

NatureScaping™: Advancing rights-based environmental governance through ecological stewardship, community participation, and sustainable development

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ABSTRACT

Despite a global advocacy of the right to clean, healthy and sustainable environment, which strengthened the bond between environmental protection, sustainable development, social justice and human rights, a persistent gap has been observed towards environmental rights in the planning, conservation, restoration and institutional accountability. The paper develops a rights-based philosophy for environmental governance that integrates ecological integrity, environmental justice, community stewardship, participatory governance, institutional accountability, and sustainable development within a common conceptual framework, i.e., NatureScaping™. The study adopts a qualitative conceptual research design drawing on interdisciplinary field, international environmental and human-rights instruments, and documented experience in community-based conservation, biodiversity management, ecological restoration, environmental education, and landscape stewardship. NatureScaping™ is not a replacement of the established approaches such as Nature-based Solutions (NbS), Forest Landscape Restoration (FLR), Integrated Landscape Management (ILM), Ecosystem-based Adaptation (EbA), One Health, or socio-ecological resilience. It complements them by positioning substantive and procedural environmental rights as an organising principle for governance. Two complementary components, the NatureScaping™ Environmental Rights Framework (NERF) and the NatureScaping™ Sustainability Index (NSI), are proposed. Whereas NERF translates rights-based principles into a governance cycle linking assessment, planning, participation, implementation, accountability, monitoring, and adaptive learning; the NSI provides a conceptual basis for assessing ecological, social, institutional, and rights-based dimensions of sustainability. Thus, NatureScaping™ presents a flexible conceptual pathway for connecting environmental rights with locally grounded stewardship and sustainable development.

KEYWORDS

NatureScaping™; Environmental rights; Environmental governance; Community stewardship; Environmental justice

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Introduction

Deterioration of the environment is a major challenge for the ecological sustainability and human well-being. Unsustainable development and overexploitation of the resources are resulting into the land degradation, pollution, changes in climatic conditions, water and food insecurity which are not only affecting the ecology but the social and economic aspects too. These impacts are often experienced disproportionately by Indigenous Peoples, local communities, and other socially vulnerable groups. Environmental governance therefore needs to work for the social aspects too, alongside ecological concerns [1-5].

International environmental governance is well aware of this relationship, result of which is the 1972 Stockholm Declaration which established an important foundation for raising the issue of human well-being with the environment. It was followed by the Rio Declaration, the Convention on Biological Diversity (CBD), the Paris Agreement, the 2030 Agenda for Sustainable Development, and the Kunming-Montreal Global Biodiversity Framework (K-MGBF), which broadened environmental governance through principles of participation, equity, sustainability, intergenerational responsibility, and international cooperation. A major normative development was the adoption of United Nations Human Rights Council Resolution 48/13 in 2021 and United Nations General Assembly Resolution 76/300 in 2022, which recognized the right to a clean, healthy, and sustainable environment.

Merely, recognition does not guarantee effective implementation; therefore, global assessments continue to document biodiversity decline, ecosystem degradation, climate risks, and environmental

inequalities [3,4,6]. Environmental governance also remains institutionally fragmented and separate policies and institutions were engaged in addressing the issues of biodiversity conservation, climate adaptation, water management, agriculture, urban planning, and public health. Participation was limited to consultation. Assessment of environmental justice, institutional accountability, community participation, or the realisation of environmental rights was inadequate and monitoring was limited to biophysical outcomes.

In response of such gaps, approaches like NbS, FLR, ILM, EbA, One Health, and socio-ecological resilience have advanced ecosystem restoration, biodiversity conservation, climate adaptation, sustainable resource management, and collaborative governance [7-10]. Community-based conservation and environmental stewardship further demonstrate the importance of participation, local knowledge, and community ownership [11-16].

Despite of such approaches, the conceptual gap continued. Without connecting the organizing principles of these approaches such as ecological integrity, participation, justice, accountability, and sustainability, environmental rights may be recognized. A rights-based perspective requires attention to both substantive rights such as healthy ecosystems, clean air, safe water, biodiversity, and protection from environmental harm and procedural rights, including access to information, meaningful participation, transparency, accountability, and access to justice [5,7,17,18].

The present work proposed NatureScaping™ within this implementation gap. It connects the ecological and social strengths of the existing approaches through an explicit rights-based governance perspective. The paper raised a concern of operationalizing the environmental rights through an integrated governance framework

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that strengthens ecological integrity, participation, accountability, and sustainable development (Figure 1).

The study is guided by four objectives: *first*, to examine the gap between recognition and implementation of environmental rights; *second*, to consider contributions and limitations of major integrated governance approaches; *third*, to develop NatureScaping™ as a rights-based governance philosophy; and *fourth*, to propose NERF and NSI as complementary conceptual mechanisms for implementation, monitoring, and evaluation.

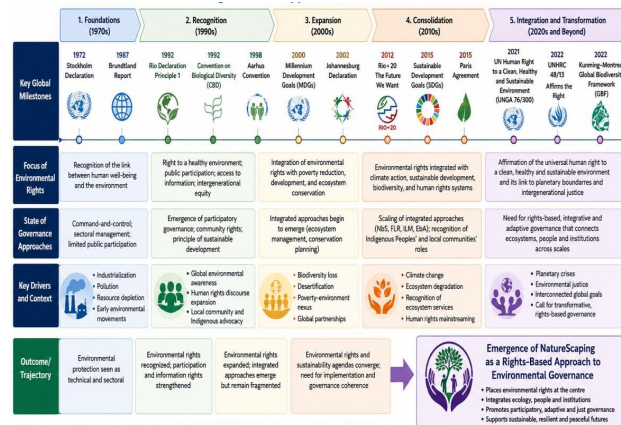


Figure 1. Evolution of environmental rights and the emergence of NatureScaping™ as a rights-based approach to environmental governance.

Methodology

Research Design

Ecology, biodiversity conservation, restoration, landscape governance, sustainability, environmental law, human rights, and public policy are connected with environmental rights. Therefore, a qualitative conceptual research design is adopted for this study as it integrates theories, evidence, and policy perspectives around complex interdisciplinary problems [19,20].

The study collates existing researches, international environmental and human-rights instruments, and documented conservation experience to incorporate environmental rights into ecological conservation and restoration, participatory decision-making, institutional accountability, and long-term stewardship. Consequently a complementary governance philosophy, NatureScaping™, is developed which distinctly positioned environmental rights as a central organizing principle connecting ecological stewardship, participation, accountability, and adaptive governance.

Literature review and evidence base

The review was purposive and sources were selected on the basis of their relevance to the conceptual problem as well as which clarify environmental rights, integrated environmental governance, ecological stewardship, participation, accountability, or adaptive learning. The approach was considered as per the objective of the conceptual framework construction. The analysis converges and complements similar studies that identify gaps in existing governance where environmental rights are non-operational.

The interdisciplinary evidence base covers a wide array of environmental rights, environmental governance, biodiversity conservation, ecological restoration, environmental justice, sustainable development, landscape management, and community-based natural-resource management. Sources include peer-reviewed literature, scholarly books, international legal instruments,

multilateral environmental agreements, policy documents, and technical reports from recognized institutions, following a conceptual literature-synthesis approach [21].

Due attention was given to the literature from the global platforms like the United Nations system and OHCHR, UNEP, CBD, IUCN, IPCC, and IPBES. Further, author's published work and documented experience covering biodiversity conservation, community participation, ecological restoration, environmental education, and landscape stewardship were incorporated. These materials are treated as contextual and practice-based evidence [13-16].

Framework development

NatureScaping™ was developed through four stages (Figure 2). Stage 1, normative analysis, examined human-rights instruments, environmental agreements, and sustainability frameworks for principles including participation, equity, transparency, accountability, ecological stewardship, and intergenerational responsibility. Stage 2, comparative governance analysis, considered NbS, FLR, ILM, EbA, One Health, and socio-ecological resilience in relation to integrated governance and environmental rights. Stage 3, conceptual integration, synthesized literature with documented experience in community-based conservation, restoration, environmental education, and participatory landscape management. Stage 4, framework construction, organized the resulting principles into three components: the NatureScaping™ Philosophy as the normative foundation; NERF as the governance process; and NSI as the conceptual basis for monitoring, evaluation, and adaptive learning.

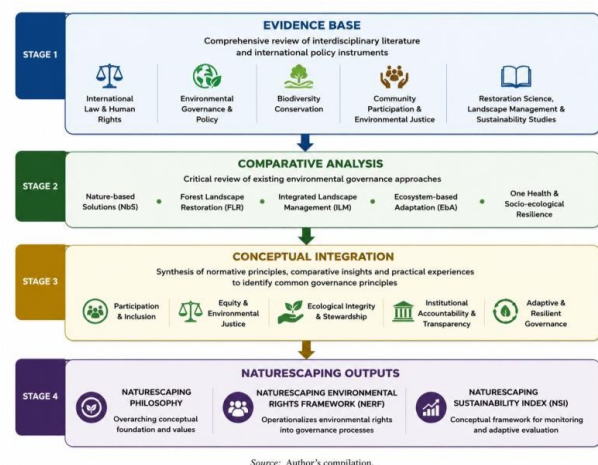


Figure 2. Research design and framework development process.

Scope and limitations

The study establishes a conceptual foundation for subsequent research and application. Empirical validation is needed for NatureScaping™, NERF, or NSI. Future work should test the framework through comparative case studies, participatory research, governance assessments, and long-term monitoring, with particular attention to the development and validation of NSI indicators.

Environmental Rights: Evolution, Principles, and Contemporary Challenges

Evolution of environmental rights

In the modern context, it took decades of international legal and policy development to recognize the dependence of human well-being on healthy environment. A major milestone was the 1972 Stockholm Declaration linking environmental quality with human freedom, equality, and conditions necessary for dignity and well-being [22]. Subsequently, the Rio process widened the relationship through

participation, intergenerational equity, precaution, and sustainable development. Further, the CBD, UNFCCC, Paris Agreement, 2030 Agenda, and Kunming–Montreal Global Biodiversity Framework connected environmental protection with biodiversity, climate action, sustainable development, and participation [23–26].

A significant development was marked with the adoption of UN Human Rights Council Resolution 48/13 in 2021 and UN General Assembly Resolution 76/300 in 2022 strengthening the human right to access a clean, healthy, and sustainable environment and its relationship to human dignity, health, well-being, and social justice.

Core principles of rights-based environmental governance

Environmental rights have substantive and procedural dimensions and environmental governance is successful when both dimensions work together, as the ecological outcomes and governance processes are interdependent [5,7,18]. A community may have access to a healthy environment but be devoid of access to information, institutions, or decision-making influence to protect the environment. On the other hand, participation without environmental safeguards affects human health, livelihood and dignity. These dimensions reinforce each other. Substantive rights cannot be protected if communities lack information or meaningful participation. At the same time, procedural rights lacks value if ecological degradation affects the natural environment necessary for human well-being. Therefore, a rights-based governance approach must address ecological integrity, social equity, participation, institutional accountability, and intergenerational responsibility together.

Whereas substantive dimensions concern environmental conditions necessary for a dignified and healthy life which includes clean air, safe water, healthy ecosystems, biodiversity, and protection against pollution and environmental hazards; the procedural dimensions concern with accessibility to environmental information, meaningful participation, transparency, accountability, and justice. The universal principles include equity and non-discrimination, intergenerational responsibility, precaution, sustainability, good governance, and recognition of Indigenous Peoples' and local communities' knowledge and rights. NatureScaping™ considers rights from all such perspectives.

Contemporary challenges in operationalizing environmental rights

Four interconnected challenges are particularly important. First, the implementation gap means formal recognition does not always lead to planning, institutional practice, effective remedies, or environmental outcomes. *Second*, institutional fragmentation separates responsibilities for biodiversity, climate, land, water, agriculture, urban development, and health. Third, participation may remain consultation-based rather than constituting meaningful influence over planning, implementation, monitoring, and evaluation. *Fourth*, environmental burdens and climate risks are unevenly distributed, while monitoring often focuses on ecological indicators but fails to assess justice, governance quality, participation, or rights realization.

These challenges show that environmental rights need governance arrangements that can connect rights, participation, accountability, ecological stewardship, and adaptive learning rather than relying only on legal recognition or sector-specific interventions.

From environmental rights to NatureScaping™

NatureScaping™ responds to this implementation gap by embedding environmental rights throughout the governance process. This includes assessment and planning through participation to implementation, monitoring, accountability, and adaptive learning. It seeks to connect protection of healthy ecosystems with the rights and responsibilities of people and institutions that depend upon and manage them. Its contribution is therefore not a new sectoral intervention; instead, it acts as a conceptual bridge between recognition of environmental rights and their

operationalization through ecological stewardship and participatory governance.

Existing Environmental Governance Approaches: Achievements, Limitations and the Need for NatureScaping™

Evolution of integrated environmental governance

Environmental governance has shifted from sector-specific management to integrated approaches. These approaches recognize interdependence among ecological systems, human well-being, and sustainable development [27,28]. Frameworks like NbS, FLR, ILM, EbA, One Health, and socio-ecological resilience have strengthened cross-sectoral planning, restoration, climate adaptation, stakeholder participation, and adaptive governance.

These approaches provide important foundations. However, they come from different primary orientations such as ecological restoration, landscape management, climate adaptation, health, or resilience. This result into inconsistency in incorporating environmental rights as the universal principle linking substantive rights, procedural participation, institutional accountability, and environmental outcomes.

Major environmental governance frameworks

Comparatively, the established approaches differ in the unit of governance as many of them are organized around an intervention, ecosystem, landscape, hazard, or health objective. NatureScaping™ organizes the governance relationship among rights, people, institutions, and ecological systems allowing the same architecture applicable for different substantive interventions without need of a new management model for any sector. Thus, it is better understood as a connective governance philosophy than another specialized environmental framework.

NbS address societal challenges through ecosystem protection, restoration, and sustainable management. Their multi-benefit and participatory orientation provide a strong foundation, while NatureScaping™ adds an explicit rights-based governance perspective.

FLR seeks to restore ecological functions, biodiversity, ecosystem services, and livelihoods across degraded landscapes. Its participatory orientation is compatible with NatureScaping™, which broadens the governance focus to include rights realization, institutional accountability, and continuous learning.

ILM promotes coordination among governments, communities, civil society, and private stakeholders across multiple land-use objectives [29,30]. NatureScaping™ reframes such participation as part of environmental governance and rights rather than only as a management mechanism.

EbA uses biodiversity and ecosystem restoration to reduce climate vulnerability and strengthen resilience. NatureScaping™ complements this by connecting adaptation with environmental justice, procedural rights, community stewardship, and institutional accountability.

One Health links human, animal, and ecosystem health and provides a systems perspective. NatureScaping™ complements this health orientation by making environmental rights, justice, and stewardship explicit governance dimensions.

Socio-ecological resilience emphasizes adaptation, learning, flexibility, and collaboration [31,32]. NatureScaping™ complements resilience thinking by specifying how environmental rights can guide planning, participation, accountability, and monitoring.

The comparison does not lower the established approaches; instead, their strengths provide the foundations towards a development of rights-based environmental governance philosophy.

The emerging need for NatureScaping™

A rights-based architecture can also improve the interpretive relationship between ecological and social evidence. For example, a

restoration programme may report hectares restored, survival of planted vegetation, water-quality change, or species recovery while providing little information about who participated, whose interests were considered, whether access to environmental information was equitable, or whether local institutions can sustain the intervention. On the other side, a participatory programme may report meetings and consultations without demonstrating improvement in ecological condition. NatureScaping™ seeks to avoid such separations by integrating ecological performance and governance performance as linked dimensions of the same sustainability challenge.

The growing importance of environmental rights provides an opportunity to widen environmental governance beyond sector-specific objectives. NatureScaping™ unites ecological restoration, biodiversity conservation, climate resilience, landscape management, environmental justice, community stewardship, and institutional accountability through a definitive rights-based orientation. Its distinctive proposition is integration across governance processes rather than the creation of another sectoral environmental intervention.

Table 1. Comparative analysis of contemporary environmental governance frameworks.

Framework	Primary focus	Major strength	Key limitation	NatureScaping™ contribution
NbS	Ecosystem solutions to societal	Multi-benefit ecosystem management	Rights implicit rather than explicit	Integrates environmental rights across governance
FLR	Landscape restoration	Ecological recovery and livelihoods	Limited governance indicators	Rights-centred restoration and stewardship
ILM	Cross-sector coordination	Stakeholder collaboration	Variable accountability	Rights-based institutional governance
EbA	Climate adaptation	Ecosystem resilience	Climate-centric orientation	Integrates adaptation with environmental justice
One Health	Human–animal–ecosystem health	Systems thinking	Limited governance guidance	Rights-oriented environmental governance
Socio-ecological Resilience	Adaptive systems	Resilience and adaptation	Rights not explicitly operationalized	Links resilience with environmental rights

Source: Author's synthesis

NatureScaping™: A Rights-Based Philosophy for Environmental Governance

Conceptual foundation

NatureScaping™ is a rights-based governance philosophy integrating ecological stewardship, environmental justice, community participation, institutional accountability, and sustainable development within a unified conceptual perspective. Its central

proposition is the interdependence of human well-being and ecological integrity. To realize environmental rights effectively, the governance systems must recognize and strengthen relationships among healthy ecosystems, human well-being, and institutional responsibility.

Interestingly, NatureScaping™ emphasizes proactive and consistent management of the relationships among people, institutions, and ecosystems instead of reactive responses towards environmental degradation. Ecosystems are dynamic socio-ecological systems which sustain biodiversity, cultural identity, livelihoods, climate resilience, and human dignity. As a result, environmental rights become an organizing principle for planning, implementation, participation, monitoring, and adaptive governance.

Philosophical foundations

NatureScaping™ is based on five principles that strengthen each other.

Ecological integrity

Healthy ecosystems provide the ecological foundation for environmental rights. Governance should maintain ecosystem structure, functions, resilience, and the processes necessary to sustain biodiversity and human well-being.

Environmental justice

Environmental benefits and burdens are unevenly distributed. Rights-based governance therefore requires equitable access to environmental resources, fair decision-making, protection from disproportionate environmental risks, and consideration of present and future generations.

Community stewardship

People should be active stewards rather than passive beneficiaries. Indigenous Peoples, local communities, civil society, academic institutions, and responsible private actors can contribute knowledge, capacities, and social capital.

Participatory governance

Participation extends beyond consultation to planning, implementation, monitoring, evaluation, and adaptive learning. Meaningful participation can strengthen legitimacy, transparency, social ownership, and long-term stewardship.

Adaptive sustainability

Governance must respond to changing ecological, climatic, social, and institutional conditions. Monitoring, evaluation, learning, and continuous improvement are therefore integral to environmental management.

Integrated governance philosophy

This integrated perspective also helps us recognize trade-offs. Environmental decisions often involve competing claims over land, water, access, conservation restrictions, livelihoods, infrastructure, or development. A rights-based governance process does not eliminate such conflicts; instead, it makes the principles and procedures used to solve them much clearer. Transparency, participation, access to information, grievance redress, and evidence-based decision-making help make these trade-offs visible. They also ensure conflicts face legitimate deliberation. Thus, the framework emphasizes governance quality alongside ecological outcomes.

NatureScaping™ treats biodiversity conservation, restoration, environmental rights, community participation, institutional accountability, and sustainable development as interconnected elements of a dynamic socio-ecological system. Within it, substantive rights define environmental conditions needed for human well-being, and procedural rights shape the exact processes used to achieve and maintain those conditions. Therefore, governance is understood as an ongoing stewardship process working to balance ecological resilience, social equity, and institutional accountability.

Relationship with global sustainability agendas

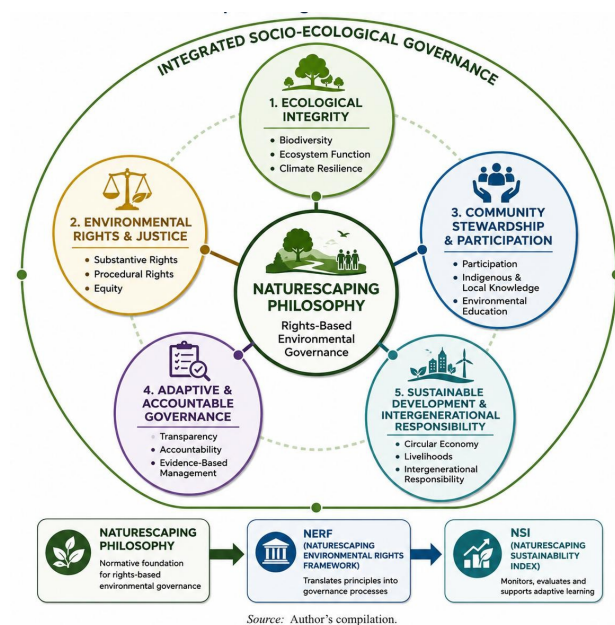
NatureScaping™ complements the 2030 Agenda through its emphasis on healthy ecosystems, climate resilience, biodiversity, inclusive institutions, and participation. It also complements the Paris Agreement through ecosystem resilience and adaptation, and the Kunming-Montreal Global Biodiversity Framework through integrated conservation, restoration, and equitable governance. Its contribution is more towards the connection of existing commitments with implementation, participation, accountability, and adaptive stewardship.

From philosophy to practice

Two complementary components operationalise philosophy. The NatureScaping™ Environmental Rights Framework (NERF) which translates principles into a governance process linking environmental rights with planning, participation, implementation, monitoring, accountability, and adaptive management. The NatureScaping™ Sustainability Index (NSI) which provides a conceptual basis for assessing ecological, social, institutional, and rights-based dimensions of governance performance.

The architecture can be represented as:

NatureScaping™ Philosophy → NERF → Implementation → NSI Assessment → Learning → Revised Planning



Source: Author's compilation.

Figure 3. The NatureScaping™ philosophy: Five foundational principles of a rights-based environmental governance.

NatureScaping™ Environmental Rights Framework (NERF): Operationalizing Rights-Based Environmental Governance

Operational pathway

NERF turns the NatureScaping™ philosophy into practical institutional processes. It enables governments, conservation organizations, communities, academic institutions, development agencies, and private stakeholders to incorporate environmental rights into planning, implementation, monitoring, and adaptive management. NERF is context-specific flexible architecture adaptable to ecological, institutional, legal, and socio-cultural aspects and does not claim for a stand-alone conservation programme or replacement for existing governance systems.

Conceptual structure of NERF

NERF conceptualizes five interdependent governance pillars which operationalises through a six-stage continuous governance cycle.

Pillar I: Rights-based environmental planning

Planning identifies ecological priorities, environmental risks, stakeholder interests, legal obligations, and community aspirations while addressing substantive and procedural rights.

Pillar II: Participatory governance and community stewardship

Communities and other stakeholders contribute knowledge, experience, and social capital across planning, implementation, monitoring, conflict resolution, and adaptive learning. Indigenous and local ecological knowledge is integral.

Pillar III: Integrated environmental action

Restoration, biodiversity conservation, sustainable agriculture, climate adaptation, water management, pollution control, and environmental education are considered within a coordinated governance framework.

Pillar IV: Institutional accountability and collaborative governance

Transparent decision-making, defined responsibilities, access to information, grievance redress, reporting, evaluation, and inter-agency coordination strengthen accountability and policy coherence.

Pillar V: Adaptive monitoring, learning, and continuous improvement

Monitoring assesses ecological outcomes alongside governance effectiveness, participation, institutional performance, environmental justice, and rights realization. Evidence and stakeholder feedback inform subsequent decisions.

The six operational stages shown in Figure 4 are: (1) rights-based assessment; (2) participatory planning; (3) integrated implementation; (4) institutional coordination and accountability; (5) monitoring and adaptive management; and (6) stewardship and continuous learning.



Source: Author's compilation.

Figure 4. NatureScaping™ Environmental Rights Framework (NERF): A continuous governance cycle for operationalizing environmental rights.

continuous learning. The stages are cyclical rather than strictly sequential.

Governance cycle

The six operational stages are not a rigid project sequence. One can return to a rights-based assessment during implementation; participation can continue through monitoring; institutional accountability can also shape changes to implementation; and stewardship and learning can highlight new risks or priorities that need a renewed assessment. The true value of the cycle comes directly from this feedback loop. It offers a common structure for iterative governance while allowing the specific actors, indicators, decision rules, and institutional arrangements to vary by context.

The cycle starts with rights-based assessment and planning, moving through participatory and integrated implementation, strengthens institutional accountability, and finally uses monitoring and learning to create a revised planning. This feedback loop differentiates NERF from other conventional project management by treating environmental governance as an evolving process instead of a series of discrete interventions.

Alignment and applications

As NERF is deliberately non-prescriptive, implementation does not require a single, fixed institutional arrangement. In one context, an existing government planning body might coordinate the cycle; in another, different groups like a protected-area authority, watershed committee, municipality, community institution, or multi-stakeholder platform can provide the coordinating mechanism. The only essential requirement is that responsibilities, rights, participation, information, monitoring, and feedback remain completely visible within the governance process. This built-in flexibility ensures NERF is compatible with existing legal and administrative mandates.

NERF actively supports relevant objectives of the 2030 Agenda, Paris Agreement, and Kunming–Montreal Global Biodiversity Framework by promoting water security, sustainable settlements, climate resilience, biodiversity conservation, restoration, participation, and equitable stewardship. Its versatile applications include protected areas, ecological restoration, watershed management, climate adaptation, sustainable agriculture, urban ecological planning, coastal and wetland management, community-based natural-resource management, environmental education, and ESG initiatives.

NatureScaping™ Sustainability Index (NSI)

Rationale

Environmental governance cannot be evaluated solely by policy adoption or project implementation. Assessment should also determine whether interventions improve ecological integrity, strengthen environmental rights, support participation, and enhance institutional accountability. Conventional environmental indicators remain essential but may provide limited insight into justice, governance quality, participation, accountability, and rights realisation.

Therefore, NSI is proposed as a conceptual monitoring and evaluation framework complementary to NERF. It is not presented as a validated quantitative index. Its purpose is to establish a common structure for future indicator development, stakeholder consultation, empirical testing, and context-specific validation.

Assessment dimension

NSI comprises five dimensions.

Ecological integrity

Ecosystem condition, functionality, biodiversity, habitat quality, restoration, landscape connectivity, soil and water health, and climate resilience.

Environmental rights and justice

Realisation of substantive and procedural rights, equitable access to environmental resources and information, participation, access to justice, recognition of Indigenous and local knowledge, and protection of environmental defenders.

Community stewardship and social inclusion

Quality and continuity of participation, local leadership, environmental awareness, capacity building, inclusion of women and youth, and collaborative partnerships. Participation is assessed by influence and effectiveness rather than the number of consultations.

Institutional effectiveness

Governance capacity, policy coherence, inter-agency coordination, transparency, accountability, regulatory compliance, grievance mechanisms, and effectiveness of environmental decision-making.

Adaptive sustainability and learning

Adaptive management, monitoring, evidence-based decision-making, policy learning, knowledge exchange, innovation, stakeholder feedback, and institutional flexibility.

Indicator development

Instead of imposing identical indicators across all sites, a future NSI application should begin with a context assessment and stakeholder-defined outcomes. For example, biodiversity and habitat indicators might be central in a protected area, and water security, land-use equity, public-space access, or climate vulnerability may need more attention in an urban or watershed context. Similarly, the meaning of participation and accountability can change across different legal and institutional systems. This contextualization matches the index's conceptual status, and is essential to avoid reducing complex governance relationships to a single decontextualized score.

NSI is a flexible conceptual framework, not a fixed global index. One can adapt indicators to local ecological conditions, legal requirements, institutional capacity, available data, and community priorities while retaining the common five-dimensional structure. All indicators must be scientifically credible, policy relevant, transparent, measurable, and practical. One can also mix quantitative measures with a qualitative assessment of community trust, governance legitimacy, environmental justice, and stakeholder experience. Finally, selection, weighting, measurement, and interpretation of these indicators require stakeholder consultation and empirical validation.

Table 2. Illustrative dimensions and indicators of the NSI.

Assessment dimension	Illustrative indicators
Ecological Integrity	Biodiversity status, habitat quality, ecosystem restoration, water and soil health, climate resilience
Environmental Rights & Justice	Access to information, participation, access to justice, equity, protection of environmental defenders
Community Stewardship & Social Inclusion	Community participation, environmental education, co-management, Indigenous knowledge integration, volunteer engagement
Institutional Governance	Transparency, accountability, policy coordination, institutional capacity, grievance mechanisms
Adaptive Sustainability	Sustainable livelihoods, circular economy, green employment, climate adaptation, intergenerational sustainability

Source: Author's compilation.

Integration of NSI and NERF

Instead of an independent assessment system, NSI functions as the monitoring and evaluation component of NERF. NERF provides the governance processes through which environmental rights are built directly into planning, participation, implementation, accountability, and adaptive management, while NSI assesses performance and outcomes. This creates a continuous feedback mechanism:

NatureScaping™ Philosophy → NERF → Implementation → NSI Assessment → Learning → Revised Planning.

Together, NERF and NSI creates a continuous cycle linking implementation, evidence, evaluation, learning, and improvement.

Future development and application

Future research must establish measurable indicators, determine appropriate weighting and justified assessment methods where justified, undertake stakeholder consultation, and test NSI across contrasting socio-ecological and governance contexts. Comparative case studies should assess reliability, sensitivity, applicability, and policy usefulness.



Source: Author's conceptual illustration.

Figure 5. NatureScaping™ Sustainability Index (NSI): conceptual monitoring framework.

Governance applications of NatureScaping™

From conceptual architecture to practical governance

NatureScaping™, NERF, and NSI provide a flexible governance architecture that can be incorporated into existing programmes without creating parallel systems.

Biodiversity conservation and protected areas

NatureScaping™ can connect ecological integrity with environmental rights, participatory decision-making, and collaborative stewardship. NERF supports transparent planning and coordination, while NSI can assess ecological outcomes alongside governance quality, equity, and participation.

Ecological restoration and landscape recovery

The framework broadens restoration beyond physical outputs such as area restored or trees planted by incorporating community priorities,

environmental rights, institutional accountability, and long-term stewardship. Restoration is therefore approached as both an ecological intervention and continuing governance process.

Climate change adaptation and resilience

NatureScaping™ links adaptation with ecological resilience and social equity through restoration, biodiversity conservation, water security, sustainable land management, and participatory governance. A rights-based perspective can help adaptation strengthen resilience without creating additional environmental inequalities.

Community-based natural resource management

The emphasis on stewardship also extends the meaning of community participation. Participation is not just about attending meetings or being consulted during project design. Instead, it includes sharing knowledge, being involved in decisions, taking part in shared implementation, monitoring, conflict resolution, capacity development, and providing feedback for future decisions. This conception matches the paper's main argument that procedural environmental rights are achieved through institutions and relationships, not through formal recognition alone.

The framework places community stewardship at the focus of environmental governance through shared decision-making, recognition of Indigenous and local knowledge, equitable benefit-sharing, capacity building, environmental education, and long-term partnerships. This approach aligns with documented community-based conservation and environmental education experiences [14,15].

Sustainable urban and regional planning

NatureScaping™ can integrate ecological infrastructure, biodiversity conservation, climate resilience, and environmental rights into development strategies. We must view urban ecosystems as public assets and highlight their contributions to environmental quality, public health, social inclusion, and resilience.

Corporate sustainability and ESG governance

NatureScaping™ offers a complementary perspective for corporate sustainability by encouraging ecological stewardship, stakeholder participation, transparency, accountability, and community engagement within ESG strategies. Environmental rights can thereby be considered within organizational governance and no longer have to view only as external compliance requirements.

Public policy and international environmental governance

At this scale, NatureScaping™ acts as an integration mechanism instead of a new layer of international obligation. Existing commitments already include principles for sustainability, participation, equity, biodiversity, climate resilience, and human rights. The proposed architecture simply makes the connections among these commitments more visible during implementation. Therefore, its true value lies in coherence: a common governance logic helps actors understand how ecological outcomes, rights, institutional responsibilities, and community stewardship interact.

The framework helps governments and international organizations connect their global commitments under the 2030 Agenda, Paris Agreement, Kunming–Montreal Global Biodiversity Framework, and recognition of the human right to a clean, healthy, and sustainable environment with practical planning, implementation, monitoring, and evaluation.

Across all these applications, the framework provides clear governance benefits. First, it builds environmental rights into decision-making. Second, it creates stronger institutional coordination and policy coherence. Third, it ensures meaningful community participation and stewardship. Fourth, it brings greater transparency and accountability along with adaptive learning. Finally, it improves the overall alignment among ecological integrity, social equity, and sustainable development.

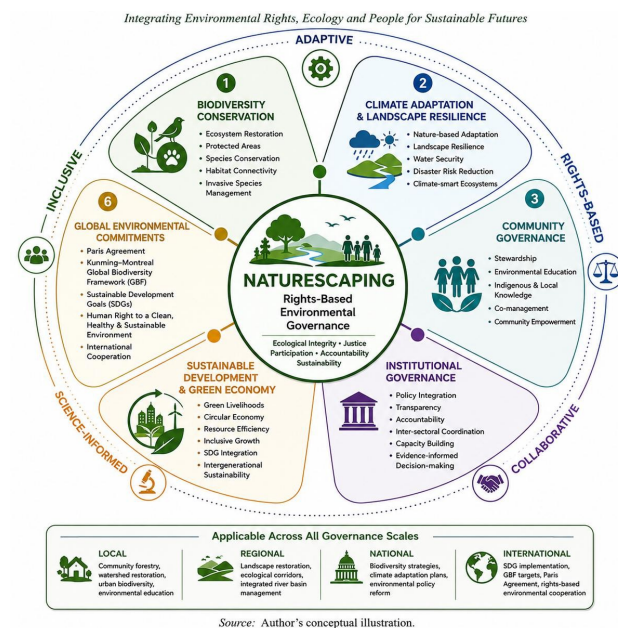


Figure 6. Governance applications of the NatureScaping™ frameworks.

Discussions: Advancing Rights-Based Environmental Governance Through NatureScaping™

From recognition to practical realization

The recognition of the human right to a clean, healthy, and sustainable environment is an important development. However, its practical value depends on institutional processes which are used to implement and monitor rights. The conceptual analysis shows that fragmentation among policies, institutions, and administrative levels can weaken this translation.

NatureScaping™ addresses the gap directly by treating environmental rights as a central organizing principle across the governance cycle. The relationship among the philosophy, NERF, and NSI connects normative recognition with planning, participation, implementation, accountability, monitoring, and adaptive learning without creating parallel governance structures.

Relationship with established approaches

NatureScaping™ is placed within established environmental governance. Frameworks like NbS, FLR, ILM, EbA, One Health, and resilience approaches have already made major contributions to ecosystem management, conservation, adaptation, and collaborative governance. The proposed contribution does not replace or duplicate these systems. It is governance reframing in which substantive and procedural environmental rights act as an explicit connective principal ties together ecological integrity, justice, stewardship, institutional accountability, and sustainable development.

This distinction is important. NatureScaping™ is not the first rights-based environmental approach, nor does it suggest that established approaches ignore rights, participation, or equity. Instead, its uniqueness lies in proposing a common architecture allowing these critical dimensions to be integrated across multiple environmental approaches and governance stages.

Theoretical contributions

The framework creates a clear distinction between normative foundation, governance process, and assessment. The NatureScaping™ Philosophy answers the question of what principles should guide environmental governance; NERF addresses how those principles can

be built into decision-making and implementation; and NSI addresses what dimensions should be examined when evaluating performance and learning. Keeping these functions separate reduces the risk of treating a philosophy, a management cycle, and an index as the same thing.

The study makes four related conceptual contributions. First, it moves environmental rights from strictly legal and normative discourse towards an operational governance perspective. Second, it proposes NatureScaping™ as a rights-based philosophy integrating ecological integrity, environmental justice, community stewardship, participatory governance, and adaptive sustainability. Third, NERF and NSI connect this philosophy directly with governance processes and assessment. Fourth, the framework brings together perspectives from human rights, conservation, restoration ecology, sustainability science, landscape governance, and community-based environmental management.

These contributions remain completely conceptual. The framework has not been empirically validated yet, and therefore should not be interpreted as a demonstrated causal model.

Policy and governance implications

For policy institutions, the framework can provide a common language across departments that otherwise use different objectives and indicators. For example, biodiversity agencies focus on habitat and species outcomes, water institutions focus on availability and quality, climate institutions focus on vulnerability and resilience, and urban authorities focus on infrastructure and services. NERF can organize all these priorities within one shared governance cycle, while NSI can provide a common set of assessment dimensions. Therefore, the framework has potential value as a coordination device, subject to empirical testing of whether it improves actual institutional performance.

At national and subnational levels, NatureScaping™ can support policy coherence by connecting environmental rights with biodiversity conservation, climate adaptation, water governance, land-use planning, restoration, and environmental assessment. At local levels, it emphasizes collaborative stewardship involving municipalities, Indigenous Peoples and local communities, educational institutions, civil society, and the private sector. Internationally, it offers a way to connect existing commitments with practical governance processes.

The principal policy implication is integration rather than institutional expansion: instead of creating new departments, existing mandates can be connected through stronger participation, accountability, ecological stewardship, and adaptive governance.

Strengths, limitations and future research

Future research on the NatureScaping™ framework must prioritize comparative testing against established approaches rather than testing in isolation. Studies should focus on validating the NERF architecture across diverse socio-ecological settings, developing NSI indicators, and investigating how evidence systems support adaptive governance. For an overview of this research agenda, review the proposed comparative case studies and participatory assessments.

Toward shared environmental stewardship

The core conclusion is that environmental rights gain real-world value only when they are built into daily institutional practices and community partnerships. NatureScaping™ therefore shifts environmental governance away from strict rules and enforcement toward shared long-term stewardship. While governments are still necessary, lasting success depends equally on civil society, researchers, educators, and the private sector.

Conclusion

Despite of the increasing recognition of the human right to a clean, healthy, and sustainable environment by environmental governance, a significant gap remains between formal recognition and effective



Figure 7. Future research pathways for NatureScaping™.

implementation. To bridge this gap, it is required environmental rights to function not only as legal or normative commitments, but also as practical principles guiding planning, ecological stewardship, participation, accountability, monitoring, and adaptive management.

NatureScaping™ is proposed as an interdisciplinary, rights-based governance philosophy that bridges the gap between formal recognition of environmental rights and practical implementation. It connects ecological integrity, environmental justice, community stewardship, participatory governance, and sustainable development which are interdependent components of effective environmental governance. NatureScaping™ complements established approaches such as NbS, FLR, ILM, EbA, One Health, and resilience-based governance by providing a common rights-based orientation for their implementation.

The philosophy is operationalized through NERF and NSI. NERF provides a governance pathway linking rights with planning, participation, implementation, accountability, monitoring, and adaptive management, while NSI provides a conceptual basis for assessing ecological, social, institutional, and rights-based performance. Together they connect normative principles with implementation, evaluation, and adaptive learning.

The study's contribution is conceptual rather than empirical. NatureScaping™ should therefore be regarded as a foundation for further research, institutional experimentation, stakeholder-led assessment, and adaptive governance rather than as a completed or prescriptive model. Its applicability remains to be demonstrated through comparative case studies, empirical validation of NERF, and development and testing of NSI indicators.

Ultimately, NatureScaping™ proposes a continuous culture of shared environmental stewardship in which governments, communities, Indigenous Peoples, researchers, civil society, and responsible private actors contribute to sustaining healthy ecosystems and equitable environmental conditions.

Data Availability Statement

This is a conceptual manuscript and does not report the collection, generation, or analysis of primary empirical datasets. The study is based on published scholarly literature, international environmental and human-rights instruments, policy and institutional documents, and the author's documented conservation and environmental education experience. Accordingly, no new research dataset has been generated for this study and there are no primary

data to deposit in a public repository.

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AI-assisted tools were used during manuscript preparation and revision to support language refinement, structural editing, reduction of repetitive text, consistency checking, and editorial review. The use of such tools did not replace the author's scholarly judgement. The author critically reviewed and revised the manuscript, verified the substantive content and references, and takes full responsibility for the final content, interpretations, originality, and conclusions of the manuscript.

Ethics Declaration

This manuscript is a conceptual study based on published literature, international policy and legal instruments, and documented conservation and environmental education experience. It does not involve human participants, personal data, animal experimentation, field experimentation conducted for this study; or collection of identifiable sensitive information. Therefore, ethical approval from an institutional ethics committee was not required.

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