

Strengthening Carbon Fund Frameworks to Enhance Climate Sustainability Practice in Rural African Communities



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Abstract

Carbon funds are increasingly promoted as mechanisms for channelling climate finance into rural African communities, yet the frameworks that govern them remain fragmented, poorly resourced, and only weakly aligned with local sustainability needs. This paper examines how carbon fund frameworks can be strengthened to enhance climate sustainability practice in rural Africa. Drawing on a thematic analysis of publicly available interviews, conference addresses, and corporate disclosures from banking, insurance, and industry leaders, alongside academic and policy literature, the paper identifies recurring governance, benefit-sharing, and integrity gaps that limit the developmental value of carbon finance. Findings show convergence across sectors on the need for national regulatory frameworks, transparent benefit-sharing formulas, and community-centred monitoring, reporting and verification systems. The paper argues that strengthening carbon fund architecture is a precondition, not a by-product, of durable rural climate resilience, and offers implications for policy and practice.

Keywords: *carbon funds; climate finance; rural Africa; climate sustainability; benefit-sharing; carbon markets.*

1. Introduction

Climate change poses one of the most severe developmental threats facing rural communities across sub-Saharan Africa, where livelihoods remain closely tied to rain-fed agriculture, forestry, and fragile ecosystems. As global temperatures rise, the continent experiences disproportionate exposure to droughts, floods, and land degradation despite contributing a small fraction of historical greenhouse gas emissions (Intergovernmental Panel on Climate Change [IPCC], 2023). In response, carbon markets and carbon funds have emerged as instruments intended to translate global mitigation obligations into finance for adaptation and sustainable land management in the communities most exposed to climatic risk.

A carbon fund, in its simplest form, pools capital from public, philanthropic, or private sources to purchase verified emission reductions or removals, typically generated through forestry, agriculture, or clean energy projects. Carbon markets, whether compliance-based under the Paris Agreement's Article 6 or voluntary in structure, provide the price-discovery and trading infrastructure through which these credits move between project developers and buyers (Maguire, 2011). Climate sustainability practice, for the purposes of this paper, refers to land, agricultural, and resource-management approaches that simultaneously build resilience to climate shocks and reduce or sequester greenhouse gas emissions at community level, including agroforestry, sustainable land management, soil carbon enhancement, and clean-energy substitution.

The relationship between these three concepts is not automatic. A functioning carbon fund requires a framework, understood here as the combined set of national regulations, registry systems, benefit-sharing rules, and verification standards, through which credits generated by a rural sustainability practice are measured, certified, priced, and converted into finance that reaches the community undertaking the practice. Where any link in that chain is weak or absent, the underlying sustainability practice may continue, but the finance intended to reward and scale it does not reliably follow. This distinction between the existence of climate-beneficial practice and the existence of a framework capable of financing it at scale is central to the problem this paper investigates.

Africa's position within this architecture has historically been marginal. Under the Clean Development Mechanism, the continent hosted a small share of registered projects, and even where projects existed, local ownership and community benefit were often minimal. This pattern has persisted into the voluntary carbon market era: despite housing vast forestry, savannah, and agricultural carbon sequestration potential, African countries account for a small proportion of global credits issued, and revenues frequently fail to reach the households and communities undertaking the underlying stewardship. Recent work on the future of African carbon offset markets similarly emphasises the need for more equitable climate-finance arrangements (Mulenga, 2025). Governments, development banks,

and market bodies have begun responding with national carbon market regulations, continental initiatives, and equity principles, but implementation remains uneven, and the frameworks governing carbon funds are still being assembled in real time.

This paper therefore addresses a twofold problem. First, the institutional and regulatory frameworks that are meant to govern carbon funds in Africa are fragmented across national, continental, and voluntary-market bodies, producing inconsistent rules on registration, benefit-sharing, and verification. Second, and consequently, rural communities that generate the underlying carbon value frequently receive a disproportionately small and unpredictable share of the finance their land and labour make possible, which weakens both the equity, and the long-term sustainability of the practices carbon finance is meant to support. Multiple observers, including African Union officials, development finance institutions, and market analysts, have converged on the diagnosis that without stronger, harmonised carbon fund frameworks, Africa risks becoming a low-value supplier of carbon credits rather than a genuine beneficiary of the climate transition it is helping to finance. This documented gap between the promise of carbon finance and the lived experience of rural resource stewards motivates the empirical and policy inquiry undertaken in this paper.

2. Literature Review

The academic literature on carbon markets in Africa has evolved from early scepticism about the Clean Development Mechanism towards a more nuanced debate about how voluntary and compliance markets can be redesigned to deliver equitable outcomes. Newell et al.'s (2013) assessment of carbon markets fifteen years after Kyoto concluded that market mechanisms had produced real, if geographically uneven, mitigation outcomes, but that governance quality determined whether host communities captured lasting value from participation. This concern with governance quality has been a consistent thread in subsequent scholarship focused specifically on Africa.

Bond's (2012) analysis of emissions trading as a form of new enclosure argued that market-based conservation instruments can reproduce colonial-era patterns of land alienation when local tenure and consent arrangements are weak, a critique echoed in more recent empirical work on Kenyan and East African carbon projects. Duker et al. (2019), examining REDD+ pilot projects, found that smallholder agricultural systems were frequently excluded from carbon-financed forestry design, producing projects that were technically sound but socially narrow. Complementing this, Fobissie et al.'s (2014) comparative analysis of REDD+ policy approaches in Cameroon and the Democratic Republic of Congo found that overlapping and poorly sequenced institutional mandates across environment, land, and forestry ministries slowed the translation of national REDD+ readiness into functioning benefit-sharing mechanisms on the ground.

More recent scholarship has moved toward institutional design solutions. Gakou-Kakeu et al.'s (2024) study of REDD+ organisational arrangements in Cameroon demonstrated that sectoral integration across agriculture, forestry, and energy ministries substantially improved the coherence of carbon governance, suggesting that fragmentation is not inevitable but a product of specific institutional choices. Mpofu's (2024) chapter on the carbon credit controversy in rural African communities went further, arguing that carbon markets in their current form can simultaneously mitigate climate change and entrench economic vulnerability, depending entirely on whether contractual and regulatory frameworks protect community land rights and revenue shares. This ambivalence in the literature, credits carbon finance with real potential while documenting recurrent implementation failure, is central to the problem this paper investigates.

A parallel literature situates carbon funds within the wider climate-smart agriculture agenda. Arslan et al.'s (2015) assessment of climate-smart agriculture adoption in Zambia found that financial and informational constraints, rather than technical unfamiliarity, were the principal barriers preventing smallholders from adopting climate-resilient practices, implying that carbon finance could, in principle, relax exactly the constraint that limits adoption if it reached farmers reliably. This financing challenge is also reflected in work on carbon-market access and climate-smart agriculture for smallholders (Maguire, 2024; Woelcke, 2012). Evidence from Ethiopia's carbon market development, examined through the lens of soil and forest carbon sequestration research, similarly suggests that where monitoring, reporting and verification systems are locally adapted, community participation and project durability improve markedly (Tessema et al., 2026).

The grey and policy literature reinforces and extends these academic findings. The Africa Carbon Markets Initiative's status and outlook reporting documents growth in African carbon credit demand alongside persistent regulatory ambiguity (Africa Carbon Markets Initiative [ACMI], 2024), while continental institutions have intensified efforts to strengthen market integrity and coordination as carbon markets expand (African Development Bank, 2025). The United Nations Development Programme has argued that participation in carbon markets should be anchored in national determined-contribution commitments and supported by robust national carbon market frameworks (Hachileka, 2024), a position several African governments, including Kenya, Zimbabwe, and Malawi, have begun to operationalise through new legislation.

Equity considerations extend beyond community-level benefit-sharing to intra-household and gender dynamics, which the policy literature has begun to address more directly than the peer-reviewed academic literature. The African Development Bank's policy paper on gender and carbon markets argues that, without deliberate design, carbon revenue distribution can reproduce existing gender inequalities in land and asset control and recommends embedding gender-responsive criteria directly

into fund eligibility and benefit-sharing rules rather than treating them as an optional co-benefit (African Development Bank, 2024b). This concern is reinforced by bibliometric evidence on climate philanthropy in Africa, which finds that funding gaps remain most acute in adaptation-focused and community-level initiatives relative to large-scale mitigation infrastructure, suggesting that even philanthropic capital, which is nominally more flexible than commercial carbon finance, has not yet closed the financing gap facing rural adaptation practice (Kwanhi et al., 2025).

Taken together, the literature establishes three things clearly: that carbon finance has genuine potential to support rural climate sustainability practice; that this potential has been substantially unrealised because of fragmented, under-resourced, and inconsistently enforced governance frameworks; and that recent institutional experimentation, at both national and continental level, has not yet been systematically assessed against the perspectives of the finance and industry actors who operate within, and are attempting to reform, these frameworks. It is this gap, between institutional design proposals and the lived assessment of practitioners moving capital through carbon funds, that the paper's empirical component addresses.

3. Methods

3.1 Research design

The paper adopts an empirical, qualitative research design based on thematic analysis of secondary, publicly available data, following the approach set out by Braun and Clarke (2006) for identifying, analysing, and reporting patterns within qualitative material. Rather than generating new primary interviews, the paper draws on a corpus of documented, publicly accessible statements made by industry, banking, insurance, and policy actors engaged in African carbon markets. This approach was selected because senior decision-makers in carbon finance rarely grant primary research access, whereas their positions on framework design are frequently and substantively articulated in press interviews, panel transcripts, corporate sustainability disclosures, and multilateral summit proceedings, making these sources both accessible and empirically rich.

3.2 Search strategy

The search was conducted in two parallel strands, one building the academic and policy literature base used for the review, and one building the empirical corpus of public statements used for thematic analysis. Both strands were executed between 3 and 14 August 2026. For the literature strand, academic databases and publisher platforms, namely Google Scholar, ScienceDirect, Wiley Online Library, SpringerLink, Taylor and Francis Online, and Nature-family journals, were searched for publications dated January 2010 to August 2026, using combinations of the terms "carbon market," "carbon fund," "REDD+ governance," "climate-smart agriculture," and "Africa." Policy and institutional sources were retrieved directly from the repositories of the African Development Bank, the World Bank Open

Knowledge Repository, the United Nations Development Programme, the Intergovernmental Panel on Climate Change, and the International Emissions Trading Association, using the same core search terms combined with "policy paper" and "framework."

For the empirical strand, financial and development media (Bloomberg, Reuters, the World Economic Forum, Carbon Pulse, the Africa Report, and AllAfrica) and corporate or industry publications (Swiss Re Institute, Carbon Markets Africa, African Business, Highways Today, and the UNDP Insurance and Risk Finance Facility) were searched for material dated January 2022 to August 2026. This narrower period was chosen deliberately, as it captures the period of most active institutional formation in African carbon markets, beginning with the launch of the Africa Carbon Markets Initiative at COP27 in November 2022 and extending through subsequent national regulatory reforms in Kenya, Zimbabwe, Malawi, and Zambia. Search terms combined "carbon market," "carbon fund," and "Africa" with sector-specific qualifiers such as "bank," "insurance," "CEO," and "interview." Table 1 summarises the platforms searched, the period covered, the search terms applied, and the number of records identified and retained for each source category.

Table 1

Search strategy and data sources reviewed

Source category	Platforms / repositories searched	Search period covered	Core search terms	Records identified	Records included
Academic literature (peer-reviewed)	Google Scholar; ScienceDirect; Wiley Online Library; SpringerLink; Taylor & Francis Online; Nature-family journals	Jan 2010 - Aug 2026	"carbon market" Africa; "carbon fund" Africa; REDD+ governance; climate-smart agriculture	46	12
Policy and institutional reports	AfDB; World Bank Open Knowledge Repository; UNDP; IPCC; IETA	Jan 2012 - Aug 2026	carbon market policy paper Africa; climate finance framework	22	7
Financial and development media	Bloomberg; Reuters; World Economic Forum; Carbon Pulse; The Africa Report; AllAfrica	Jan 2022 - Aug 2026	carbon market interview Africa; bank CEO carbon credits Africa	31	11
Corporate and industry publications	Swiss Re Institute; Carbon Markets Africa; African Business; Highways Today; UNDP IRFF	Jan 2022 - Aug 2026	insurance climate risk Africa; carbon project developer interview	18	8

3.3 Inclusion and exclusion criteria

For the empirical corpus, inclusion criteria required that a source (a) quote a named individual in a banking, insurance, corporate, or senior policy leadership role, (b) address carbon funds, carbon credits, or carbon markets operating on the African continent, and (c) be publicly archived and independently verifiable at the time of writing. Sources that were purely promotional without substantive attributable comment, or that could not be traced to an identifiable speaker and event, were excluded. For the literature strand, inclusion favoured peer-reviewed journal articles carrying a digital object identifier and multilateral or development-bank policy papers with a named publishing institution; blog commentary, opinion pieces without institutional attribution, and sources that could not be independently verified were excluded. Applying these criteria across both strands yielded a working empirical corpus of nineteen public documents spanning development-bank leadership, commercial banking, reinsurance and insurance, project-level corporate leadership, and government ministerial statements included as institutional counterpoints, together with a literature base of twelve peer-reviewed academic articles and seven policy and multilateral reports, giving an approximate 63-to-37 balance of academic to policy sourcing consistent with the paper's evidentiary design.

3.4 Thematic analysis procedure

Thematic analysis proceeded in five stages: familiarisation through repeated reading of source transcripts and articles; generation of initial descriptive codes relating to governance, finance, and community benefit; iterative collation of codes into candidate themes; review of candidate themes against the full data corpus for internal coherence and distinctiveness; and final definition and naming of themes, consistent with the thematic-analysis procedure described by Braun and Clarke (2006). Coding was conducted manually and cross-checked against the original source material to minimise misattribution.

3.5 Limitations

Limitations of this design include reliance on statements curated for public consumption, which may understate internal institutional disagreement, and the absence of rural community voices as a distinct, directly sourced category within the empirical corpus, a gap the paper returns to in its concluding discussion. The restriction of the empirical strand to the 2022 to 2026 period, while justified by the pace of institutional change in this field, also means that earlier industry commentary predating the Africa Carbon Markets Initiative was not systematically captured.

4. Findings

Thematic analysis of the corpus produced four dominant themes: regulatory fragmentation and the demand for national frameworks; benefit-sharing and community integrity; the financialisation of climate risk by banking and insurance actors; and market credibility as a precondition for scaled investment. Table 2 summarises the composition of the empirical corpus by sector and actor type, and Table 3 summarises the four themes, their core findings, and illustrative sources.

Table 2

Composition of the empirical corpus by sector and actor type

Sector	Example organisation / actor	Role in corpus	Sources (n)
Development finance	African Development Bank; Africa Carbon Markets Initiative	Continental regulatory and market-infrastructure leadership	4
Government / continental policy	African Union Development Agency; Kenya, Ghana, Zimbabwe, Malawi, Zambia officials	National and continental framework design	4
Commercial banking / exchange	Johannesburg Stock Exchange	Domestic price-discovery infrastructure	2
Insurance / reinsurance	Swiss Re; Allianz; AXA	Risk transfer, underwriting, and carbon-offset purchasing	3
Project developers / corporate	SunCulture; Carbon Tanzania; Presto Innovations	Project-level implementation and community engagement	4
Market industry bodies	International Emissions Trading Association	Market credibility and Article 6 alignment advocacy	2

4.1 Regulatory fragmentation and the demand for national frameworks

Regulatory fragmentation emerged as the most consistently raised concern. Continental leadership repeatedly framed the absence of harmonised rules as the central constraint on scaling carbon finance. The African Development Bank's Vice President for Power, Energy, Climate and Green Growth described the Bank's decision to join the Africa Carbon Markets Initiative as a step toward establishing coordinated market infrastructure (African Development Bank, 2024a), while government representatives from Ghana and elsewhere used the same platform to describe country-specific efforts to strengthen monitoring, reporting and verification (African Development Bank, 2025). Continental actors also emphasised stronger integrity and coordination mechanisms as part of Africa's carbon-market development agenda (African Development Bank, 2025). Regional efforts to develop common

rules for carbon markets were interpreted by market commentators as evidence that African governments were seeking stronger domestic and cross-border authority over market participation and compliance (Bloomberg, 2023).

4.2 Benefit-sharing and community integrity

Benefit-sharing and community integrity formed a second, closely related theme. Project-level industry leaders were notably more concrete than continental officials about what strengthened frameworks should require. A Kenyan clean-energy carbon project leader emphasised that the purpose of the work was to create climate-smart livelihoods rather than credits alone (SG Editor, 2025), while a Tanzanian forest-carbon project director characterised the present period as an inflection point in which growing integrity requirements and emerging compliance-market rules were creating genuine opportunities for scale (Davis, 2025). A Kenyan carbon-removal entrepreneur working with smallholder farmers on biochar production stressed that the sector needed fewer intermediary brokers and more projects demonstrating measurable social and economic impact, directly linking framework credibility to the presence or absence of intermediary rent-seeking (Carbon Markets Africa, 2025). Taken together, these accounts converge on the need for binding, locally verifiable benefit-sharing rules rather than voluntary assurances (Carbon Markets Africa, 2025; Davis, 2025).

4.3 Financialisation of climate risk by banking and insurance actors

The financialisation of climate risk by banking and insurance actors constituted a third theme. Commercial banking infrastructure was shown moving toward carbon-market integration, exemplified by the Johannesburg Stock Exchange's preparation to launch voluntary carbon credit trading, a step intended to give African-origin credits a domestic, rather than purely offshore, price-discovery venue (Manuell, 2024). Reinsurance actors framed their engagement differently, emphasising both the purchase of carbon removal credits to offset residual emissions and a broader role providing risk assessment and underwriting capacity (Repmann et al., 2021), as well as sovereign risk-transfer instruments such as flood-risk cover for vulnerable African communities developed jointly with development-programme partners (Odera, 2022). This insurance-sector framing positioned carbon funds and climate risk finance as complementary rather than separate instruments: carbon revenue was described as building the resilience that risk transfer instruments are designed to protect.

4.4 Market credibility as a precondition for scaled investment

Market credibility as a precondition for investment scale formed the fourth theme. Multiple sources, spanning a policy specialist at a carbon-market industry association and continental development finance officials, argued that transparent price-discovery mechanisms, digital monitoring and verification systems, and Paris Agreement Article 6 alignment were necessary before institutional capital would commit to Africa at scale (African Business, 2025; International Emissions Trading

Association [IETA], 2025). This was reinforced by market-outlook data showing continued growth in African credit demand alongside a comparatively small share of global registry-issued credits, a gap that most sources attributed to persistent integrity and infrastructure concerns rather than an absence of underlying mitigation potential (ACMI, 2024; Miriri, 2023).

Table 3

Summary of the four themes identified through thematic analysis

Theme	Core finding	Illustrative source
Regulatory fragmentation	Absence of harmonised rules across national and continental bodies is the central constraint on scaling carbon finance.	African Development Bank (2024a); African Development Bank (2025)
Benefit-sharing and community integrity	Project-level actors link framework credibility to reduced intermediary rent-seeking and binding local revenue shares.	Carbon Markets Africa (2025); Davis (2025)
Financialisation of climate risk	Banking and insurance actors treat carbon revenue and risk-transfer instruments as complementary resilience infrastructure.	Manuell (2024); Repmann et al. (2021); Odera (2022)
Market credibility	Transparent price discovery, digital MRV, and Article 6 alignment are preconditions for institutional capital at scale.	IETA (2025); ACMI (2024)

4.5 Cross-cutting pattern across themes

Across the four themes, a consistent pattern emerges: actors positioned closer to project implementation, corporate developers and community-facing enterprises, articulated framework weaknesses in terms of livelihoods, intermediaries, and predictable payment, while actors positioned at continental or capital-market level articulated the same weaknesses in terms of regulatory harmonisation, registry infrastructure, and investor confidence. Both framings point toward the same underlying deficiency, namely the absence of a coherent framework linking rural sustainability practice to reliable finance, but they suggest that reform efforts pitched only at the continental or capital-market level risk leaving the intermediary and payment-reliability concerns raised by project-level actors unaddressed, and vice versa.

5. Discussion

The four themes identified through thematic analysis align closely with, and empirically extend, the concerns already documented in the academic literature. The regulatory fragmentation theme corroborates Fobissie et al.'s (2014) finding that overlapping institutional mandates slow the translation of readiness into functioning benefit-sharing mechanisms, while the movement toward national carbon market regulations across Kenya, Zimbabwe, and Malawi mirrors the institutional design solutions

Gakou-Kakeu et al. (2024) identified as improving REDD+ governance coherence in Cameroon. What the empirical corpus adds is confirmation that this diagnosis is shared, independently and consistently, by development-bank leadership, project developers, and market-infrastructure operators, not only by academic observers, suggesting the fragmentation problem is now a point of practitioner consensus rather than a contested academic claim.

The benefit-sharing theme provides a similarly close empirical echo of Mpofu's (2024) argument that carbon markets can mitigate climate change while entrenching vulnerability, depending on whether frameworks protect community revenue shares. The specificity with which project-level leaders described the mechanics of intermediary rent-seeking and livelihood outcomes offers a practitioner-level complement to Duker et al.'s (2019) finding that smallholder agriculture is frequently designed out of carbon-financed forestry projects; both bodies of evidence point toward the same policy remedy, namely binding, enforceable, and locally verifiable benefit-sharing formulas rather than voluntary best-practice guidance.

The emergence of banking and insurance actors as a distinct theme is less thoroughly anticipated in the existing academic literature, which has concentrated primarily on forestry, agriculture, and multilateral development finance. The evidence here suggests that domestic capital markets and reinsurance institutions are beginning to treat carbon finance and climate risk transfer as an integrated resilience infrastructure, a development that Arslan et al.'s (2015) finding on financial constraints as the principal barrier to climate-smart agriculture adoption in Zambia would predict should matter considerably, since domestic exchange listings and insurance-linked instruments could, in principle, widen and stabilise the finance channels reaching rural producers.

Finally, the market credibility theme underscores a tension implicit throughout the literature and the empirical corpus alike: measures that improve integrity, such as stronger monitoring, reporting and verification and Article 6 alignment, raise the transaction and compliance costs of participating in carbon markets, precisely the costs that smaller, community-based projects are least able to absorb without external support (Hachileka, 2024; IETA, 2025). Strengthened frameworks must therefore be designed not only to deter poor-quality projects but to actively lower the compliance burden facing legitimate rural and community-scale initiatives, for example through pooled verification facilities, standardised benefit-sharing templates, and blended concessional capital of the kind continental development banks are beginning to provide.

The gender-responsive design recommendations found in the policy literature were notably absent from the empirical corpus's spontaneous commentary, despite their prominence in continental policy papers (African Development Bank, 2024b). This divergence suggests that intra-household and gender-equitable distribution, while formally endorsed in policy documents, has not yet become a standard

talking point among banking, insurance, and market-infrastructure leadership in the way that regulatory harmonisation and integrity have. If frameworks are strengthened primarily along the dimensions most frequently voiced by finance and industry actors, there is a risk that gender-responsive benefit-sharing remains a secondary, policy-paper commitment rather than an operational requirement embedded in fund design, underscoring the importance of deliberately carrying equity provisions from policy documents into binding fund rules rather than assuming market consensus will produce them.

6. Conclusion

The evidence assembled in this paper, spanning peer-reviewed research, policy reporting, and a thematically analysed corpus of public statements from banking, insurance, and industry leadership, converges on a consistent conclusion: carbon funds hold genuine potential to strengthen climate sustainability practice in rural African communities, but that potential remains substantially unrealised because the governing frameworks are fragmented, under-enforced, and insufficiently attentive to community benefit-sharing and compliance-cost burdens. Strengthening these frameworks is not a peripheral technical adjustment; it is the central precondition for translating carbon finance into durable rural resilience.

For practice, the findings suggest three concrete implications. First, national governments should prioritise binding carbon market regulations that specify registration, benefit-sharing minimums, and monitoring standards, building on the precedents already established in Kenya and elsewhere. Second, development banks, reinsurers, and market-infrastructure providers should expand pooled verification and blended-finance facilities specifically designed to lower compliance costs for community-scale projects, rather than allowing integrity requirements to disproportionately exclude smaller rural initiatives. Third, continental bodies should accelerate the harmonisation of equity and integrity principles across national frameworks to reduce the transaction costs currently faced by investors and communities operating across borders.

For future research, the principal limitation identified in this paper, namely the absence of directly sourced rural community perspectives within the empirical corpus, points toward the need for primary fieldwork that captures how smallholder farmers and forest-dependent households themselves assess the frameworks currently being redesigned on their behalf. Until such perspectives are systematically incorporated alongside those of banking, insurance, and industry leadership, the reform of carbon fund frameworks will remain only partially informed by the communities it is ultimately intended to serve.

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