



Perspective

Integrating Community Well-Being into Natural Climate Solutions: A Framework for Enhanced Verification Standards and Project Permanence

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Abstract

Natural Climate Solutions (NCSs) represent a critical tool for addressing climate change, yet their long-term success is threatened by inadequate consideration of community impacts in current verification standards. While Article 6 of the Paris Agreement establishes rigorous requirements for carbon sequestration and emission avoidance verification, existing standards lack comprehensive frameworks for assessing and ensuring community well-being, undermining project permanence and market confidence. We developed an integrated framework combining community well-being assessment with verification requirements through analysis of Article 6 implementation requirements, existing voluntary carbon offset credit standards, emerging national standards, and community engagement mechanisms. Our analysis yielded a framework establishing five core tenets for community engagement (inclusion, engagement, contribution, ownership, and well-being) and nine essential well-being assessment domains, each with specific measurable indicators. The framework provides clear verification alignment protocols that integrate with existing standards while maintaining rigorous requirements and offering practical implementation guidance. Integration of community well-being assessment into NCS verification standards strengthens project permanence while meeting verification requirements, providing practical tools for standards bodies, project developers, and market participants to ensure both environmental and social benefits. As Article 6 mechanisms mature, this integration becomes increasingly crucial for project success.

Keywords: Natural Climate Solutions (NCS); carbon offset credits; community well-being; participatory process; verification standards; Article 6; project permanence; social impact assessment; stakeholder engagement; environmental governance



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1. Introduction

The first quarter of the 21st century has witnessed an unprecedented acceleration in environmental changes, particularly in global warming and biodiversity loss. Between 2001 and 2023, the Earth lost 488 million hectares of tree cover, equivalent to a 12% decrease in global forest coverage [1]. This deforestation, combined with broader land degradation, has produced catastrophic losses in carbon storage capacity and essential ecosystem services that support human well-being. Recent studies indicate that the rate of global warming has

significantly accelerated, with the Earth showing a robust acceleration of heating over the past six decades [2].

This rapid environmental change exemplifies what scholars increasingly recognize as cascading risks and emergent properties across planetary systems, including natural resources, energy, climate, health and society—a phenomenon termed the polycrisis [3]. The convergence of these risks threatens to overwhelm society’s ability to respond to any individual crisis, creating complex feedback loops between environmental degradation and social instability.

Natural Climate Solutions (NCSs) have emerged as a response to these challenges. NCSs include ecosystem restoration, the avoiding of forest conversion, natural forest management, regenerative agriculture, and the conservation of wetlands and forests [4]. Research indicates that NCS could provide up to 37% of cost-effective CO₂ mitigation needed through 2030 to maintain global warming below 2 °C [5]. However, the success of these solutions requires that greenhouse gas removals and sequestration be permanent—a requirement increasingly challenged by social and economic drivers.

The dominant frameworks for validating REDD+ carbon offset credits reside within the voluntary carbon markets. As Verra’s VCS [6] and the Gold Standard [7] have been the most prominent validation standards, we critiqued their primary social impact indicators through comparison with our well-being survey instrument. At the time of our analysis, there were 26 indicators categorized into financial, human, social, and natural resources included in Verra’s social and biodiversity impact assessment (SBIA) guidance. Eighty-one percent of the approved indicators are objective, four percent are subjective, and fifteen percent could be measured with either subjective or objective indicators.

The emergence of Article 6 of the Paris Agreement has created new imperatives for verifying and validating NCS projects [8]. While the Article 6.4 Supervisory Body has established requirements for greenhouse gas removals, current policies and programs often fail to account for the complexity of the relationship between social and biological systems. Studies have shown that this oversight has led to significant implementation failures in reducing emissions from deforestation and forest degradation (REDD+) and other agriculture, forestry, and other land use (AFOLU) projects [9,10]. While verification frameworks focus on measuring carbon sequestration or emissions avoidance, they often neglect the social dimensions that are a key determinant of a project’s long-term success.

Research in conservation science has demonstrated that project success is intimately linked to community support and participation [11]. For example, studies of REDD+ implementations have shown that projects failing to address community needs often face significant challenges in achieving permanence [12,13]. This gap between technical verification requirements and social impact considerations threatens both project permanence and market confidence.

2. Materials and Methods

This study employs an integrative framework synthesis approach to develop a practical verification model that incorporates community well-being into NCS projects. Rather than conducting a traditional systematic or scoping review, we focused on critically reviewing and integrating diverse sources—including existing voluntary and regulatory carbon standards, community engagement models, and community well-being indicator frameworks—to construct a comprehensive, applied framework that can enhance desired permanence in NCS projects. Integrative reviews are increasingly recognized in interdisciplinary research for their ability to combine theoretical, empirical, and practical insights to generate new frameworks or tools applicable to real-world problems [14,15].

Our review is best characterized as an indicators review, emphasizing the identification, adaptation, and synthesis of key social indicators from multiple established frameworks to meet emerging needs in NCS verification (Table 1). This method is particularly suited to rapidly evolving fields where applied solutions are required to fill gaps in practice [16,17].

Table 1. Methods.

Stage	Activity	Source Types	Purpose
1. Source Identification	Collected frameworks and documents related to carbon verification, community well-being, and participatory processes	UNFCCC Article 6 documents [8,18]	To gather relevant indicators, tenets, and critiques across sectors
		Voluntary standards (e.g., Verra VCS, Gold Standard) [6,7]	
		Community well-being indices (e.g., OECD, GNH, Happiness Index) [19–22]	
		Scholarly research on REDD+, community development, and conservation [9,13,23–26]	
2. Comparative Thematic Analysis	Analyzed strengths, gaps, and overlaps among frameworks and standards	Documents, scholarly literature, and indicator sets	To identify core themes (e.g., well-being domains, participatory principles) and indicator inconsistencies
		Author team meetings and memos	
3. Framework Synthesis	Constructed an integrated framework aligning social indicators with carbon verification requirements	Reflexive synthesis informed by practice and prior fieldwork [11,23–25,27]	To develop a practical, policy-aligned framework grounded in community-centered principles
4. Validation through the Literature and Cases	Compared the framework to challenges in NCS implementation (e.g., REDD+ failures)	Case examples from global REDD+ projects [12,13,28–37]	To demonstrate the practical relevance of framework components

To develop the framework, we systematically gathered and analyzed the following:

- Community well-being indices such as the OECD Better Life Index [19], Bhutan’s Gross National Happiness Index [20], and the Happiness Alliance’s Happiness Index [22];
- Social safeguard frameworks within voluntary carbon standards such as Verra’s VCS Social and Biodiversity Impact Assessment (SBIA) [6] and the Gold Standard [7];
- United Nations documents and policy texts related to the Paris Agreement’s Article 6.4 Mechanism [8,18,38];
- Scholarly critiques of REDD+ and AFOLU projects that identified risks to community well-being and project permanence [9,10,12,13].

Our analysis followed a three-step process: (1) critical comparison of existing frameworks to identify thematic gaps in current NCS verification standards; (2) synthesis of recurring and emergent themes in community well-being and participatory process literature; and (3) construction of a novel verification-aligned framework that integrates these themes into practical assessment domains and participatory tenets.

Throughout the process, we emphasized reflexivity, recognizing the influence of our experiences as researchers and practitioners in community development and conservation contexts [39,40]. The resulting framework is designed to complement and strengthen existing standards by offering measurable, community-centered indicators aligned with the objectives of Article 6 of the Paris Agreement.

Appendix A provides sources for the concepts used in elaborating the concept of participation. These sources were selected for (a) relevance to natural resource management and (b) relevance to community-level governance.

2.1. Evolution of Natural Climate Solution-Based Carbon Offset Credit Standards

The landscape of carbon offset credit standards has evolved significantly since the early days of voluntary carbon offset markets. Initially dominated by project-specific methodologies, the market has matured to include comprehensive frameworks that address both environmental and social dimensions of climate action [8,11]. In the overall global carbon offset market, which includes both compliance and voluntary segments, Natural Climate Solution projects are estimated to account for roughly 30% to 40% of total credits issued and retired (this varies by year and source), but that only 1.2% of the annual cost-effective potential of NCS have been unlocked by the voluntary carbon market [41]. According to the United Nations Environment Programme, current finance flows to nature must triple by 2030 [42]. This volume and potential growth of NCS highlights the criticality of robust standards for NCS.

NCS investments include sustainable products and value chains, direct investment in natural resources, and carbon sequestration. Our focus in this report is on the latter, in the form of carbon offset credits. We recognize that the market is evolving in the post-Paris Agreement policy regime [8] and will build upon experiences in the voluntary carbon offset market, and the voluntary carbon offset credit paradigm dominates thinking about standards. As the regulatory regime and markets evolve, researchers, practitioners and policy-makers must learn lessons from the voluntary market, and avoid repeating the failure to address the social components of NCSs in the future.

Studies by Tänzler [9] and Alusiola et al. [10] found that NCS projects employing REDD+ frequently failed to include communities in participatory processes or adequately consider community impacts. Examples of negative outcomes include the following:

- Infringement of community access rights and traditional uses in Cambodia [28,29];
- Gender exclusion and delayed payments in the Democratic Republic of Congo [30];
- Displacement and community division in Ethiopia [12];
- Elite capture and perverse incentives in Indonesia [31,32];
- Loss of indigenous land rights in Panama [33];
- Contested land tenure in Tanzania [13,34];
- Displacement and livelihood loss in Uganda [35,36];
- Forest encroachment and community tensions in Vietnam [37].

The 21st Conference of Parties to the UNFCCC met in Paris in 2015, aiming to establish a global framework for addressing climate change. One of the critical aims was to align financial flows with low greenhouse gas emissions using the framework of Nationally Determined Contributions (NDCs) and tightened regulation and oversight of carbon offset credit trading. In Decision 1/CP.21, the Parties to the UNFCCC adopted the Paris Agreement, and acknowledged that actions to address climate change should “respect, promote, and consider [Parties] respective obligations on human rights, the right to health, the rights of indigenous peoples, local communities. . .” The Paris Agreement aims to create opportunities for public participation in decision-making processes related to climate change, ensuring that local voices are heard [8].

Article 6 establishes this framework, which includes “recogniz[ing] the importance of integrated, holistic and balanced non-market approaches. . .the context of sustainable development and poverty eradication” [8]. Article 6.4 establishes a centralized carbon market mechanism with an Article 6.4 Supervisory Body. This body has adopted standards for greenhouse gas removals [8,18]. Article 7 affirms that climate adaptation should follow

a participatory and fully transparent approach and be based upon the best available science, and where appropriate, from traditional and local knowledge systems [8,18].

The salient point for the integration of well-being considerations in NCS projects under Article 6 is a very pragmatic concern for their long-term success, implied in the expression of “environmental integrity”. This is the question of “permanence”. We contend that success in NCSs requires sustained effort over decades, if not centuries. Communities in the vicinity of forests and other greenhouse gas sinks that become the target of NCS action will have substantial impact on land use and land cover change and must therefore voluntarily support the projects.

The UNFCCC has established performance monitoring standards for designated operational entities of Article 6 of the Paris Agreement [18]. Registration for Article 6.4 projects and programs includes criteria for screening projects, including environmental impacts, social impacts, and sustainable development co-benefits. Designated operational entities are screened for compliance with required global stakeholder consultations, integrity safeguards, and analysis of environmental and social impacts.

2.2. Next Steps for Verification Standards

After the adoption of the Paris Agreement, the public held a widespread expectation that consolidation of carbon offset credit standards would occur. This has not occurred, but there are ongoing efforts to align existing standards with the Paris Agreement. The UNFCCC’s Supervisory Body of the Article 6.4 Mechanism (Supervisory Body) is working to align carbon markets with the Paris Agreement Goals and to ensure that offset mechanisms both contribute to global emissions reduction and support sustainable development in host countries. For example, under the Supervisory Body, the Methodological Expert Panel workplan for 2024 included, inter alia, the production of a Concept Note on Equitable Sharing of Mitigation Benefits and a Standard for Addressing Non-Permanence. At the time of writing, the products of the 2024 workplan are not yet available. The updated methodologies are due to be operational in 2026 [18].

Meanwhile, there has been continued growth in voluntary and domestic carbon offset standards supported by Article 6.2, which gives the option for governments to work through existing independent crediting programs. The voluntary carbon offset market grew from less than 300 million dollars (US) at the time of the Paris Agreement to nearly 2 billion dollars (US) in 2021 [43]. Drivers include increased corporate demand to meet Net Zero targets, new market initiatives, UN-recognized domestic standards, and new opportunities afforded by the Paris Agreement’s Article 6. The investment bank Morgan Stanley reported in 2023 that the value of the voluntary carbon offset market is expected to grow to 250 billion dollars (USD) by 2050 [44].

Carbon offsets face substantial risks in terms of permanence. The Article 6 Supervisory Body’s must integrate tools to account for and manage risks of non-permanence and ensure equity in the sharing of costs and benefits of offsets. They will need to address the impacts of offset projects on communities, measure community acceptance of carbon offset programs, and establish an early-warning system of failure to gain community support for the offset enterprise, or else others will likely rise to the task and critique.

2.3. A Framework for Participatory Process for NCS Projects

We derived five tenets from concepts of participation, case studies, and in the legal principles articulated in the United Nations Economic Commission for Europe (UNECE) Convention on Access to Information, Public Participation in Decision-making, and Access to Justice in Environmental Matters [38]. We propose that these tenets be integrated in both voluntary and Article 6 offset standards.

2.4. Five Core Tenets for Community Engagement

The need for Article 6.4 rules to address the relationship between offset projects and community well-being is an essential step in promoting permanence. Failure to address this issue has the potential to undermine efforts to employ offsets, especially those using NCSs, to meet greenhouse gas reduction targets. We therefore offer a framework for stakeholder participation to address the potential gap. We define a participatory process as principles and activities that ensure community members impacted by an NCS have the opportunity to engage, with parity of and full access to information, in their own language, in each step of an NCS. Our definition draws from the United Nations Economic Commission for Europe (UNECE) Convention on Access to Information, Public Participation in Decision-making, and Access to Justice in Environmental Matters (Aarhus Convention) [38], which links environmental rights and human rights. This framework suggests that participatory processes for NCSs should include access to information, public participation, and access to justice [38]. A participatory process allows the community to be involved in each step of the NCS, from planning to implementation, evaluation, monitoring, managing, and maintaining. Furthermore, a participatory process that encompasses a community well-being framework enables all NCS stakeholders to measurably understand NCS co-benefits and other impacts on communities.

We posit many similarities between NCSs and wildlife conservation projects because both often can negatively or positively impact communities in an effort toward sustainable development. While a complete survey of NCSs or similar projects is beyond the scope of this proposal, there are sufficient findings to indicate a participatory process would be beneficial and may be needed to ensure NCSs do not harm communities. For example, Allgood et al. [11] found that wildlife conservation projects that include and revolve around the community, such as with a participatory process, are more likely to succeed. The Laguna San Ignacio (LSI) project, analyzed in their paper, demonstrated how the LSI Alliance and other groups helped the community create transparent, equitable, and sustainable land use maps and conservation easements. These easements, representing a clear improvement in the “good governance” domain of well-being, have been key to saving lagoons and improving the lives of people who rely on its resources for tourism and fisheries [11].

Many guides and frameworks for participatory processes exist across different fields and contexts [27]. While an evaluation of various participatory processes is outside the scope of this proposal, we have selected several scholarly conceptualizations as examples that inform our proposed framework for a participatory process in NCSs. Appendix A summarizes these examples and their components, chosen specifically for their considerations of intention, power, and harm to communities.

Our backgrounds as authors are community development researchers and advocates for paradigm shifts in wildlife conservation and community engagement (see also Appendix A). For this article, we will synthesize five tenets for participatory processes for NCSs. The tenets highlight that successful NCS projects should not only focus on carbon offsets but should equally prioritize the interests, well-being, and active involvement of the communities impacted by these projects [11,18,27].

2.5. Towards Better Assessment: Nine Well-Being Domains

To derive our tenets from our experiences and the literature, we focused on factors that contribute to safeguarding and enhancing community well-being (Table 2).

We note that community well-being is often tethered to many other areas, such as nature, culture, human talent, economics, and finances in communities [23–25]. Community well-being also must be assessed and tracked over time with measurements that matter to all stakeholders, especially local community members. Community well-being highlights the

obligation to build trust to ensure that any project does not harm well-being by recognizing power dynamics and, wherever possible, seeks to create positive, long-lasting impacts [23–25].

Table 2. Nine well-being domains.

Satisfaction with Life	The Domain of Subjective Well-Being Measures General Satisfaction with Life, a Metric Sometimes Used as an Overall Measure for Well-Being, as Well as Positive and Negative Feelings (Affect).
Community and social support	The domain of community and social support measures a person's sense of belonging to a community, as well as their trust in others (e.g., neighbors, businesses, agencies, etc.), the frequency of volunteering, donating or otherwise giving, and aspects of safety including a sense of safety as well as crime and other violations of safety. Social support is an aspect of community focused on relationships and can include a personal safety net (having others there to help if one loses a job, gets sick, etc.) and feeling cared about or lonely.
Education and culture	The domain of education and culture measures aspects of formal and informal education, as well as cultural activities and discrimination/inclusion (as an aspect of culture).
Economy	The domain of economy, also called standard of living, measures income, as well as satisfaction with income, financial struggles, and aspects of human habitats/the built environment such as housing and basic services (water, energy, etc.), although some aspects of basic services are in other domains, such as access to hospitals in the domain of health and access to government services in the domain of government.
Environment	The domain of environment includes quality/status and satisfaction of aspects of the environment (air, water, natural settings, biodiversity, etc.), as well as impacts of the environment (disasters, toxicity and health impacts, etc.). It also includes GHGs and other emissions, green energy, and management of nature (agriculture, forestry, fisheries, etc.).
Government	The domain of government measures the quality of government (e.g., corruption, democratic process, trust and confidence in the government, etc.) and satisfaction with those qualities, as well as participation in government (voting, etc.), aspects of freedom (e.g., many human rights), and governmental duties (disaster risk strategies, etc.)
Health	The domain of health measures physical health, one's sense of health, provision, and access to health services, and satisfaction with health services.
Psychological well-being	The domain of psychological well-being measures mental health, as well as aspects of flourishing (purpose, optimism, self-esteem, etc.). Note that affect is measured in the SWL domain, and there is a crossover with trait affect (somewhat permanent, not a transitory mood or state affect).
Work and time use	The domain of work and time balance measures employment, satisfaction with employment, and other aspects of employment (e.g., work environment) such as work–life balance, leisure time, and other aspects of time balance (enjoyment of what one does, feeling rushed, having enough time).

While some standards allude to community well-being or benefit, the qualia are not expressed in terms defined by the community but are externally imposed standards, usually in the form of economic measurements [11,45]. No evidence was found in the review of standards of participatory processes to identify indicators of community well-being. A self-/community-determined well-being framework provides guidance for participatory project design, data collection, analysis, and use. It offers meaningful, accessible measurements about the status of a community's well-being and changes to it from NCSs or other factors.

While a full survey of well-being frameworks in NCS projects is beyond our scope, we can draw from existing social standards in Verra's Verified Carbon Standards (VSCs) Social and Biodiversity Safeguards (SBIs) and the Gold Standard and add findings from wildlife conservation to create a comprehensive well-being framework that enhances NCS project permanence and success [6,7].

Allgood et al. [46] found that linking community well-being and wildlife stewardship through indigenous or local knowledge in wildlife conservation projects results in more equitable and sustainable results. Further research [46,47] demonstrated that wildlife con-

servation and animal welfare positively contributes to the achievement of ten Sustainable Development Goals (SDGs). Earlier work by Allgood et al. [48] established that animal welfare and wildlife conservation played important roles in community well-being, including psychological well-being, health, education and learning, cultural diversity and resilience, community vitality, living standards, ecological diversity and resilience, good governance, and time use.

Many different instruments measure community well-being. For this proposal, we build on Allgood et al. [11] and Musikanski et al.'s [49] development of well-being instruments for community-based wildlife conservation projects. Musikanski et al.'s instrument includes a domain for perceptions of wildlife's impact on individual and community well-being, which we adapted to gather data for perceptions of NCS impacts. Our framework and indicators also are based on the analysis of several of the following established indices:

- Organization for Economic Cooperation's Better Life Index [19];
- Bhutan's Gross National Happiness Index [20];
- United Kingdom Office of National Statistics' National Measures of Well-being [21];
- Happiness Alliance's Happiness Index [22].

Our proposed well-being instrument is structured around domains with indicators measuring aspects of each domain as outlined in Table 2.

As of this writing, Verra is in the process of updating its VCS Program to strengthen social and environmental safeguards, grievance mechanisms, and benefit-sharing requirements, among other elements. Public consultation has occurred, and Version 5 is soon to be released [50]. The SBIA toolkit [51], first published in 2011 under the Climate, Community & Biodiversity Alliance (CCBA) for the Climate, Community & Biodiversity (CCB) Standard, remains the leading framework for assessing social and biodiversity impacts in AFOLU projects under the VCSs. Despite the merger of the CCB Standard into the VCS Program, the SBIA has not been updated to reflect advances in best practices or emerging challenges in conservation and community engagement.

This underscores a critical gap. The most widely used standard for evaluating social impacts in AFOLU projects is not adequate for addressing complexities in ensuring equitable and effective conservation outcomes. Our work showcased in this piece aims to address this gap and further conversations towards improving research, policy, and practice. We conducted, as an author team, a thorough review of the aforementioned frameworks via research review, online videoconference meetings, email correspondence, and reflections on our respective research and practice. At all times, we aimed to ensure reflexivity critiquing our personal biases, influences, overstatements, and credibility [39,40]. Then, we grouped our well-being domains with the SDGs, the framework used to assess social impacts in the Gold Standard. Finally, we evaluated the social indicators outlined in the VCS SBIA Toolkit [51].

3. Results

3.1. Framework Overview

Our review resulted in the development of a comprehensive framework that integrates community well-being assessment with current carbon offset credit verification requirements. The framework addresses both the social and technical aspects of NCS project implementation. This framework also promotes participatory processes that strive towards more equitable, community engaged approaches addressing the aforementioned critical gap existing today.

3.2. Participatory Process Framework

Tenets for participatory processes for NCSs (Table 3) outline our comprehensive framework for participatory processes in NCSs that places a strong emphasis on fostering community engagement at the forefront. The five tenets stress the importance of defining the community impacted by NCSs (Tenet 1), involving community members through ongoing communication (Tenet 2), ensuring their active participation in decision-making (Tenet 3), building their capacity (Tenet 4), and safeguarding their well-being (Tenet 5). This community-centric approach underscores the significance of valuing and prioritizing the voices, values, and interests of those directly affected.

Table 3. Five core tenets for community participation.

Tenet	Description
1	Inclusion. Careful consideration of who is included in the “community” that may be impacted by an NCS.
2	Engagement. Ongoing outreach and two-way communication with community members throughout the project to engage all community members, with outreach occurring in ways to which community members respond (e.g., in the language of the community), and employing an approach that respects all contributions.
3	Contribution. Optimal inclusive involvement of the community in decision-making at all stages of the project (as is practical and desirable from the community perspective) with occasional re-assessments of Tenet 1 and 2, and ensuring enough time is taken for inclusive involvement.
4	Ownership. Community ownership and building the capacity of the community as needed to fully participate in all stages of the project throughout all stages, including decision-making, planning, implementation, managing, monitoring, maintaining, and sustaining after project completion.
5	Well-being. Safeguard community well-being for project community members, including avoiding negative impacts on community well-being, offsetting them when they are unavoidable, and, wherever possible, creating positive, lasting impacts on community well-being. This includes access to justice for the community to redress grievances.

The tenets also emphasize meaningful, adaptable, and flexible continuous engagement and empowerment as opposed to one-time or ad hoc engagement. They stress the need for continuous outreach, effective two-way communication, and periodic reassessments (Tenets 2 and 3) to ensure that the community’s perspectives and needs are considered and incorporated. Tenets 3 and 4 underscore community empowerment, emphasizing community involvement in decision-making and building their capacity to participate effectively in all aspects of the project. Community empowerment fosters a sense of ownership, self-reliance, and sustainability. Also, flexibility and adaptability should be incorporated in regular reassessments of the community’s composition and outreach methods, adjusting to community dynamics and evolving to address community needs over time (e.g., Tenet 3).

3.3. The Well-Being Assessment Framework

The well-being framework in Table 2 comprises nine key domains. Table 4 identifies key topics within each domain for consideration in undertaking an assessment.

Supplemental materials for the assessment of well-being indicators for a comprehensive well-being framework can be accessed here: <https://onenatureinstitute.org/WILD-supplemental-material/>, accessed on 5 June 2025.

Table 4. Well-being framework for NCSs.

Well-Being Domain	Well-Being Topics for Well-Being Framework	
Satisfaction with Life	Satisfaction with life	
	Positive feelings (affect)	
	Negative feelings (affect)	
Community and Social Support	Sense of belonging in community	
	Community representation	
	Trust in neighbors	
	Crime	
	Personal safety	
	Domestic violence	
	Generosity	
	Satisfaction with personal relationships	
	Social safety net (someone there in times of need)	
	Feeling lonely	
	Education level	
Learning and Culture	Proficiency in math and reading	
	Access to formal education	
	Access to informal education	
	Participation in formal and informal education	
	Discrimination	
	Access to sports and recreation	
	Access to artistic and cultural activities	
	Income	
Economy	Satisfaction with personal finances	
	Ability to meet needs with finances	
	Poverty	
	Housing	
	Access to basic service, including electricity	
	Access to roads	
	Food security	
	Land rights and ownership	
	Environment	Access to nature
		Protection and preservation of wildlife (all life forms) and ecosystems
Sustainable agriculture and forest management		
Forest cover		
Natural Disaster impacts on life and property		
Soil quality		
Air quality		
Water quality and access to safe water		

Table 4. Cont.

Well-Being Domain	Well-Being Topics for Well-Being Framework
Government	Access to safe sanitation
	Green fuels and technology
	Greenhouse gas emissions
	Satisfaction with public services
	Corruption
	Freedom to make life choices (Independence)
	Voting habits
	Government's inclusive and responsive decision-making
	Natural disaster risk reduction strategies
	Peace (conflict)
Health	Confidence in government
	Satisfaction with health
	Access to healthcare (including family planning)
	Self-assessment of health
	Diseases
	Undernourishment
	Mortality rates (overall, women, children)
Psychological Well-being	Disability
	Suicide rates
	Flourishing (purpose, engagement, optimism, accomplishment, self-esteem)
Work and Time Balance	Spirituality
	Employment
	Unemployment
	Satisfaction with Work
	Work–life balance
	Unpaid work
Perceptions of Natural Climate Solutions	Leisure
	Satisfaction with the impact of natural climate solution on personal well-being
	Satisfaction with the impact of natural climate solution on community well-being

3.4. Integration with Verification Standards

The verification of NCS requires careful alignment between carbon offset credit standards and community well-being assessments. Based on experiences from REDD+ implementations [9,10], we recommend a three-tiered verification protocol: First, baseline community well-being assessments should be conducted concurrent with initial carbon stock assessments, using a well-being framework such as that outlined in Table 2. This establishes clear metrics for both environmental and social aspects of the project before implementation begins.

Second, verification processes should integrate community well-being indicators with existing carbon offset credit requirements, such as those established under Article 6.4 of the Paris Agreement [8,18]. Regular monitoring should assess both carbon sequestration metrics and community well-being indicators on an annual basis, with particular attention to potential risks identified in the participatory process framework (Table 3).

Third, permanence verification should explicitly consider community impacts and engagement levels as key risk factors. As demonstrated by the failures documented in various REDD+ projects [12,13], community disengagement can substantially undermine project permanence. Therefore, verification protocols should require evidence of ongoing community participation and benefit-sharing, aligned with the five core tenets for community engagement presented in our framework.

3.5. Practical Implementation Guidance

Drawing from successful approaches in wildlife conservation [46] and lessons learned from REDD+ implementations, we propose practical guidance for implementing integrated community well-being assessment in NCS projects. The implementation should follow the five core tenets outlined in Table 3, with particular (measured) attention to inclusion, engagement, contribution, ownership, and well-being.

Initial implementation should begin with comprehensive community mapping and baseline assessment using the nine well-being domains identified in Table 2. This provides a foundation for understanding community needs and values, similar to successful approaches documented in the Laguna San Ignacio project [11]. Project developers should use participatory methods to engage communities in decision-making processes, following the UNECE Convention on Access to Information guidelines [38].

Implementation must address common failure points identified in previous NCS projects, including the following:

- Infringement of community access rights and traditional uses;
- Lack of transparent benefit-sharing mechanisms;
- Inadequate grievance resolution procedures;
- Insufficient community engagement in decision-making;
- Poor alignment between project goals and community needs.

These issues, documented across multiple REDD+ projects [12,28,30], can be mitigated through careful attention to community well-being indicators and regular assessment of project impacts on all nine well-being domains.

The framework should be implemented with regular monitoring and assessment cycles that align with Article 6.4 verification requirements. This includes the following:

- Annual assessment of community well-being indicators;
- Regular stakeholder consultations aligned with domestic arrangements;
- Integration of traditional knowledge and local perspectives;
- Transparent reporting of both carbon offsets and community metrics;
- Clear mechanisms for community feedback and grievance resolution.

Success in implementation can be measured through improved project permanence, enhanced community support, and better alignment with Article 6 requirements for environmental integrity and sustainable development. Following the example of successful wildlife conservation projects [11], implementation should emphasize building community capacity and ensuring long-term community ownership of project outcomes.

4. Discussion

In our review of current frameworks and the major gaps existing between implementing them in practice that ensures equitable outcomes that enhance community well-being, we synthesized common domains of well-being into a new well-being framework with tenets for participatory processes. We recommend that NCS projects incorporate a comprehensive well-being framework like ours to strengthen the prospects for long-term sustainability. This framework should begin with baseline community assessment and stakeholder mapping, followed by the development of culturally appropriate participatory processes. Implementation should include regular assessment protocols, clear feedback channels, and transparent reporting systems, all designed to ensure meaningful community engagement throughout the project lifecycle. The metrics for this framework can and should be integrated into a unified data system addressing all aspects of the offset enterprise.

For existing standards bodies such as Verra and the Gold Standard, we recommend substantial revision of current frameworks to incorporate robust participatory processes and measurable well-being metrics. These revisions should emphasize community-based monitoring systems, participatory verification processes, and regular social impact assessments. Standards bodies should also develop comprehensive capacity-building programs, including local verifier training and technical support systems, to ensure effective implementation.

Developers of emerging standards have a unique opportunity to integrate these considerations from the outset. We strongly recommend incorporating well-being assessment requirements and participatory process guidelines into their foundational frameworks. These new standards should include clear guidance documents, assessment toolkits, and technical resources to support implementation across diverse contexts and scales.

Limitations

Our proposed framework and recommendations hold limitations that future research must address. A comprehensive analysis of existing NCS projects is needed to determine which standards were used, how authentically participatory processes were integrated, and how well-being frameworks were employed. While components of our approach have been tested in different conservation projects, they have not been fully evaluated in NCS activities, creating uncertainty about their effectiveness in this specific context.

Our research was a thorough review of the current frameworks and their limitations and opportunities. Thus, our research was constrained by limited engagement with key stakeholders. We did not explicitly engage with standards organizations, affected communities, or NCS investors and implementors. This gap in stakeholder consultation requires more research to address future issues regarding implementation challenges, community engagement experiences, and potential market responses. Geographic and cultural variations also present substantial challenges that require further investigation, as we noted how tethered community well-being is to culture, history, and many other factors [23–25].

5. Conclusions

Current standards for NCSs lack adequate frameworks to secure safeguards for individuals and communities affected by NCS projects. The subset of standards that currently address social impacts typically applies top-down, externally derived metrics that privilege material well-being without adequately considering cultural nuances, power imbalances, incentive effects, or benefit distribution inequities within communities. This approach fundamentally fails to address this core development question: what is being developed, and for whom?

The sustainability of NCS work depends critically on local stakeholder support. Our analysis strongly suggests that a community-engaged well-being assessment framework, beginning from a baseline and incorporating regular reassessments, provides the most effective early warning system for potential project challenges. As Article 6 mechanisms mature and national standards emerge, the need for such frameworks becomes increasingly urgent.

This piece offers a practical approach to integrating participatory processes and well-being assessments into NCS standards. By combining structured community engagement with comprehensive well-being metrics, our framework provides a methodology for measuring and supporting community well-being in NCS projects. This integration is not merely a social consideration but a fundamental requirement for project success and permanence.

The path forward requires coordinated effort from standards bodies, project developers, and market participants. Future development should focus on framework integration, implementation guidance, and verification protocols that maintain both environmental integrity and social benefits. As the carbon offset market evolves, these enhanced standards will be crucial for ensuring project permanence while fostering equitable and sustainable outcomes for affected communities.

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Abbreviations

The following abbreviations are used in this manuscript:

NCSs	Natural Climate Solutions
REDD+	Reducing Emissions from Deforestation and Forest Degradation (with additional social and biodiversity considerations)
AFOLU	Agriculture, Forestry, and Other Land Use
UNFCCC	United Nations Framework Convention on Climate Change
NDCs	Nationally Determined Contributions
SBIA	Social and Biodiversity Impact Assessment
VCS	Verified Carbon Standard
CCBA	Climate, Community & Biodiversity Alliance
CCB	Climate, Community & Biodiversity (Standard)
OECD	Organization for Economic Cooperation and Development
UNECE	United Nations Economic Commission for Europe
SDGs	Sustainable Development Goals
IFAW	International Fund for Animal Welfare

Appendix A. Conceptualizations and Components of Participatory Processes in Communities

Source	Conceptualization	Components
Arnstein (1969) [52]	Participation can be seen as a spectrum of community engagement that bridges the gap from passive participation to full empowerment.	<ul style="list-style-type: none"> • (highest) Community control, delegated power, and partnerships • (lowest) Tokenism via consultation or informing, placating processes, and subjecting communities via manipulation or coercion
Pretty (1995) [53]	A typology for participation in development programs and projects (from most to least effective).	<ul style="list-style-type: none"> • Self-mobilization (p. 1252) • Interactive • Functional • Participation for material incentives • Participation by consultation • Passive • Manipulative
White (1996) [54]	Participation is political and dynamic including use and abuse.	<ul style="list-style-type: none"> • Nominal • Instrumental • Representative • Transformative
Cornwall (2008) [55]	“...greater public involvement in making the decisions that matter and holding governments to account for following through on their commitments” (p. 269).	<ul style="list-style-type: none"> • <i>Who</i> participates • <i>What</i> they are participating in, • The difference between involvement and influence within a community and on a community • The power dynamics and power differentials within a community and between the community and others
Eversole (2012) [56]	Participation is “ultimately a discourse: a way of speaking, signaling (in an implicit binary) that we-as-professionals believe that they-as-communities have something important to contribute to the process of social change” (p. 30).	<ul style="list-style-type: none"> • “whose knowledge counts” (p. 32), • “whose institutions to use” (p. 35), • How to undertake participation to honor participants in their own right • How to move across institutional and knowledge terrains to create new spaces for communities and organizations to “participate together” (p. 37).

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