

ROUNDTABLE 2: CLIMATE CHANGE

Engaging Science Through Science Fiction: Regenerative Dialogues in a Brazilian University Extension Course

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Abstract

This essay takes as its starting point the experience of designing and teaching the extension course “Regenerative Ecologies: Imagining Sustainable Futures through Science Fiction,” offered at the Federal University of Pelotas in late 2024 as part of Brazil’s triadic model of teaching, research, and extension in higher education. Bringing together participants from the humanities, natural sciences, health sciences, and environmental studies, the course created a space where speculative narratives could be read alongside diverse forms of expertise and lived experience, fostering ecological awareness, critical engagement with science and technology, and the exercise of accountability and collective responsibility. From this context, I explore the role of science fiction as a critical and imaginative tool for public engagement with science and draw upon philosophy of science to argue that science fiction supports ethical reflection, strengthens scientific communication, and cultivates the “moral imagination” essential to responsible science, enabling readers to anticipate the social and environmental consequences of scientific and technological advancements. Through this case study, I highlight how speculative narratives can bridge the gap between scientific practice and public participation in the co-creation of sustainable futures, while also showcasing the affordances of public higher education outreach initiatives in Brazil.

Keywords: literature and science; moral imagination; philosophy of science; science fiction; university outreach initiatives

Philosophers of Science such as Helen Longino, Heather Douglas, and Mathew Brown have long argued for the benefits of scientific knowledge and scientific practice that are permeated by critical discursive interaction and wider public participation.¹ As Douglas highlights, because evidence is rarely perfect, scientists must make judgement calls about when evidence is strong enough to act on, and when those decisions carry social consequences—such as impacts on health, safety, or the environment—science cannot be separate from public responsibility; it must be open to ethical reflection and accountability.²

During my PhD in Literature, Culture, and Translation at the Federal University of Pelotas (2021–2025), my research was guided by the conviction that literature provides powerful

¹ Brown 2020; Douglas 2000, 2009; Longino 1990, 2002, 9.

² Douglas 2009, 172.

tools for reflecting on the world we share. As a cultural product that demands a particular kind of engagement that is both individual and collective—involving reader, narrative, and society—literature allows us to observe what *is* and imagine what *could be*.³

As Jay Clayton has argued, fiction can actively shape public engagement with science, as cultural narratives mediate the social imagination around knowledge making. *Science* fiction, as I argue on my doctoral thesis, is especially attuned to the alliances modern science establishes with capitalism and colonialism.⁴ As such, it offers a powerful framework for examining the entangled forces that underpin many of today's environmental and political challenges—especially the complex role of science in shaping them.

Beyond enabling critique and expression, science fiction also supports a deeper ethical function: it cultivates what Matthew Brown refers to as “moral imagination”—the capacity to play out possible actions and consequences before they happen, in a kind of ethical dramatic rehearsal.⁵ This imaginative foresight is essential to scientific responsibility, and it is precisely here that science fiction becomes especially powerful. By offering a space to explore alternative futures, weigh risks, and question dominant assumptions in ways that are emotionally resonant and publicly accessible, science fiction narratives may allow both scientists and the broader public to anticipate consequences, understand the entanglements of science with social and cultural structures, and imagine more just and sustainable futures.

In what follows, I review a course I designed and taught at the Federal University of Pelotas, Brazil, in October 2024 titled *Ecologias regenerativas: imaginando futuros sustentáveis através da ficção científica* [*Regenerative Ecologies: Imagining Sustainable Futures through Science Fiction*], under the supervision of Professor Dr. Eduardo Marks de Marques. Open to both university students and members of the local community, the course used science fiction to generate discussion about science, political and economic structures within society, and our shared responsibility for the planet. I hope to demonstrate how public engagement with science can be fostered by science fiction and amplified within the Brazilian higher education triadic model of teaching, research, and extension. Its extension component in particular creates a powerful model for combining speculative narratives with participatory discussion between students and community members. This setting hones participants' capacity for ethical reflection, critical engagement with science, and imaginative reasoning about sustainable futures.

1. Regeneration through critical discursive interaction

The course *Ecologias regenerativas: imaginando futuros sustentáveis através da ficção científica* was held at the University of Pelotas drawing an initial group of 20 participants, with an average of 15 attending regularly. Over the span of six in-person sessions, held twice weekly and supplemented by asynchronous forum discussions, the course offered 20 hours of collaborative engagement with science fiction as a medium to explore science, sustainability, and ethics. Participants came from a range of backgrounds—literature, philosophy,

³ Candido 1995.

⁴ Clayton 2023. My doctoral thesis, titled “Science Fiction as a Critique of the Alliances between Capitalism, Colonialism, and Modern Science: A Regenerative Epistemology for a World in Crisis, from *Frankenstein* to *Solarpunk*,” argued that science fiction exposes the logics of expropriation, control, and assimilation that sustain the entanglements between Capitalism, Colonialism, and Modern Science, while simultaneously proposing alternative ways of relating to nature and difference.

⁵ Brown 2020, 161.

environmental management and environmental engineering, chemistry, nursing, and nutrition—bringing with them diverse perspectives shaped by their studies, political work, and activist commitments.

The course focused on two short novellas by Becky Chambers—*To Be Taught, If Fortunate* and *A Psalm for the Wild-Built*—selected for their capacity to present different views on human–science–nature interaction.⁶ Before turning to the literary texts, I dedicated two sessions to engaging with and activating participants’ prior knowledge. Each session centred on shared reading and guided discussion, often beginning in small breakout groups to foster peer dialogue before moving into whole-class conversations. As facilitator, I posed questions, shared theoretical provocations, and encouraged participants to connect the stories to real-world contexts, particularly by foregrounding how science is shaped by the capitalist structures in which it operates and what the consequences of that influence may be. Building on their existing knowledge and life experiences, we interrogated who science serves, how knowledge is validated, and what alternatives science fiction can help us imagine.

In the first session, participants were asked to reflect on how the science fiction stories they knew might connect to the Sustainable Development Goals (SDGs). Students from environmental engineering and environmental management shared their familiarity with the SDGs, which opened new angles for those coming from the humanities. In turn, the humanities students brought literary and cultural perspectives that helped reframe the SDGs in unexpected ways. For example, *Star Trek* was highlighted as a vision of several SDGs put into practice, though students also noted that access to these benefits is limited to those within the fictional alliance. Octavia Butler’s *Earthseed* duology was connected to SDGs 11 and 12 through its exploration of sustainable communities, while also raising questions about whose needs and values shape such projects. Samanta Schweblin’s *Little Eyes* was read through SDG 9 (Industry, Innovation, and Infrastructure), with its unsettling depiction of technology that brings both innovation and new forms of control. Finally, the show *Arcane* prompted discussion of SDG-related issues such as public health, labour exploitation, and unequal economic growth, underscoring how technological and social development can simultaneously enable and threaten well-being.

The second session explored how estrangement and cognition operate in science fiction, showing how speculative scenarios de-familiarize everyday realities and sharpen critical awareness.⁷ Participants brought up the *Doctor Who* episode “Oxygen,” where the commodification of air illustrates the extremes of capitalist logic, and works like Margaret Atwood’s *The Heart Goes Last* and Kazuo Ishiguro’s *Never Let Me Go*, which expose how vulnerable lives become expendable under certain economic systems. *The Handmaid’s Tale* offered a further example of estrangement through plausibility, its theocratic oppression resonating uncomfortably with Brazil’s recent resurgence of authoritarian and religious politics.

The discussion took a vital turn when students connected these dynamics to Brazilian Indigenous non-fiction, particularly *The Falling Sky: words of a Yanomami Shaman* (A Queda do Céu) by Davi Kopenawa and Bruce Albert. Rather than imagining distant futures, the book causes estrangement by presenting Yanomami cosmology. The Yanomami are one of the largest Indigenous groups in the Amazon, living between northern Brazil and southern

⁶ Chambers 2019, 2021.

⁷ As formulated by Darko Suvin 1980 and expanded by Carl Freedman 2000.

Venezuela, whose way of life is deeply interwoven with the forest and its spirits. This discussion led the participants and myself to broaden our understanding of estrangement and cognition beyond the boundaries of science fiction, revealing unexpected parallels between speculative modes and Indigenous ways of narrating and knowing.

We discussed *To Be Taught, If Fortunate* in our third session, in which participants were led to reflect on how science can be reimagined as a practice of humility and care, rather than a tool for domination. This narrative sparked deep discussion about modern science's extractivist tendencies and scientific responsibility. Participants from environmentalist and Indigenous backgrounds importantly pointed out that the values of care and humility that appear innovative within Becky Chambers' speculative vision have long been central to Indigenous cosmologies discussed in the previous session. This was vital to highlight how Western cultural products can sometimes present as novel what has, in fact, been systematically marginalized by colonial knowledge systems.

To deepen the discussions regarding sustainability and science, we also engaged with the work of Brazilian ecologist Fabio Scarano in our fourth session, whose concept of regeneration offers a critique of dominant sustainability discourse. In *Regenerative Dialogues for Sustainable Futures*, Scarano proposes a shift in language and perspective: from "sustainable development" to the more inclusive concepts of regeneration and planetary well-being. Regeneration, as he defines it, "applies to repairing of systems, relationships and rights and is therefore inclusive of other worldviews, as opposed to the more strict (modern, capitalistic) notion of sustainable development."⁸ Planetary well-being, in turn, avoids the exclusions that have come to characterize sustainability discourse and foregrounds the relational ethics and plural cosmologies necessary for collective planetary habitability—human and non-human alike.

Our conversations around Scarano's work resonated strongly with themes from earlier sessions, where science fiction had already prompted participants to interrogate the limits of dominant narratives about progress and sustainability. By the time we reached these discussions, students were more attuned to how the Sustainable Development Goals (SDGs), while framed as universally desirable, often remain entangled with capitalist logics of growth and development. Science fiction had played a crucial role in enabling this awareness: by staging alternative ways of living and imagining futures beyond extractivism and domination, it offered participants conceptual tools to question not only the promises but also the contradictions embedded in the SDGs.

The fifth session focused on introducing students Ursula K. Le Guin's carrier bag theory of fiction, opening up a new way of thinking about narrative as something other than heroic conquest or linear resolution.⁹ Instead, participants reflected on stories as "bags" that hold fragments of experience, small gestures, and unpredictable encounters that only gain meaning in relation to one another and in moments of discussion such as the ones we were having. This shift in perspective immediately resonated with the group: some pointed to everyday acts of care and hospitality that might otherwise be dismissed as trivial in a hero's story, but, in this framework, become central to how we live and imagine together. Others highlighted how the theory allowed them to value diversity within a story—differences of perspective, ways of relating, and even contradictions—as not something to be resolved, but

⁸ Scarano 2024, 4.

⁹ Le Guin 2019.

something to be carried. What emerged in the conversation was a shared recognition that narratives, like lives, are less about conquest or final answers than about collecting and holding fragments that help us reflect on how we relate to each other, to the environment, and to ourselves.

In discussing *A Psalm for the Wild-Built* for our last session, participants explored how the narrative cultivates attentiveness, care, and ethical engagement through a quiet journey between a tea monk and a robot through a planet whose inhabitants have committed to preserving half of its ecosystems, occupying the remaining space with deliberate care. The novella's society prompted discussions about sustainable living and relational ethics: students noted the care taken to preserve natural areas, implement sustainable farming practices, and acknowledge past ecological losses, such as the disappearance of certain species, as a reminder of the consequences of human action.

The emotional resonance of the text led several participants to notice their surroundings with new attentiveness after the course, spontaneously sending me photos of insects and plants they had previously overlooked. These works of science fiction, in this sense, became a tool that sharpened perception and recalibrated participant's moral imagination. In this sense, the course itself enacted what philosophers of science describe as the essential condition for responsible knowledge production: critical discursive interaction. Literature, and especially science fiction, proved to be a catalyst for that interaction, allowing participants to imagine more ethical and sustainable futures while sharpening their capacity to interrogate the present.

2. The triadic Brazilian model for socially meaningful science

Offering this initiative as a university extension course was key to its impact and success. In Brazil, extension programmes (*extensão universitária*) are a constitutionally mandated part of public higher education, positioning universities as active participants in social transformation. These courses are typically free and open to a wide audience, including university students, professionals, and members of the public. By designing this course in this format, it was able to bring together diverse participants whose perspectives enriched discussions and amplified the initiative's reach.

Brazilian public universities are structured around a foundational triad of teaching, research, and extension. Teaching refers to undergraduate and graduate education; research encompasses scientific investigation and innovation; and extension involves outreach initiatives that connect the university with broader communities.¹⁰ As described by Souza: "Academic work [in Brazilian universities] articulates extension with teaching and research, establishing the university's social responsibility and accountability to society as well as a new epistemological base whereby the need to test and reformulate theory against the concreteness of daily life is a given."¹¹

Rather than being a one-way transfer of knowledge, extension is a dialogical process, ensuring that the knowledge produced in universities is socially relevant, inclusive, and responsive to local and national needs. Integral to public universities since the 1930s, Brazilian university extension programmes have long been practicing a form of science

¹⁰ Moita and De Andrade 2009.

¹¹ Souza 2017, 62.

communication that closely aligns with what Matthew Nisbet identifies as a paradigm shift in global science communication: the move away from the traditional “deficit model,” in which the public is treated as ignorant and in need of expert correction, towards a model of framing information and fostering engagement with the wider society.¹² Rather than assuming that information alone changes minds, Nisbet argues that science communication is a process of negotiating meaning across diverse values and cultural contexts, which is at the heart of how extension is conceived within the Brazilian teaching–research–extension triad.¹³

In the context of *Ecologias regenerativas*, Nisbet’s model of science communication took on new dimensions, as my experience on the course demonstrated that this negotiation is not only about translating scientific knowledge for a public audience but also about co-creating meaning together. Participants brought insights from their professional, environmental, and cultural backgrounds, which shaped the discussion of science and sustainability in real time. In turn, speculative narratives acted as a mediating space, allowing participants to engage with complex ethical and ecological dilemmas in ways that were experiential and relational.

By inviting participants to engage with science fiction stories as a narrative space for ethical rehearsal and collective imagining, the course enacted university extension’s transformative potential by turning speculative storytelling into a mode of thinking and engaging with science and its products, while attuning participants to the moral and political dimensions of knowledge. It also provided a space where individuals could become more capable of expressing themselves within contexts of criticism, reluctance, and dissent from scientific practice and the public policies it informs. Most importantly, as I facilitated these discussions, I was equally challenged and influenced by the perspectives participants brought to the table. Their contributions have informed the writing of my doctoral research, drawing my attention to questions I had previously overlooked. For example, participants’ diverse professional and experiential backgrounds enriched my understanding of ongoing debates in biology, ecology, and public health, which helped me contextualize speculative narratives even further in relation to contemporary scientific and societal concerns. Additionally, I became more attuned to the situatedness of science fiction: as it emerges largely from Western epistemic traditions, its affordances, and limitations benefit from critical expansion when placed in dialogue with other forms of knowing and narrating, including Indigenous cosmologies and Latin American speculative narratives. In this way, the course embodied the core principle of extension as mutual transformation—learning *with*, not simply teaching *to*.

3. Conclusion: science (fiction) and public engagement

The experience of teaching *Ecologias regenerativas* affirmed that the speculative genre of science fiction can be a powerful space for public engagement with science, not only by communicating scientific ideas but also by opening up ethical, political, and affective dimensions of how science is imagined, practiced, and governed. Rooted in the Brazilian model of university extension, the course invited participants to critically and collectively reflect on the futures they hope to inhabit, the ones they seek to resist, and the role of science in shaping both.

Importantly, only through such a well-established structure of public outreach would I have been able to test the hypothesis that, unlike other narrative forms, science fiction uniquely suited to foster critical reflection on the relationships between human, nature, science, and

¹² Nisbet 2009, 42; Souza 2017, 57.

¹³ Nisbet 2009, 64.

capitalism. The extension course model created a space in which participants could encounter and interrogate the consequences of scientific and technological choices without being limited to the familiar or the immediate. This illustrates the capacity of Brazilian university extension programmes to bridge gaps not only between disciplines but also between higher education institutions and local communities. Extension courses such as this one create spaces where academic knowledge is tested, expanded, and reframed in dialogue with lived experiences, demonstrating how universities can actively contribute to social transformation by cultivating critical, collaborative, and inclusive forms of learning.

This experience points to the combined power of speculative narratives and Brazilian extension practices. For universities, it is evidence of how extension programmes can bridge gaps not only between disciplines but also between academic institutions and local communities, cultivating inclusive and transformative forms of learning. For educators and scientists, they highlight science fiction's capacity to serve as a pedagogical bridge. And for scholars and writers of science fiction, especially in the Global South, they underscore the genre's role as a site of public intervention where science, culture, and hope converge in the urgent task of imagining more just and sustainable futures.

Jade Arbo holds a PhD in Literature, Culture, and Translation from the Federal University of Pelotas, Brazil, which included a visiting research period at Swansea University, UK. She also holds an MA in Philosophy and a BA in Letters. Her research investigates the epistemic and ethical dimensions of speculative fiction at the intersections of science, literature, and environmental humanities.

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