Principles for Environmental Justice in Technology: Toward a Regenerative Future for Computing

SANJANA PAUL, Rooted Futures Lab, USA and MIT, USA

This paper introduces the Environmental Justice in Technology (EJIT) Principles, a design and values framework developed by Rooted Futures Lab to guide technological innovation toward ecological regeneration, anti-colonial practice, and collective care. Inspired by the 17 Principles of Environmental Justice, the EJIT framework offers a transition toolkit for computing and related fields within ecological and social limits: one that centers frontline communities, works to dismantle extractive paradigms, and redefines innovation beyond speed, scale, or profit. We situate the principles within the broader context of environmental justice, design justice, and critical innovation studies, arguing that justice must be foundational, not peripheral, to the development of computing systems in a time of planetary crisis. The EJIT Principles offer a scaffolding for refusing harmful defaults, redistributing power, and co-creating technologies that work with, rather than against, the Earth.

CCS Concepts: • **General and reference → Evaluation**; • **Social and professional topics → Codes of ethics**; **Sustainability**.

Additional Key Words and Phrases: Environmental Justice, Regenerative Technology, Justice-Centered Design, Sustainability

ACM Reference Format:
Sanjana Paul. 2025. Principles for Environmental Justice in Technology: Toward a Regenerative Future for Computing . 1, 1 (June 2025), 4 pages. https://doi.org/XXXXXXX.XXXXXXX

1 Introduction

The accelerating climate crisis and intersecting social inequities demand urgent, transformative approaches to technological innovation. Current models of technology development, driven by imperatives of speed, scale, and profit, too often reinforce extractive, exclusionary, and colonial logics. While "sustainable tech" and "green innovation" have gained prominence as responses to planetary challenges, these frameworks frequently remain rooted in technocratic and ahistorical paradigms that prioritize efficiency and market viability over justice, care, and accountability.

This paper introduces the Environmental Justice in Technology (EJIT) Principles, a collaboratively developed framework from Rooted Futures Lab. This paper introduces the Environmental Justice in Technology (EJIT) Principles, a collaboratively developed framework from Rooted Futures Lab. Inspired by the 1991 Principles of Environmental Justice, which foreground universal protection from harm, self-determination, and the right to a healthy environment, the EJIT Principles extend these commitments into the domain of technological design, development, and deployment [**?**]. The framework is grounded in the belief that technology should not be exempt from the obligations of justice. It challenges the assumptions that technological systems are neutral, inevitable, or inherently beneficial, and instead insists on centering frontline communities, dismantling extractive paradigms, and redefining innovation beyond conventional metrics of success.

Too often, dominant approaches to technology obscure harm behind claims of neutrality, scalability, or inevitability [**?**]. "Tech for good" initiatives, while popular, frequently function as reputational offsets that leave underlying systems of extraction intact [**?**]. Much of the world's digital infrastructure - from lithium extraction and water-intensive data centers to predictive policing algorithms - actively deepens environmental and social harm [**?**]. In this context, refusal of harmful default conditions must be a core component of the design process, echoing calls from critical computing and data justice scholarship to actively resist extractive logics and center marginalized voices [**?**], [**?**], [**?**].

The EJIT Principles are not intended as a rigid checklist or a prescriptive blueprint. Rather, they serve as a compass for reimagining technology's role in society, shifting its purpose and practice from acceleration, efficiency, and profit toward repair, redistribution, and shared governance. In the sections that follow, we situate the framework within its broader context, articulate the principles themselves, and consider how they might guide the reorientation of technological work toward justice and collective flourishing.

Recent scholarship in environmental data justice underscores the importance of participatory, community-centered approaches that challenge extractive data practices and center historically marginalized perspectives. Similarly, critical approaches to climate justice and technology emphasize the need for interdisciplinary, justice-oriented frameworks that connect social justice and technological innovation [**?**]. These works highlight the necessity of embedding justice and care at the heart of technological development, rather than treating them as peripheral concerns.

In the sections that follow, we situate the EJIT Principles within the broader context of environmental justice, design justice, and critical innovation studies, articulate the principles themselves, and consider how they might guide the reorientation of technological work toward justice and collective flourishing.

2 Context and Related Work

Efforts to build environmentally just futures in technology must contend with the persistent reality that justice is rarely treated as a baseline requirement in the design and deployment of digital systems. While conversations about "sustainable tech" and "green innovation" have gained momentum, many guiding frameworks remain rooted in ahistorical, apolitical, and technocratic logics, prioritizing efficiency and market viability over questions of power, harm, and repair.

Author's Contact Information: Sanjana Paul, sanjana@rootedfutureslab.io, Rooted Futures Lab, USA and MIT, USA.

ACM XXXX-XXXX/2025/6-ART
https://doi.org/XXXXXXX.XXXXXXX

A growing body of work across design justice, critical STS, and post-growth computing now challenges these defaults. Design justice, for instance, asks who gets to design, who benefits, and who is harmed in the process [?]. Degrowth computing argues that economic expansion should not be a proxy for success, instead pointing to repair, sufficiency, and shared governance as more relevant goals [?]. Others have called attention to how dominant tech paradigms reinforce colonial infrastructures, militarized surveillance, and planetary extraction [?], [?]).

The Environmental Justice in Technology (EJIT) Principles build on this work by drawing directly from the environmental justice movement. The environmental justice (EJ) movement has evolved from its grassroots origins to become a robust field of scholarly research and practice, with a growing body of literature documenting the disproportionate impacts of environmental harms on marginalized communities. Early work in environmental justice established the correlation between pollution and race and poverty, demonstrating that inequitable exposure to environmental nuisances is a persistent feature of modern societies [?]. More recent scholarship has expanded this focus, calling for EJ frameworks to be integrated into technical fields such as exposure science [?] and emphasizing the importance of community engagement, participatory research, and the incorporation of local knowledge into scientific and technological processes [?].

Contemporary EJ research increasingly adopts multidimensional approaches that go beyond the distribution of environmental "goods" and "bads" to include recognition, participation, and socio-historical analysis. This shift reflects a recognition that quantitative methods alone, while valuable for mapping spatial inequalities, often fail to capture the complex, lived experiences and structural processes that shape environmental injustices. [?], [?]. Qualitative and mixed-methods approaches are therefore advocated to provide a more comprehensive understanding of environmental justice, and to inform both academic insight and practical policy impact.

As Paul and Minns (2024) argue, dominant narratives of innovation often exclude the knowledge, priorities, and leadership of the people most impacted by environmental and technological harm. These exclusions are not accidents; they are features of systems designed to concentrate power. The EJIT framework insists on a different approach: one that centers the experiences, leadership, and self-determination of communities historically pushed to the margins.

The principles are also informed by Indigenous and relational epistemologies that reject the idea of nature and technology as separate domains. In line with long-standing calls from Indigenous scholars and land defenders, the framework takes seriously the need to design technologies that work with the land, not against it [?]. This means recognizing the social and ecological impacts of infrastructure and asking different questions about how technologies are imagined, built, and governed.

The Environmental Justice in Technology (EJIT) Principles build on these scholarly traditions by drawing directly from the legacy of the environmental justice movement and its foundational documents. The framework insists on a different approach to technology development—one that centers the experiences, leadership, and self-determination of communities historically pushed to the margins. The EJIT Principles also reflect the insights of design justice and post-growth computing, advocating for justice as the foundation, not an afterthought, of technological development.

3 The EJIT Principles: A Framework for the Future

The Environmental Justice in Technology (EJIT) Principles are a set of shared values meant to guide how technology is imagined, built, and evaluated, especially in the context of intersecting ecological, racial, and economic harms. Inspired by the 1991 Principles of Environmental Justice, the EJIT framework extends the movement's core commitments - universal protection from harm, self-determination, and the right to a healthy environment - into the domain of technology. While the original principles focus on environmental policy and activism, the EJIT framework emphasizes the need to dismantle extractive logics, center community governance, and ensure that technological systems do not reproduce or deepen existing injustices. The principles are as follows:

- Environmentally just technology is explicitly anti-racist.
- Environmental justice in technology calls for responsible innovation in every aspect of technological creation. Responsible innovation occurs when all people are provided the resources to innovate, all potential uses of the innovation are accounted for to prepare for contingencies, emphathy is central to innovation and its creative intent.
- Environmental justice in technology empowers those who wish to live without certain technologies. It demands preserving traditional Indigenous ways of living without interference from capitalist and corporate technologies.
- Environmental justice in tech means refusing to cooperate with or arm the military-industrial complex, prisons, or police. Environmentally just tech is used to elevate all ordinary people, not to oppress any of them with violence or the threat of it.
- Environmental justice in technology demands that democracy be the foundation of all of its endeavors. A democratic and community-centric environment is necessary to have a just world.
- Environmentally just technology dismantles capitalist-centric development and does not harm economic vitality. It promotes equitable and just income (re)distribution across the world.
- Environmentally just technology preserves the beauty and utility of the natural world for future generations.
- Environmental justice in technology means having a harmonious relationship with the Earth and with all life. Environmentally just tech has a collaborative, regenerative, and sustainable relationship with the natural world, not an extractive relationship.
- Environmentally just technology is not used to exclude parts of the Earth for use by some individuals and not others. It enables all people to access all parts of the Earth.
- Environmentally just technology is open-source. Environmentally just tech makes all information about its creation (including blueprints, instructions/manuals, and information

for repair) freely available and accessible to empower everyone to make, repair, modify, and develop their technology.
- Environmental justice in technology requires that the burdens and benefits of technology be equally shared amongst all people. Environmentally just tech will never empower one group at the expense of another.
- Environmental justice in technology strives to eliminate global and local burdens inherent in its creation.
- Environmental justice in technology calls for the deployment of technology where and when it is appropriate and beneficial to its local community. When these criteria are not met, environmentally just technology is not deployed.
- Environmental justice in technology provides for the cleanup and restoration of lands, waters, and communities that have been harmed by past uses of technology.
- Environmental justice in technology calls for the removal of colonial and neocolonial intentions with technology; instead, it encourages self-determination, freedom, and repatriation.
- Environmentally just technology is not separate from nature, Earth, and the environment. Rather, it works synergistically with nature.
- Environmentally Just Tech is intentional about harm. It is cognizant of who a given technology helps and who it harms.

Below, we present the EJIT Principles as a series of prompts and values. Each principle is framed as a question or provocation, inviting reflection and action rather than serving as a rigid checklist. The principles are grouped into four overarching themes, each representing a critical shift required to center environmental justice in technological development.

3.1 Designing with Power and Positionality in Mind

There is no such thing as neutral technology. Every technical decision reflects and reinforces structures of power. The EJIT Principles begin by naming this openly: environmentally just technologies must be anti-racist and anti-colonial by design, not just in rhetoric. They must reject relationships with systems of harm that have long relied on technological tools to surveil, discipline, and displace [**?**], [**?**].

- Principle 1: Is this technology explicitly anti-racist and anti-colonial in its design and intent?
- Principle 2: Does this technology empower communities to refuse imposed or extractive technologies?
- Principle 3: Who holds decision-making power over this technology? Are frontline communities leading its development and deployment?

3.2 Restructuring Innovation for Collective Flourishing

Innovation, as it is commonly practiced, rewards speed, novelty, and capital. The EJIT framework pushes for an approach that emphasizes responsibility, empathy, and shared benefit. This includes accounting for unintended consequences, ensuring all people have access to the tools and knowledge needed to shape innovation, and prioritizing collective well-being over market success [**?**].

Innovation here is plural and distributed. It includes Indigenous ecological knowledge, mutual aid infrastructure, grassroots environmental monitoring, and other practices that rarely get recognized in mainstream tech spaces but are no less vital [**?**] [**?**].

- Principle 4: Are all people provided with the resources and knowledge to shape innovation?
- Principle 5: Are the potential uses and unintended consequences of this technology accounted for and prepared for?
- Principle 6: Is empathy central to the technology's creative intent and impact?

3.3 Reorienting the Relationship Between Technology and Nature

The idea that technology is somehow outside or above nature is one of the most dangerous assumptions in modern infrastructure. The EJIT Principles treat all technological systems as embedded in ecosystems, materially, energetically, and ethically.

This means prioritizing systems that are regenerative rather than extractive, designed with local ecological limits in mind, and developed in ways that do not worsen environmental degradation. It also means being accountable for harm: not just avoiding future damage, but actively cleaning up and restoring communities and ecosystems harmed by past technologies [**?**]. This draws from a long lineage of work that connects environmental repair with political accountability and ecological humility [**?**].

- Principle 7: Does this technology preserve the beauty and utility of the natural world for future generations?
- Principle 8: Does it have a regenerative, not extractive, relationship with nature?
- Principle 9: Is it accountable for harm, including the cleanup and restoration of lands, waters, and communities harmed by past technologies?

3.4 Embedding Access, Accountability, and Reparative Practice

Environmental justice in technology also demands that access and accountability be built into the foundation of a system, not bolted on afterward. This includes open access to documentation, repair tools, and modification rights; it also includes transparency around who benefits, who is excluded, and how harms are addressed [**?**].

- Principle 10: Is all information about this technology's creation (blueprints, manuals, repair guides) openly accessible?
- Principle 11: Are the burdens and benefits of this technology equally shared?
- Principle 12: Does this technology enable self-determination, freedom, and repatriation, especially for communities impacted by colonialism?

The EJIT Principles do not constitute an exhaustive checklist but function as a conceptual framework of inquiries, provocations, and core values aimed at preventing technological development from perpetuating systemic violence. They provide a structural orientation for establishing repair, redistribution, and relational responsibility as foundational to technological systems, rather than exceptional considerations.

4 Implications and Applications

The EJIT Principles provide a critical lens and a framework for reorienting technological development toward justice and ecological responsibility. As the climate crisis and intersecting social inequities intensify, there is a pressing need for clear guidance that moves beyond critique to inform the design, evaluation, and deployment of technology across multiple domains.

4.1 Operationalizing the EJIT Principles

The principles can also translate into concrete criteria for assessing and guiding technology projects. These criteria could include:

Power Redistribution: Does the system transfer decision-making authority to frontline and historically marginalized communities? This echoes calls from both environmental justice and design justice to center meaningful participation and self-determination as foundational to any just outcomes [**?**] [**?**].

Harm Repair: Does the project include explicit plans for restoring ecosystems and communities affected by past technological harms? This reflects a core aspect of the EJ movement's emphasis on accountability and reparative justice [**?**].

Careful Open Access: Are blueprints, repair guides, and data publicly accessible? Open-source and open-access practices can be a key part of efforts to democratize technology and enable community-led innovation, where appropriate [**?**].

Contextual Deployment: Is technology deployed only where it is locally beneficial and appropriate? Paying attention to this criterion ensures that technological interventions are responsive to community needs and ecological limits [**?**].

These criteria could inform funding, policy, and design benchmarks, such as requiring community consent and reparative commitments in grant applications or technology procurement processes.

4.2 From Principles to Practice

The EJIT Principles can also serve specific pathways for implementation across several key areas of technological work, including education and curriculum development, project assessments and evaluations, open-sourced and community led development, and decision-making around infrastructure.

Education and Curriculum Design: Integrating justice as a foundational concept in computing and engineering curricula fosters a new generation of technologists who are attuned to the social and ecological implications of their work. This approach is supported by scholarship advocating for the inclusion of justice-oriented frameworks and participatory methods in technical education [**?**].

Project Assessment and Evaluation: Moving beyond traditional metrics of usability and performance, project assessments should incorporate social and ecological impacts, drawing on multi-dimensional justice frameworks that encompass distribution, recognition, and participation [**?**] [**?**] [**?**].

Open-Source and Community-Led Development: Open-source practices that center transparency, repairability, and community governance empower users to adapt technology to their needs and ensure that benefits and burdens are equitably shared [**?**] [**?**].

Infrastructure Decision-Making: Infrastructure projects that account for land, water, labor, and consent, not just technical feasibility. This requires participatory planning processes and ongoing codesign with affected communities.

4.3 Towards a Justice-Centered Technological Future

The EJIT Principles do not offer a prescriptive checklist but serve as a conceptual and practical compass for navigating the complex terrain of technological development in a time of planetary crisis. By grounding design in justice, centering community voices, and insisting on accountability, the principles provide a roadmap for building technologies that are responsive to both people and place. This approach is increasingly recognized as essential for addressing the intertwined crises of climate change, inequality, and technological overreach.

5 Conclusion

To compute within limits is not merely to constrain, but to fundamentally reimagine the purpose, process, and politics of technological creation. It requires us to critically interrogate what should be built, who holds the authority to make such decisions, and whether construction itself is always the most ethical or necessary response. The EJIT Principles provide a conceptual map for this reorientation: a framework of values, provocations, and practices designed to guide us through the complex intersections of planetary crisis, technological overreach, and collective survival. These principles compel us to move beyond inherited measures of success, such as scale, speed, and profitability, and to adopt alternative metrics rooted in repair, redistribution, and regeneration. They demand that we confront the systemic harms encoded within computing's supply chains, funding structures, and imagined users, and that we commit to building technological systems that are accountable to both people and place. Recent scholarship on environmental data justice and community-based participatory research underscores the importance of such accountability, emphasizing the need to center historically marginalized voices and to challenge extractive logics in technological design. The work of justice-oriented technology is neither neutral nor optional. As the climate crisis intensifies and extractive technologies proliferate, computing must become a site of principled refusal, a space where business-as-usual is actively resisted and alternative futures are deliberately designed. The EJIT Principles offer a starting point for this transformation, grounding design in justice, amplifying the perspectives of those who have long resisted environmental harm, and reminding us that technology is never exempt from the ethical and ecological obligations of our time. We offer this framework not as a definitive solution, but as an open invitation: to collaboratively construct new models of environmental innovation, to center justice in every technical choice, and to approach every byte stream, build, and blueprint as an opportunity to enact care. In doing so, we acknowledge the ongoing work of environmental justice communities, the necessity of continuous self-reflection and accountability, and the imperative to build technological futures that are equitable, regenerative, and just.

Received 1 May 2025; revised 20 June 2025; accepted 20 June 2025