioritized. Thus, KPI translation is not merely technical but political, reflecting the power to define what counts as success in protected landscapes. By embedding justice alongside ecological and recreational metrics, KPIs transform the JRE framework into a practical tool for governance, enabling landscapes to be managed not only for biodiversity and visitor flows but for equity and legitimacy.

4.2. Advantages and Limitations of the Framework

The Justice–Recreation–Ecology (JRE) framework, operationalized through key performance indicators (KPIs), offers a transformative approach to evaluating recreational planning in protected landscapes. Its central contribution lies in broadening assessment criteria beyond biophysical conservation metrics to encompass distributive fairness, participatory inclusion, and cultural recognition. This reframing is particularly important in regions where conservation has historically marginalized local voices, ensuring that recreation is understood as a shared stewardship process rather than an external pressure on ecosystems [1,20].

A major strength of the JRE model is its ability to institutionalize accountability through measurable indicators that integrate social and ecological dimensions (**Figure 5**). By embedding justice variables such as community benefit-sharing ratios, representational parity, and accessibility equity within the same evaluative matrix as biodiversity or visitor-flow data, the framework bridges the persistent divide between ecological science and social policy. This quantitative–qualitative synthesis allows planners and communities to track both conservation success and social fairness in parallel, promoting adaptive governance grounded in evidence rather than assumption [9,23]. Through this mechanism, land-use managers can visualize spatial and temporal alignments between ecological integrity and community well-being, enabling decisions that are both environmentally sound and socially legitimate. The framework also enhances cross-regional learning by providing a common evaluative grammar for diverse governance contexts. KPIs permit benchmarking between, for example, Namibia's community conservancies, Nepal's heritage-based tourism programs, and Costa Rica's rights-of-nature initiatives. Such comparisons illuminate both best practices and contextual vulnerabilities, generating globally transferable insights while maintaining sensitivity to local realities [21]. Importantly, the framework strengthens inter-institutional coordination: conservation agencies, tourism boards, and rural-development departments can align around shared indicators that reflect the intertwined goals of justice, recreation, and ecology [5].

Despite these advantages, the framework presents significant challenges. It's very reliance on metrics introduces an epistemic risk of reductionism. Justice is inherently contextual, relational, and dynamic—qualities that resist compression into numerical form. Quantifying participation by counting consultation meetings, for instance, may overlook who actually influences decisions or how power circulates within deliberations. Similarly, measuring income distribution can obscure intangible values such as cultural continuity, identity, or spiritual connection to the landscape [3]. Over-emphasis on measurement can thus create a technocratic illusion of inclusivity, in which representation on paper substitutes for empowerment in practice. A second limitation involves data asymmetry and limited institutional capacity, especially in developing contexts where qualitative and participatory data collection remains under-resourced. While ecological data can increasingly be captured through remote-sensing networks, social-justice indicators demand trust-based engagement, fieldwork,

and cross-disciplinary expertise [22]. These activities are time-consuming and financially intensive, and without adequate support, evaluative processes risk privileging what is easily measurable over what is meaningful. Strengthening community-led monitoring, participatory GIS, and local data stewardship is therefore essential for ensuring that the evidence base itself reflects plural knowledge systems [24,25].

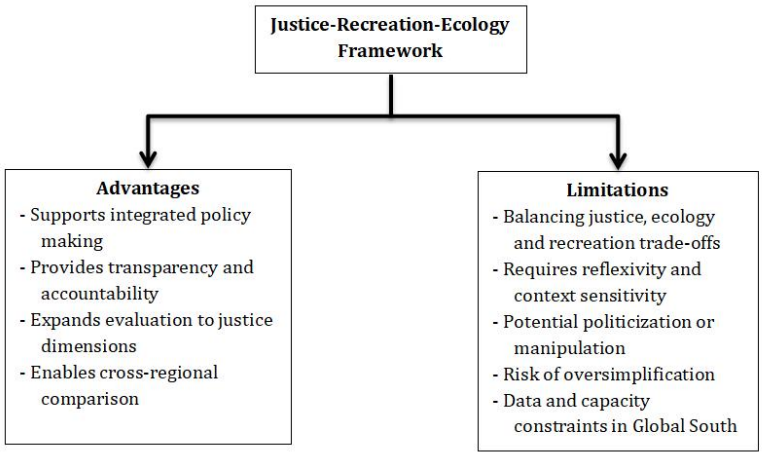

Figure 5. Advantages and Limitations of the Justice–Recreation–Ecology (JRE) framework.

Another vulnerability concerns political manipulation and selective reporting. In settings where environmental data influence investment or international funding, actors may emphasize favorable indicators while concealing distributive or procedural failures. Governments might publicize increased tourism revenue while neglecting inequitable benefit distribution, or showcase digital monitoring as transparency while consolidating centralized control [20]. Without participatory oversight, technology-driven monitoring can replicate the very asymmetries it seeks to remedy. Establishing open-access data platforms and third-party audits can mitigate these risks by embedding accountability within both institutional and technological structures [21]. A deeper issue lies in the normative tensions intrinsic to the JRE triangle. Justice, recreation, and ecology frequently generate competing imperatives that resist perfect reconciliation. Restricting tourist numbers may safeguard fragile habitats and uphold ecological justice, yet diminish local livelihoods dependent on visitor income. Conversely, maximizing community revenue can escalate ecological stress or cultural commodification. These trade-offs reveal that justice is not an equilibrium to be achieved but a continuous negotiation requiring ethical judgment and adaptive learning [6]. The JRE framework's value, therefore, resides less in resolving conflicts than in making them visible, thus transforming tensions into opportunities for deliberation and collective problem-solving.

Furthermore, technological and methodological dependencies expose structural inequalities in capacity. Access to GIS, remote-sensing data, or blockchain-based tracking remains uneven across regions, reinforcing informational hierarchies between global research institutions and local communities. Equitable implementation requires targeted capacity-building, open-source tools, and inclusive data governance protocols that guarantee community ownership of environmental information [21,48]. Technology, in this sense, becomes not merely an analytical instrument but a political space where questions of sovereignty, trust, and recognition are negotiated. Finally, the framework must confront its normative fragility: the pursuit of measurable justice can unintentionally privilege procedural efficiency over moral depth. Indicators cannot replace ethical reflexivity. Policymakers and researchers must therefore approach the JRE framework as a heuristic device or a guiding structure that encourages iterative reflection rather than a prescriptive checklist. When applied critically, it facilitates multi-stakeholder dialogue, exposes trade-offs, and fosters mutual accountability among institutions and communities [23]. Therefore, the JRE–KPI frame-

work offers an innovative synthesis of justice, recreation, and ecology that operationalizes ethical commitments through structured evaluation. However, its transformative power depends on how reflexively it is used. Applied uncritically, it risks reinforcing technocratic hierarchies; applied reflexively, it can cultivate transparency, inclusivity, and resilience within protected-landscape governance. In summary, the JRE–KPI framework succeeds when reflexively applied as a dialogue among science, ethics, and community governance rather than as a fixed checklist.

4.3. Towards an Integrated Monitoring Culture

For the Justice–Recreation–Ecology (JRE) framework to realize its transformative potential, it must operate within an integrated monitoring culture that unites technical precision with participatory legitimacy. Such a culture recognizes that indicators are not neutral instruments but expressions of value systems, power relations, and competing imaginaries of what landscapes should become. Monitoring, therefore, must be understood not only as a technical exercise but as a political and ethical practice that shapes how justice, recreation, and ecology are defined and pursued.

Integrated monitoring depends on methodological pluralism. Quantitative measures such as biodiversity indices, satellite imagery, and visitor analytics are indispensable for ecological accountability, yet they capture only part of the story. Qualitative methods such as community storytelling, participatory mapping, ethnographic observation, and deliberative workshops reveal the cultural, emotional, and historical layers that underpin ecological behavior. When combined, these approaches produce multi-dimensional insights that reflect how people experience and negotiate protected landscapes. For instance, remote-sensing data showing vegetation recovery should be interpreted alongside local narratives of soil fertility or resource access; otherwise, ecological improvement may be mistaken for social well-being. Equally important is the creation of participatory technology governance. Digital and spatial tools like GIS, drones, and blockchain must be co-designed and co-managed with the communities whose territories they monitor[21,22,48]. Participatory GIS, for example, enables communities to embed indigenous spatial knowledge into formal mapping systems, while blockchain-based revenue tracking can enhance transparency in tourism income distribution when locally governed. Such innovations shift power from centralized authorities toward shared stewardship, transforming technologies from instruments of surveillance into vehicles of equity and accountability.

Institutional embedding is another prerequisite for durable impact. Monitoring frameworks should be woven into the operational structures of national park management plans, community-conservancy agreements, and regional reporting mechanisms such as the Convention on Biological Diversity. Embedding ensures that KPIs inform decision-making and are not confined to academic or donor-driven exercises. National and subnational agencies can employ the JRE indicators to evaluate distributive outcomes, participation quality, and ecological thresholds simultaneously, linking micro-scale monitoring with policy-level accountability[1,20]. This alignment prevents fragmentation and institutional fatigue, enabling a coherent flow of knowledge from field observations to strategic reform. An integrated monitoring culture must also embody adaptive governance. Indicators should be iterative rather than static, and revised through periodic stakeholder dialogues that respond to shifting ecological baselines and social expectations. As climate change accelerates and visitor demographics diversify, what counts as justice or ecological success will evolve. Hence, monitoring systems should function as learning architectures: diagnosing emerging inequities, revising metrics, and redistributing authority as contexts change[6,9]. Adaptive monitoring transforms evaluation into a continuous conversation rather than a one-time audit. Building such a culture also demands capacity development. Local institutions and communities must possess the skills and resources to collect, interpret, and act upon data. Training in participatory GIS, environmental auditing, and social-impact assessment ensures that monitoring remains locally anchored rather than externally imposed. When knowledge production becomes collaborative, it enhances both the credibility and the legitimacy of conservation outcomes.

4.4. Managing Trade-Offs and Complexity

Implementing a matrix of JRE metrics is inherently complex, as the indicators often present trade-offs. A crucial aspect of justice-oriented planning is explicitly acknowledging and managing these conflicts, which requires procedural transparency and robust political negotiation [47]. For instance, maximizing Benefit Retention Rate (Justice KPI) by increasing visitor numbers might compromise the Biodiversity Intactness Index (Ecology KPI). Similarly, achieving perfect Procedural Justice by including every stakeholder in every decision may slow down urgent ecological responses, negatively impacting the Ecosystem Restoration Area (Ecology KPI). The JRE framework handles these trade-offs by setting a non-negotiable boundary for the Ecology dimension: ecological integrity must not fall below a defined threshold, even if it limits recreational or economic growth. Within this ecological boundary, managers must use the procedural justice metrics (Participation Rate) to negotiate acceptable trade-offs for distributive outcomes. Decision-making processes should be mandatory, structured around multi-stakeholder workshops, and based on consensus-building (or formal voting) to weigh conflicting KPI outcomes transparently. This approach moves planning from merely reporting individual KPIs to using them as levers for adaptive, politically legitimate decision-making. The integration of digital tools, specifically GIS and remote sensing, enables the rapid visualization of these trade-offs, providing a common data platform for all stakeholders to negotiate potential conflicts, for example, mapping out areas where tourism revenues are low but ecological fragility is high.

5. Discussion and Policy Pathways

5.1. Reconciling Competing Land Claims

Recreational planning within protected landscapes is rarely a neutral exercise of design and policy; it is instead a terrain of contestation where multiple claims to land intersect [99,100]. Governments often frame protected landscapes as assets for tourism, biodiversity conservation, and national pride, while rural communities perceive them as ancestral domains central to cultural identity and livelihood security [101]. Private investors, meanwhile, increasingly view such landscapes as sites for real estate development, eco-lodges, or commercial agriculture. The challenge is that these claims are not merely economic; these claims are imbued with histories of dispossession, cultural marginalization, and uneven power relations that recreational planning either exacerbates or seeks to redress. The historical roots of these conflicts can be traced to colonial-era land policies that designated vast tracts as game reserves or national parks, often displacing rural populations under the guise of conservation [102]. Postcolonial governments, while rhetorically committed to rural revitalization, frequently maintain exclusionary conservation regimes that prioritize tourism revenue over community access. For instance, in East Africa, the creation of expansive safari landscapes has generated significant foreign exchange earnings but entrenched inequalities by restricting pastoralist grazing rights [103]. A similar dynamic is evident in parts of Southeast Asia, where mangrove reserves restrict traditional fishing but allow high-end ecotourism projects.

Reconciling these competing land claims requires a justice-oriented framework that goes beyond monetary compensation or token participation. It involves recognizing the legitimacy of customary land rights, embedding cultural values into land management, and creating binding mechanisms that hold both state and private actors accountable for distributive and procedural fairness [104]. Such recognition is not only ethically necessary but also pragmatic; research consistently shows that exclusionary protected areas face higher rates of conflict, encroachment, and ecological degradation than those designed with community stewardship [105]. Thus, the first pathway towards equitable recreational planning is to confront the politics of land ownership head-on rather than masking them under the technocratic language of "sustainability." Unless competing claims are reconciled transparently, KPIs of ecological integrity and rural revitalization will remain unattainable.

5.2. Towards Just Recreational Planning

Moving towards just recreational planning requires embedding justice as both principle and practice. Jus-

tice in this context encompasses distributive fairness (who benefits), procedural fairness (who participates in decision-making), and recognitional justice (whose knowledge and cultural values are respected) [106]. Current planning frameworks often emphasize distributive outcomes, such as revenue-sharing schemes or community tourism projects, without addressing the deeper structural exclusions that shape participation. As a result, even when communities receive financial benefits, they remain peripheral actors in shaping the recreational vision of their landscapes. For example, case reflections reveal alternative possibilities. In the Annapurna Conservation Area of Nepal, a co-management model enables local communities to directly govern tourism permits and reinvest revenues into rural infrastructure and conservation [107]. This model has enhanced local legitimacy and improved conservation outcomes, demonstrating that procedural and recognitional justice are as critical as revenue sharing. In Europe, biosphere reserves under UNESCO's Man and the Biosphere (MAB) programme increasingly integrate participatory governance, enabling farmers, conservationists, and tourism stakeholders to negotiate land-use trade-offs collaboratively [108].

However, replicating these models requires sensitivity to context. In sub-Saharan Africa, attempts to transplant co-management frameworks have often faltered due to weak local institutions, elite capture, and lack of sustained financial support [109]. The lesson here is that justice cannot be designed as a template but must evolve through iterative negotiation, trust-building, and context-specific arrangements. Recreational planning, therefore, should be reframed not as a technical blueprint but as a continuous socio-political process. Critically, ecological integrity must remain central to this justice agenda. There is a risk that in emphasizing livelihoods and participation, conservation outcomes are diluted. The challenge is to design multi-objective frameworks where ecological restoration, biodiversity protection, and community well-being reinforce rather than undermine each other. Adaptive management tools, such as ecological monitoring linked to social KPIs (e.g., household income, land tenure security), can provide a balanced pathway [110]. Therefore, just recreational planning is not simply about adding a social component to conservation but about transforming the very logic of planning: from one that privileges external investors and state bureaucracies to one that acknowledges landscapes as lived spaces of justice, memory, and resilience.

5.3. Policy Instruments for Protected Landscapes

The translation of justice-oriented planning into practice depends on the policy instruments deployed. These instruments must address three interlocking domains: land tenure, governance frameworks, and ecological-economic incentives. Land tenure reform is foundational. Many conflicts in recreational landscapes stem from unclear or contested land rights, particularly in rural regions where customary claims coexist uneasily with statutory systems [111]. Recognizing community tenure within national legal frameworks provides security against displacement and creates a platform for negotiation in recreational planning. For example, in Mexico's ejido system, communities hold collective land rights while engaging in ecotourism initiatives, resulting in both livelihood benefits and enhanced conservation [112]. Also, the governance frameworks must shift towards co-management and polycentric arrangements. Centralized, state-led governance is ill-equipped to address the complexity of protected landscapes where ecological systems cross administrative boundaries, and stakeholders have divergent interests. Polycentric governance, where authority is distributed across multiple actors and scales, can enhance resilience, accountability, and innovation. This is particularly relevant for landscapes experiencing rapid ecological change due to climate impacts. This aligns with recent work on adaptive, multi-scalar environmental governance that stresses learning and accountability [113].

Ecological-economic incentives such as Payments for Ecosystem Services (PES), green taxation, and tourism levies can align conservation with local livelihoods. However, these mechanisms require robust institutional oversight to prevent elite capture. For instance, Costa Rica's PES program has been celebrated for restoring forests, but critiques highlight its tendency to

benefit wealthier landowners unless equity safeguards are embedded [114]. Therefore, designing financial incentives in recreational planning must be done with explicit distributive justice criteria. At the KPI level, policy instruments should be evaluated not merely on ecological outputs (e.g., species richness, forest cover) but also on justice metrics such as tenure security, participation rates, and equitable revenue distribution [115]. Embedding these dual metrics creates an accountability framework that reflects the multi-dimensional nature of recreational landscapes.

5.4. Technology and Participatory Monitoring

Technology offers powerful tools for planning, monitoring, and evaluating recreational landscapes, but its role must be critically assessed through the lens of justice and access. Remote sensing and Geographic Information Systems (GIS) are now widely used to map land cover, track deforestation, and monitor ecological change in near real time [22–24]. For recreational planning, such technologies enable evidence-based zoning, carrying capacity assessments, and restoration tracking. Yet, their deployment often reinforces technocratic control, sidelining local knowledge and creating dependency on external expertise. A more equitable approach is participatory monitoring, where communities are trained and equipped to gather ecological and social data. Citizen science initiatives have demonstrated that local actors can effectively monitor wildlife, forest health, and visitor impacts, generating datasets that complement scientific tools while fostering ownership [116]. For example, in Tanzania, community-based monitoring of wildlife corridors has enhanced both data quality and community legitimacy in decision-making.

However, technology can also deepen inequities if not carefully managed. Access to digital tools is uneven across rural areas, raising questions of digital divides and data sovereignty [117]. Moreover, reliance on external platforms for data storage and analysis may compromise community autonomy. Thus, policy frameworks should emphasize technology transfer, capacity building, and community control of data. KPIs in this domain should track not only ecological outcomes (e.g., habitat connectivity) but also participation metrics, such as the proportion of monitoring activities conducted by local actors and the degree of community data ownership. Such indicators would help ensure that technology enhances, rather than undermines, land justice.

5.5. International Lessons and Transferability

Global experiences offer valuable lessons for rethinking recreational planning, but they also caution against the uncritical transfer of policies across diverse socio-ecological contexts. In Europe, the Natura 2000 network demonstrates the potential for large-scale ecological corridors that harmonize conservation and recreation through integrated land-use governance. This success is supported by strong legislative frameworks, dedicated funding, and institutional coordination across member states, ensuring that human access coexists with biodiversity protection [118]. In Latin America, community-led ecotourism projects, particularly in the Amazon Basin, exemplify how indigenous stewardship can align conservation with cultural continuity and livelihood diversification. These initiatives illustrate that when local governance systems retain decision-making power, recreational landscapes become vehicles for both ecological restoration and socio-cultural empowerment [119]. In Asia, participatory coastal zone management in mangrove ecosystems, such as in Thailand and the Philippines, has shown how inclusive governance can mitigate conflicts between fishers, conservation authorities, and tourism operators. Here, recreation serves as both an economic opportunity and a negotiation platform for resource sharing, demonstrating the importance of adaptive, cross-sectoral collaboration [120].

In Africa, evolving models of recreational planning reflect growing efforts to reconcile conservation with justice and local livelihood needs. Kenya's community conservancies and Namibia's communal conservancy programme illustrate how devolution of land rights and benefit-sharing can transform protected areas into spaces of co-management, where tourism revenues directly support local development and wildlife protection [121]. Similarly, South Africa's Working for Ecosystems and People and Parks programmes integrate

recreation, restoration, and employment creation, aligning ecological objectives with social inclusion. However, many African initiatives still face challenges of inadequate funding, weak policy enforcement, and uneven community participation, highlighting that achieving equitable recreational landscapes requires not just policy transfer, but locally adaptive governance anchored in social justice and ecological resilience.

The transferability of these lessons depends on institutional capacity, socio-political histories, and ecological conditions. In many African countries, weak tenure regimes and centralized governance limit the viability of community-led models without sustained external support[122]. Similarly, high levels of poverty may constrain the adoption of PES schemes that require upfront investment. A critical takeaway is that policy tourism, which is the practice of importing models without contextual adaptation, often fails. Instead, international lessons should serve as inspirations for locally negotiated solutions rather than prescriptive templates. A promising approach is policy hybridity, where elements from global experiences are selectively adapted and blended with local traditions and governance practices. For instance, Ghana's Community Resource Management Areas (CREMAs) draw on global co-management principles but are rooted in customary land tenure systems, making them more culturally resonant[123]. Such hybrid pathways hold greater promise for creating resilient recreational landscapes that honor both ecological and social imperatives.

5.6. The Pathways Forward

The future of recreational planning in protected landscapes depends on reimagining governance as a process of shared stewardship, which is a model that harmonizes ecological protection with the social and economic aspirations of local communities. Moving beyond the historical legacies of exclusionary conservation requires integrating land justice, rural revitalization, and ecological integrity within a single governance vision. These dimensions are not parallel objectives but interdependent processes that collectively sustain both people and nature. Institutional restructuring forms the first and most critical step. Traditional conservation frameworks, heavily centralized and expert-driven, have struggled to adapt to complex socio-ecological realities. Emerging scholarship on polycentric governance highlights that authority must be distributed across multiple, interacting centers, including state agencies, local communities, NGOs, and private actors, to ensure flexibility, accountability, and responsiveness to local knowledge[124]. Such institutional pluralism can transform communities from passive participants into active custodians, embedding local ecological intelligence in formal decision-making. In contexts where historical dispossession persists, formal recognition of community land tenure and co-management rights becomes a prerequisite for equitable recreational planning.

The second pathway concerns justice-centered evaluation. Conventional ecological indicators such as habitat integrity or species diversity remain important, yet they overlook the lived realities of social inequity. Justice-sensitive metrics must therefore assess who gains, who decides, and who is represented in landscape governance. Integrating dimensions of recognitional, distributive, and procedural justice into performance frameworks ensures that recreational landscapes do not reproduce exclusion beneath a sustainable façade. This reorientation redefines planning as a democratic negotiation rather than a technocratic exercise. The third pathway emphasizes ecological–economic alignment. Tourism revenues, ecosystem service payments, and restoration funds must simultaneously sustain biodiversity and strengthen local livelihoods. However, without transparency and safeguards, these mechanisms risk entrenching elite capture. Innovative financing instruments, including conservation trust funds, biodiversity credits, and climate adaptation finance, should prioritize community reinvestment, smallholder inclusion, and fair benefit distribution[125]. Economic incentives aligned with justice principles can generate a virtuous cycle of ecological care and local prosperity. Recreational landscapes should therefore evolve as living infrastructures of justice and resilience, where ecological functionality coexists with social equity and cultural vitality. As climate disruption, tourism pressure, and demographic change accelerate, the challenge is no longer to balance conservation and devel-

opment, but to redesign governance systems that bind them together through shared responsibility and moral purpose. Justice-centered recreational planning offers a transformative path that reframes protected landscapes not as isolated reserves or consumer space but as dynamic commons that embody the interdependence of environment, identity, and well-being.

6. Conclusions

Protected landscapes have reached a critical juncture: traditional models rooted in exclusion and elite recreation cannot sustain long-term social legitimacy or ecological stability. This paper argues forcefully that the question "Whose landscape is protected?" must be answered by placing justice at the core of all planning. We introduce the Justice–Recreation–Ecology (JRE) framework, which integrates justice as the ethical mandate, recreation as the social vehicle, and ecology as the biophysical boundary. The powerful take-home message is this: landscapes only truly thrive when local communities are empowered as co-stewards, anchored by secure land justice and shared governance. To achieve this, the JRE framework is operationalized through measurable KPIs that track benefit retention, participation, and ecological intactness. By adopting this approach, and by leveraging and ethically governing new digital technologies, protected areas transform from contested spaces into living infrastructures of sustainability, ensuring that conservation, equity, and rural renewal mutually reinforce one another. This is the new paradigm for global protected landscape governance.

Author Contributions

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Conflicts of Interest

The authors declare no conflict of interest.

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