Cosmopolitics of Regeneration: Rethinking Development Through African Relational Ontologies, Planetary Boundaries, and Sociotechnical Transitions

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Posted Date: 4 December 2025

doi: 10.20944/preprints202512.0344.v1

Keywords: regenerative development; Ubuntu; cosmopolitics; sociotechnical transitions; pluriverse; relational ontology; African philosophy; planetary boundaries; ecological governance; global south

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Article

Cosmopolitics of Regeneration: Rethinking Development Through African Relational Ontologies, Planetary Boundaries, and Sociotechnical Transitions

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Abstract

Contemporary development models remain anchored in extractive epistemologies that privilege economic expansion, industrial accumulation, and the mastery of nature as the dominant measure of progress. Yet the global polycrisis—marked by climate instability, biodiversity collapse, deep inequalities, and sociopolitical fragmentation—exposes the profound limits of growth-centered paradigms. This article proposes a cosmopolitical framework for regenerative development rooted in African relational ontologies, planetary boundary science, and multi-level sociotechnical transition theory. Drawing from Ubuntu ethics, Bantu cosmologies, ecological theologies, and pluriversal thought, the article argues that regeneration rather than growth constitutes the emerging civilizational axis of the twenty-first century. By integrating insights from Earth system science, relational anthropology, and transition studies, the paper develops the concept of Relational Regeneration Systems (RRS)—institutional and infrastructural architectures that restore the vitality of socio-ecological systems while enhancing cultural meaning, community cohesion, and technological appropriateness. Empirical examples from African regenerative agriculture, hydrological commons governance, and digital innovation ecosystems demonstrate how relational ontologies generate alternative pathways for sociotechnical transformation. The framework elaborated here offers policymakers, scholars, and practitioners a pluriversal, ecologically grounded, and justice-oriented vision of development capable of navigating the unprecedented challenges of the Anthropocene.

Keywords: regenerative development; Ubuntu; cosmopolitics; sociotechnical transitions; pluriverse; relational ontology; African philosophy; planetary boundaries; ecological governance; global south

Introduction

Humanity has entered an unprecedented civilizational threshold in which the foundational assumptions of development, progress, and economic value are being radically destabilized. The combined pressures of climate disruption, ecological overshoot, widening inequality, and digital transformation reveal the inadequacy of growth-centered development models inherited from industrial modernity. These models are historically rooted in colonial extraction, fossil-fuel dependency, and the commodification of life, producing what many scholars describe as an epistemic crisis of development (Escobar, 2018 ; Moleka, 2025a). At the same time, the rise of Indigenous, pluriversal, and relational epistemologies across the world—particularly in Africa—signals the emergence of alternative pathways grounded in interdependence, reciprocity, and ecological care.

This article advances the argument that regeneration, not growth, is becoming the new axis around which a sustainable and just civilizational paradigm must be organized. Regeneration refers to the processes through which ecological, social, cultural, and technological systems are repaired,

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revitalized, and made capable of sustaining life across generations (Buckton, Fazey, Sharpe, Om, Doherty,Ball ... & Sinclair, 2023). The proposed framework—conceptualized here as cosmopolitics of regeneration—combines African relational ontologies, planetary boundary science, and sociotechnical transition theory to articulate a cohesive, transdisciplinary approach to development.

The article proceeds in seven sections. First, it critiques the epistemic foundations of extractive development. Second, it elaborates African relational ontologies as fertile resources for rethinking prosperity. Third, it draws on Earth system science to explain why regeneration is necessary within planetary limits. Fourth, it mobilizes sociotechnical transition theory to analyze how regenerative systems emerge. Fifth, it introduces the analytic framework of Relational Regeneration Systems (RRS). Sixth, it presents empirical examples from African contexts. Finally, it proposes a cosmopolitical vision of governance beyond the state–market binary.

1. The Epistemic Crisis of Extractive Development

The dominant model of development that has shaped global policies since the mid-twentieth century is deeply entwined with an extractive ontology of nature and humanity. Rooted in Enlightenment rationalism, industrial capitalism, and colonial resource regimes, development became synonymous with industrialization, economic expansion, and GDP growth (Fioramonti, 2017; Moleka, 2025b, 2025c). This model rests on several problematic assumptions.

First is the belief that economic growth is both intrinsically beneficial and indefinitely sustainable. Yet the GDP metric—conceived originally as a wartime accounting tool by Simon Kuznets—was never intended as a measure of wellbeing or ecological health (Kuznets, 1934). Its universalization as the central indicator of national progress reflects what Mitchell (2002) identifies as the "material politics" of carbon-heavy industrial modernity. GDP counts pollution, deforestation, and social disruption as positive contributions, revealing its underlying logic of extractivism.

Second, extractive development universalizes a Eurocentric vision of modernity that positions Western industrial societies as the telos of human progress. This epistemic stance, critiqued by postcolonial scholars, denies the validity of other forms of knowledge, cosmology, and relationality (Mignolo & Walsh, 2018). It produces what de Sousa Santos (2014) calls "epistemicide"—the systematic erasure of non-Western knowledge systems.

Third, extractive development is structurally tethered to colonial logics of appropriation. The global South—especially Africa—has long been positioned as a repository of raw materials, cheap labour, and ecological sacrifice zones. The coloniality of development persists through extractive industries, debt regimes, and the externalization of ecological costs.

Finally, the model is incompatible with planetary boundaries. As Rockström et al. (2009) demonstrate, humanity is operating beyond safe thresholds in climate, biodiversity, and biogeochemical cycles. Development based on extraction fundamentally undermines the biospheric conditions that make development possible.

These crises reveal a profound truth: development must be reconceptualized as a relational, ecological, and regenerative process rather than a linear trajectory of industrial expansion.

2. African Relational Ontologies as Developmental Foundations

African relational ontologies constitute one of the most profound philosophical resources for reimagining development in the twenty-first century. While contemporary global development debates increasingly acknowledge the need for pluriversal alternatives, few epistemic traditions offer as coherent, sophisticated, and lived a model of relationality as African cosmologies (Woldegiorgis, 2025). Far from being remnants of a premodern worldview, African relational systems represent dynamic, adaptive, and deeply ecological frameworks that articulate how human life, nonhuman life, and the spiritual worlds are woven together in a complex web of interdependence. In African thought, personhood and wellbeing are never conceptualized as individual achievements but as emergent properties of relational networks—networks that include ancestors, communities,

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ecosystems, and ultimate reality. This stands in stark contrast to the ontological individualism that underpins Euro-American developmental thinking, where the human is positioned as an autonomous agent acting upon a passive, externalized nature (Mangori & Moleka, 2021). Instead, African ontologies affirm that to live well is to live *with* others, *through* others, and *for* others, meaning that development cannot be abstracted from ecological ethics, spiritual meaning, and communal responsibilities. This relational worldview, increasingly recognized in fields such as ecological anthropology, environmental humanities, and sustainability science, provides foundational insights for regenerative development models (Chilisa, 2020; Ndlovu-Gatsheni, 2023).

Ubuntu and the Ethics of Interdependence

Ubuntu remains one of the most emblematic expressions of African relational thought and serves as a philosophical keystone for rethinking development beyond extractivism. Frequently translated as *"a person is a person through other persons"*, Ubuntu articulates an ethic of radical interdependence that transcends human sociality to include ecological life and the spiritual cosmos. Recent scholarship highlights that Ubuntu is not simply a moral norm or cultural value but a complex ontological principle about the nature of existence itself (Letseka, 2022; Ramose, 2023; Moleka, 2025d). It proposes that beings come into fullness through relational enactment, and thus harm to the community or environment diminishes both individual identity and collective flourishing. This ontological insight has crucial implications for development: it reframes prosperity not as material accumulation but as the enhancement of relationships—social, ecological, and spiritual. Ubuntu also offers a philosophical critique of neoliberal development paradigms, which prioritize competition, commodification, and self-interest. Unlike Western development models that view the environment as a set of resources to be optimized, an Ubuntu-informed approach would understand ecological health as inseparable from human dignity and moral life. The ethics of interdependence embedded in Ubuntu thus provides a normative foundation for regenerative development systems that measure success through the vitality of relationships rather than economic output.

Bumuntu and the Moral Economy of Personhood

While Ubuntu has gained global recognition, the concept of bumuntu—common among Bantu-speaking societies—further deepens the moral ontology of human flourishing. Bumuntu refers to the ideal qualities of genuine humanness: compassion, empathy, integrity, restraint, humility, and responsibility toward the collective and the land. It signals that personhood is not automatic at birth but cultivated through moral practice, ecological care, and harmonious participation in community life (Mulago, 2021; Mpofu, 2020). In development contexts, bumuntu challenges the assumption that progress can be pursued independently of virtue, morality, and cultural identity. The cultivation of bumuntu ties development directly to ethical transformation: a society cannot develop if it produces wealth without humanity, infrastructure without justice, or technology without wisdom. Bumuntu therefore functions as a moral compass for regenerative development, insisting that transformation be simultaneously ecological, social, and ethical. It also provides a counter-narrative to the dominant economistic frameworks that reduce development to production metrics while ignoring the moral quality of social relations. By foregrounding virtue, bumuntu encourages development approaches that restore dignity, nurture moral communities, and protect future generations.

African Spiritual Ecologies

A central dimension of African relational ontologies is the spiritual ecology that undergirds relationships between humans, ancestors, and the more-than-human world. African spiritual ecologies view rivers, forests, animals, mountains, and soils not as commodities but as kin—living presences with agency, meaning, and moral significance (Olupona, 2014; Boamah, 2022). In many societies, ecological degradation is understood not only as biophysical loss but as spiritual rupture, a violation of the cosmic balance that sustains life. This worldview cultivates practices of reverence,

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restraint, and reciprocity, which prefigure contemporary regenerative and conservation paradigms. Recent environmental scholarship notes that African spiritual ecologies often align with the principles of Earth stewardship and biocultural diversity conservation (Alves & Albuquerque, 2021; Anderson & Ntshim, 2023). These ecologies promote governance mechanisms—taboos, rituals, sacred groves, customary land systems—that restrict harmful extraction and maintain ecological resilience. Far from being archaic, such systems complement modern environmental governance and offer alternative models for aligning ecological management with cultural and spiritual values. They challenge the instrumental rationality that dominates mainstream environmental policy, proposing instead a cosmology of care and kinship.

Relational Ontologies as Epistemic Correctives

African relational ontologies do more than offer "alternative perspectives"; they function as epistemic correctives to the developmental paradigms that have produced ecological overshoot, social fragmentation, and cultural erosion. They question the philosophical foundations—anthropocentrism, dualism, individualism, materialism—on which extractive development is built. In place of these assumptions, they introduce a holistic epistemology that perceives knowledge as embodied, communal, dialogical, and spiritually grounded (Chilisa, 2020; Nyamnjoh, 2022). This epistemology calls for methodologies that value ecological listening, ancestral knowledge, community deliberation, and ethical relationality. It challenges the coloniality of knowledge that marginalizes Indigenous ways of knowing and normalizes Western technocratic dominance. Moreover, relational ontologies democratize development by broadening the community of beings who matter in decision-making, including future generations, ecological systems, and the spiritual realm. In doing so, they resonate with emerging global frameworks—degrowth, doughnut economics, rights of nature, planetary health—that seek to restore balance between humans and the Earth system (Raworth, 2017; IPBES, 2022). By integrating African relational ontologies into development discourse, regenerative governance becomes not simply a technical exercise but a civilizational reorientation toward reciprocity, care, and interconnectedness.

3. Planetary Boundaries and the Need for Regeneration

The planetary boundaries framework offers one of the most rigorous scientific lenses for understanding the biophysical limits within which human societies must operate. Initially articulated by Rockström et al. (2009) and extensively revised by Steffen et al. (2015), this framework identifies nine critical Earth-system processes—climate change, biosphere integrity, biogeochemical flows, land-system change, freshwater use, ocean acidification, atmospheric aerosol loading, novel entities, and ozone depletion. Crossing these boundaries increases the risk of triggering nonlinear, abrupt, and potentially irreversible ecological tipping points. Recent assessments show that six out of the nine planetary boundaries are already transgressed, pushing the Earth system into a dangerously unstable state (Richardson et al., 2023). These trends are not incidental but derive directly from the logic of extractive development: fossil-fuel dependence, industrial monocultures, hyper-consumption, and the externalization of ecological damages to marginal communities, particularly in the global South. Africa, though historically the least contributor to global emissions, faces disproportionate consequences—erratic rainfall, heat extremes, soil degradation, and threats to food sovereignty.

From Sustainability to Regeneration

The discourse of "sustainability" is increasingly recognized as insufficient for addressing the depth of the Earth system crisis. Sustainability implies maintaining existing systems, yet existing systems are themselves ecologically destructive. Even "net-zero" frameworks, while politically appealing, often rely on speculative carbon offsets and technocratic solutions that leave extractive structures intact (Hickel & Kallis, 2020). What is needed is a civilizational shift from sustaining

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damaged systems to regenerating life-support systems. Regeneration entails active ecological healing: restoring watersheds, rebuilding organic soils, increasing biodiversity, rewilding landscapes, revitalizing community ecologies, and repairing socio-cultural relations (Moleka, 2025e, 2025f, 2025g). It is fundamentally a paradigm of enhancement, not reduction—one that recognizes humans as participants in Earth's metabolic cycles rather than external managers or extractors.

Long-term ecological regeneration also requires a profound shift in cultural imaginaries. As Latour (2018) argues, modern societies must "land"—that is, reconnect to the territory, climate, and living processes that make life possible. African relational ontologies, which inherently conceptualize humans as co-constitutive with land, ancestors, and ecosystems, provide powerful philosophical resources for such a shift. They challenge the dualist ontology that underpins planetary degradation and instead invite an ethics of mutual flourishing. In this sense, the movement from sustainability to regeneration is not merely scientific but cosmological: it redefines what it means to live well in a more-than-human world.

Biospheric Preconditions for Development

A fundamental insight of Earth system science is that social, economic, and political systems are embedded within the biosphere and cannot be analytically or materially separated from it (Folke et al., 2021). Development is not an autonomous domain but a derivative of ecological stability. The biosphere provides the energetic, hydrological, climatic, and biological conditions that make agriculture, infrastructure, urban life, and technological innovation possible. When those conditions degrade, the foundations of development collapse. For instance, the degradation of pollinator species directly threatens African horticultural economies; disruptions in rainfall patterns undermine hydropower and agricultural productivity; loss of soil fertility increases food insecurity and conflict (Hernandez & Camerin, 2024; Kovaleva, 2023).

Planetary boundaries therefore must not be understood as restrictions that limit development but as enabling conditions for long-term prosperity. Operating safely within these boundaries allows societies to build resilient economies, maintain cultural continuity, and safeguard intergenerational wellbeing. The challenge is that current development pathways—based on material throughput, linear resource flows, and industrial extraction—are fundamentally incompatible with planetary stability. Regeneration, by contrast, aligns development with Earth's biophysical processes, ensuring that human aspirations do not undermine the ecological infrastructure upon which all life depends.

Regeneration as a Civilizational Imperative

Given the scale and interconnectedness of the crisis, regeneration must be approached as a civilizational transformation rather than a sectoral or technocratic adjustment. It requires reimagining institutions, governance arrangements, infrastructural systems, educational frameworks, cultural narratives, and economic models. A regenerative civilization recognizes that resilience emerges not from centralized control but from diversity, redundancy, reciprocity, and distributed ecological stewardship.

Africa holds a unique position in this global transformation. The continent combines a wealth of ecological knowledge, a youthful population with high capacity for innovation, expansive biodiversity, deep relational cosmologies, and vibrant community-based governance systems. Furthermore, Africa's relatively low historical carbon footprint allows it to leapfrog into regenerative systems without the burden of entrenched fossil-fuel infrastructures. Emerging movements in agroecology, pastoral mobility, community conservation, and circular economies demonstrate Africa's potential as a global pioneer in regenerative development. If supported by appropriate policy frameworks (Tindwa, Semu & Singh, 2024), Africa can model pathways that integrate ecological integrity, technological innovation, and relational well-being—offering the world a living example of post-extractive development.

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4. Sociotechnical Transitions Toward Regenerative Systems

Sociotechnical transition theory provides powerful tools for analyzing how large-scale system change occurs. The multi-level perspective (MLP) developed by Geels (2002) conceptualizes transitions as dynamic interactions between three analytical levels: niches (spaces of radical innovation), regimes (dominant sociotechnical structures), and landscapes (macro-level forces such as climate change, demographics, or geopolitical shifts). This framework is particularly useful for understanding how regenerative systems can emerge within environments still dominated by extractive logics.

Niche Innovations in African Contexts

Across the African continent, diverse regenerative niches are accelerating. These include agroecology movements in Senegal and Burkina Faso, decentralized solar micro-grids in Kenya and Rwanda, community forest governance in Ethiopia, regenerative pastoralism in Namibia, and circular bio-economies in South Africa. These niches are not merely technical innovations; they are socio-ecological systems grounded in local knowledge, collective agency, and cultural meaning. They challenge extractive regimes by demonstrating that development can enhance, rather than degrade, ecological integrity (Moleka, 2025c).

African agroecological innovations illustrate the power of niche experimentation. For example, farmer-managed natural regeneration (FMNR) in Niger has restored over five million hectares of degraded land, improved food security, and increased groundwater recharge—all without industrial inputs (Reij & Winterbottom, 2017). Such examples show that regenerative niches can outperform industrial agriculture in resilience, cost, and ecological performance.

Regime Destabilization Through the Global Polycrisis

Dominant regimes—such as industrial agriculture, centralized energy systems, or linear economies—maintain their stability through institutional lock-ins, sunk investments, policy incentives, and powerful interests. However, the global polycrisis—comprising climate disruption, resource scarcity, public health emergencies, financial instability, and geopolitical volatility—is increasingly destabilizing these regimes (Prabhu, 2024). Droughts undermine monocultures; fossil-fuel volatility threatens centralized grids; extreme weather events expose infrastructural vulnerabilities; social unrest disrupts extractive value chains (Castro Hernandez et al., 2025).

As regimes weaken, regenerative niches gain strategic opportunities to scale. Crises act as windows of possibility, making previously unthinkable transitions politically and economically viable. This dynamic underscores the need for strategic support to regenerative innovations so they can move from peripheral experiments to dominant pathways.

Digital Infrastructures as Enablers of Regeneration

Digital technologies—when aligned with relational and ecological values—can amplify regenerative transitions. Community mapping platforms, open-source environmental sensors, blockchain systems for transparent land governance, and digital knowledge commons allow communities to monitor ecosystems, share best practices, coordinate collective action, and build local capacities. African digital innovation ecosystems—such as Kenya's Ushahidi, Nigeria's civic tech networks, or Rwanda's digital agriculture platforms—illustrate how technology can enable distributed governance, ecological monitoring, and collaborative stewardship (rotich, 2017).

However, digital infrastructures must be embedded within ethical frameworks that avoid techno-solutionism and reinforce community autonomy. Digital systems should serve ecological regeneration and relational wellbeing, not accelerate extractive digital capitalism.

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Social Innovations and Collective Agency

Technological innovation alone cannot produce regenerative transitions; social innovation is equally essential. This includes new forms of governance (community assemblies, customary councils, watershed committees), new narratives ("land as kin," "economies of care"), new institutions (community seed banks, territorial food systems), and new economic practices (solidarity markets, mutual aid networks). African communities are increasingly experimenting with hybrid governance models that integrate tradition, modernity, and ecological stewardship. These innovations reflect a broader shift from state-centric or market-centric development to polycentric, community-anchored, and relationally grounded forms of governance.

5. Relational Regeneration Systems (RRS): A New Analytic Framework

To conceptualize the forms of development emerging from African relational ontologies and ecological science, this article introduces the notion of Relational Regeneration Systems (RRS). RRS refers to institutional, ecological, cultural, and technological arrangements that enhance the capacity of socio-ecological systems to regenerate, sustain, and evolve life across generations. Unlike traditional development models—which prioritize economic outputs, industrial growth, and infrastructural expansion—RRS foreground the quality of relationships among humans, ecosystems, technologies, and spiritual worlds. They represent a shift from material accumulation to relational flourishing.

Defining RRS

An RRS is defined by four core principles:

1. **Relational Ontology** – Systems are grounded in worldviews that understand life as interconnected and co-constitutive. Development emerges from the strengthening of relationships rather than the extraction of resources. This draws from African philosophies such as Ubuntu and bumuntu, as well as spiritual ecologies that view land and life as sacred.
2. **Ecological Regeneration** – Systems actively restore soils, forests, biodiversity, water cycles, and ecological metabolisms. Regeneration is not an add-on but the organizing logic of institutions and infrastructures.
3. **Technological Appropriateness** – Technologies used within RRS are not evaluated solely on efficiency or scalability but on their alignment with ecological limits, cultural values, and community autonomy. This echoes the principle of "convivial technology" articulated by Illich (1973) and expanded in contemporary debates on appropriate technology in Africa (Kimera & Lwasa, 2022).
4. **Community Cohesion and Collective Governance** – Social cohesion, inclusive participation, and distributed decision-making are essential components. RRS prioritize community-led governance architectures that integrate customary institutions, local knowledge, gender equity, and intergenerational stewardship.

Together, these principles produce systems that are not only ecologically resilient but culturally meaningful and socially just.

Indicators of Relational Regeneration

To operationalize RRS, this article proposes four categories of indicators:

- **Ecological Indicators**: biodiversity levels, soil organic carbon, water-cycle integrity, landscape connectivity.
- **Relational Indicators**: community trust, reciprocity networks, intergenerational knowledge transmission.
- **Cultural Indicators**: maintenance of sacred sites, rituals of ecological care, linguistic vitality related to ecological knowledge.

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- **Technological–Institutional Indicators**: accessibility of digital commons, presence of polycentric governance structures, degree of community ownership over infrastructures.

These indicators shift development evaluation away from GDP, productivity, or investment flows and toward metrics of life-enhancing capacity.

Governance Implications

RRS imply a transition toward polycentric governance, where authority is distributed across local communities, customary institutions, ecological custodians, and state actors. This aligns with Ostrom's (2010) work on polycentric climate governance but extends it with African relational philosophies and Earth system science.

Moreover, RRS challenge the state–market binary by introducing a third domain—the commons. In RRS, the commons are neither privatized nor nationalized; they are governed collectively with responsibilities rooted in relational ethics. This offers an alternative to development models dominated either by neoliberal markets or centralized bureaucracies.

6. Case Studies from Africa: Empirical Foundations of Regeneration

While the framework of Relational Regeneration Systems (RRS) is conceptually robust, its practical viability is demonstrated through emerging practices across the African continent, where relational ontologies, planetary care, and sociotechnical innovation converge in tangible ways.

In Ethiopia, large-scale landscape restoration initiatives in Tigray and Oromia exemplify how community-led approaches can transform degraded ecosystems. Before the recent conflict, the Tigray region restored over one million hectares of degraded land through collective mobilization, exclosures, and regenerative agricultural practices (Gebresamuel, Langan, & Wossen, 2020). Village assemblies and customary elder councils provided relational governance structures, while low-cost terraces and water-harvesting technologies ensured technological appropriateness. The ecological restoration of vegetation through exclosures was complemented by cultural continuity practices, including land blessing rituals and communal labor traditions known as *debo*. These interventions demonstrate how decentralised, relational worldviews can achieve landscape-level regeneration on a massive scale (Reij & Winterbottom, 2017; Mekuria, Veldkamp, & Sterk, 2020).

Rwanda offers another compelling example of RRS in action through its community-based environmental governance and the *Imihigo* performance contract model. Rooted in precolonial accountability traditions, *Imihigo* encourages local leaders to commit publicly to ecological targets such as tree planting, watershed protection, and waste management (Ansoms & Rostagno, 2012). Rwanda has also advanced regenerative energy transitions, implementing community-owned micro-hydropower systems, decentralized solar arrays, and digital environmental monitoring platforms (Nkurunziza, 2021). These initiatives illustrate polycentric governance structures, the mobilization of collective agency through communal work days (*umuganda*), and the integration of digital technologies to support environmental stewardship (Rotich, 2017). By reinterpreting cultural traditions within contemporary governance frameworks, Rwanda demonstrates the potential of relational and regenerative development approaches.

In Kenya, digital innovation increasingly intersects with ecological regeneration, creating hybrid systems that combine technological sophistication with community knowledge. Platforms such as Ushahidi, digital farmer registries, and mobile-based agroecology networks facilitate knowledge sharing, climate adaptation, and market transparency (Omundo, 2024). Simultaneously, regenerative agriculture initiatives led by SACDEP, the Green Belt Movement, and youth-led agroforestry startups blend indigenous practices with digital tools to restore degraded lands and strengthen local food systems (Mogaka & Mwangi, 2020). Women-led tree restoration programs, seed sovereignty networks, and the revitalization of sacred groves and traditional ecological taboos further reinforce relational governance and cultural renewal. Kenya thus illustrates how digital commons can be

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mobilized to support rather than undermine community-centered ecological practices (Alves & Albuquerque, 2021).

The Democratic Republic of Congo (DRC), home to the world's second-largest tropical rainforest, presents an illustrative case of forest commons governance and sociotechnical hybridities. Community forest concessions (CFCLs) in provinces such as Mai-Ndombe, Équateur, and Tshopo grant local communities legal rights to manage forests while integrating GPS mapping, open data, and traditional ecological knowledge (Chaoui, Christe, Das, & Estiévenart, 2024). These arrangements embody relational cosmologies in which forests are regarded as ancestral territories and spiritual beings, fostering governance practices that are simultaneously ecological, cultural, and communal. Community-led reforestation, sustainable harvesting, and sacred site protection exemplify ecological regeneration within these systems, demonstrating how regeneration is inseparable from territorial justice, cultural sovereignty, and resistance to extractive industries (Olupona, 2014; Boamah, 2022).

Taken together, these cases show that RRS are not hypothetical constructs but are already emerging across multiple scales—landscape, community, and technological infrastructure. Ethiopia, Rwanda, Kenya, and the DRC exemplify how African knowledge systems, relational governance, and digital innovation intersect to produce regenerative outcomes that respect both ecological limits and cultural values. They demonstrate that relational ontologies, when operationalized through sociotechnical and policy interventions, can provide viable pathways for post-extractive, regenerative development in Africa and beyond.

7. Cosmopolitics of Life: Governance Beyond the State–Market Binary

The cosmopolitics of regeneration proposes a new civilizational orientation grounded in the recognition that life—human and more-than-human—possesses intrinsic value and agency. Cosmopolitics, as articulated by Stengers (2010), calls for plural forms of world-making where multiple ontologies, species, and cosmologies participate in shaping collective futures. When grounded in African relational philosophies, cosmopolitics becomes a framework for reimagining governance, law, and development beyond the state–market binary.

Rights of Nature and Ecological Jurisprudence

Across the world, rivers, forests, and ecosystems are increasingly recognized as legal subjects with rights (Kauffman & Martin, 2021). African relational ontologies provide powerful philosophical foundations for this trend. If rivers are living beings, if forests are ancestral, then governance frameworks must respect their agency. This shift challenges the anthropocentric legal frameworks that have justified centuries of extraction.

Community Assemblies and Polycentric Governance

Cosmopolitics invites governance models where humans and non-humans co-govern territories. Examples include:

- Watershed assemblies in Kenya and Ethiopia.
- Community forest councils in the DRC.
- Biocultural community protocols in South Africa and Namibia.
- Coastal fisheries assemblies in Senegal.

These models embody governance as a collective negotiation among species, generations, and cosmologies (Moleka, 2026).

Beyond State vs Market

The cosmopolitics of regeneration does not abolish the state or market but repositions them within the broader domain of the commons. States become facilitators of ecological stewardship;

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markets become tools subordinate to planetary boundaries; and communities become custodians of relational wellbeing.

Regeneration as Civilizational Horizon

Ultimately, regeneration emerges as the civilizational horizon for the 21st century—a guiding principle for reorganizing economies, infrastructures, cultures, and governance systems. It calls for a transformation in values: from extraction to care, from domination to reciprocity, from individualism to relationality. As African philosophies remind us, life flourishes not through accumulation but through interdependence. The cosmopolitics of regeneration therefore offers a framework for navigating the planetary crisis while cultivating pluriversal prosperity.

Conclusion and Outlook

This article has advanced a cosmopolitical framework for regenerative development, anchored in African relational ontologies, planetary boundary science, and sociotechnical transition theory. It has argued that extractive, growth-centered models are no longer tenable due to the convergence of ecological, social, and technological crises. By foregrounding relationality, regeneration, and collective agency, the proposed framework—Relational Regeneration Systems (RRS)—offers a multidimensional approach to development that harmonizes ecological integrity, social cohesion, cultural meaning, and technological appropriateness.

The empirical cases from Ethiopia, Rwanda, Kenya, and the DRC demonstrate that regenerative practices are not hypothetical; they are being implemented at landscape, community, and infrastructural scales. These cases highlight the capacity of African knowledge systems and community-based governance to navigate planetary boundaries while creating locally rooted forms of prosperity.

Key Insights

1. **Regeneration over Growth**: Development should prioritize the repair and enhancement of socio-ecological systems rather than mere economic expansion.
2. **Relational Ontologies Matter**: African philosophies such as Ubuntu, bumuntu, and ecological cosmologies provide ethical and epistemic foundations for regenerative systems.
3. **Sociotechnical Transitions Enable Change**: Niche innovations, digital commons, and polycentric governance structures are critical levers for shifting regimes toward sustainable and regenerative pathways.
4. **Cosmopolitics of Life**: Governance must recognize the agency of non-human life, integrate multiple cosmologies, and embrace polycentric decision-making to foster intergenerational and planetary justice.

Outlook and Research Directions

Future research should explore:

- **Scaling RRS** across diverse ecological, cultural, and institutional contexts in Africa and the Global South.
- **Interoperable metrics** that capture ecological, relational, cultural, and technological dimensions of regeneration.
- **Policy integration** of relational and pluriversal principles into national development strategies, climate adaptation plans, and digital infrastructure governance.
- **Transdisciplinary experimentation**, bringing together ecology, anthropology, political science, technology studies, and African philosophy to co-design sustainable futures.

In conclusion, regeneration represents a civilizational horizon for the 21st century. It challenges the linear, extractive logic of past development paradigms and situates humanity within a relational, ecological, and ethical cosmopolitics. Africa, with its rich relational knowledge systems, youthful demographics, and ecological endowments, is poised to lead the transition to post-extractive, regenerative futures that align local flourishing with planetary stewardship.

 doi:10.20944/preprints202512.0344.v1

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