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In the Minor Key: The Minuscular Mycelium and its Implications for Citizen Science

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Abstract In an era marked by ecological precarity and growing demands for knowledge systems that are more inclusive, situated, and responsive, grassroots initiatives have begun to challenge dominant models of science and expertise. Among these, citizen science has emerged as a powerful mode of inquiry that brings together university-based scientists with communities to highlight lived experience, local knowledge, and collective sense-making. One such initiative, which is grounded in a commitment to care, justice, and co-creation is the project *Diamonds on the Soles of our Feet* (DSF) which originated as a locally rooted water literacy project in the province of Limpopo in South Africa. Since its inception in 2019, the project has evolved in unexpected, generative and at times even unfathomable ways. From its start in one rural village, it grew into a multi-sited, transnational, and increasingly entangled exploration of environmental justice and relational care. This paper seeks to make sense of these developments through the conceptual lens of a 'fungal turn' and the aesthetics of care. Engaging with the entanglements of citizen science, we found, can open up forms of learning that stretch beyond conventional scientific frameworks. Here the image of the fungal as a (dis)organizing principle allows us to contrast it with the more rigid image of science as a container. As DSF networ(ld)s extend into uncharted geographical terrains, the application of an ethics of care, coupled with fungal imagery, offers a valuable lens to interpret the unexpected and indeterminate textures that characterize our unfolding DSF journey. By equipping both learners and educators, DSF aims to create a collaborative model that supports long-term behavioral change and where authentic, value-transparent conversations become the fertile ground for meaningful engagement. We thus aim to create a pedagogy of connection, one that links ecology, identity, and imagination, resisting the impulse to fix, explain away or simplify, but instead to cultivate the capacity to remain present with the troubling complexity of it all. Once we took citizen science out of the container, we began to inhabit a space where encounters became unpredictable, often uncomfortable and occasionally deeply troubling. By resisting the impulse to command, to classify and to control and by resting instead in the *minor key*, meaning in the unfolding process rather than the singular event, we allowed ourselves to become entangled. Mushrooms offer more than a biological metaphor; they become a lens to reimagine ecological entanglement and the often-invisible networks that shape our understanding of science, learning, and care.

Plain Language Summary As we face growing environmental challenges and calls for more inclusive ways of knowing, grassroots efforts are pushing back against traditional ideas of science and expertise. One such effort is *Diamonds on the Soles of our Feet*(DSF), a citizen science project that began in 2019 in a rural village in Limpopo, South Africa. Focused on water literacy and rooted in care, justice, and collaboration, DSF has grown into a larger, international network exploring environmental justice and community-based learning. This project brings scientists and communities together, valuing lived experience and local knowledge. Instead of following strict scientific structures, DSF embraces more open, evolving ways of learning—what we describe through the metaphor of fungi. Like fungal networks, DSF has grown in unpredictable and interconnected ways. Using this "fungal lens" and a focus on care, DSF encourages deeper, long-term conversations and learning. It moves away from trying to control or simplify, and instead welcomes the messy complex realities of life. Through this, DSF helps create a model of education that connects ecology, identity, and imagination, offering a new way to think about science, care, and community.

Key Points:

- Fungi as metaphor to rethink science—with an emphasis of connection and growth—unlike traditional controlled science
- Welcoming complex uncomfortable situations—embracing the unexpected and "messy" aspects of science in everyday life
- This citizen science project is not just about major discoveries but the "minor" everyday moments of caring and learning together

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1. Introduction

In an era marked by ecological precarity and growing demands for knowledge systems that are more inclusive, situated and responsive, grassroots initiatives have begun to challenge dominant models of science and expertise. Among these, citizen science has emerged as a powerful mode of inquiry that brings together university-based scientists with communities to center lived experience, local knowledge, and collective sense-making. One such initiative, which is grounded in a commitment to care, justice, and co-creation, is the project *Diamonds on the Soles of our Feet* (DSF) which originated as a locally rooted water literacy project in the province of Limpopo in South Africa. Since its inception in 2019, the project has evolved in unexpected, generative and at times even unfathomable ways. From its start in one rural village, it grew into a multi-sited, transnational, and increasingly entangled exploration of environmental justice and relational care.

The concept of the *minuscular mycelium* operates as a visual and conceptual metaphor grounded in the biological structure of mycelium—an intricate, subterranean network through which fungi communicate and transport nutrients. This metaphor evokes the entangled nature of individual experiences and the often invisible interconnections that shape social, ecological, and informational systems. Just as mycelial networks sustain ecosystems through decentralized and micro-level exchanges, this imagery reflects the distributed and relational nature of citizen science. It foregrounds the subtle, often overlooked processes—those that operate beneath the surface yet are essential to the flow of knowledge, care, and also data. In this context, the metaphor invites a rethinking of citizen science not as a series of isolated, spectacular interventions, but as an ongoing, situated practice shaped by incremental, routine, and often mundane engagements. The invocation of the *minor key* further deepens this perspective by offering a mode of attunement to the quieter dynamics of data collection and environmental monitoring—such as in the case of water quality assessment—highlighting how meaning and significance reside not only in dramatic events or large-scale data sets, but in the processual, relational, and accumulative aspects of participation. The *minor key* thus becomes both an esthetic and epistemological stance, privileging the everyday, the marginal, and the continuous as vital to how citizen science is enacted and experienced.

This paper seeks to make sense of these developments through the conceptual lens of a "fungal turn" and the aesthetics of care. A pivotal insight into the project's evolution emerged in January 2025, when theater practitioner and scholar James Thompson delivered a keynote address at the 3rd International Care Ethics Research Consortium Conference in the Netherlands. His reflection on care aesthetics, in particular on what he called "care in the minor key," challenged and reframed our understanding of DSF's unfolding trajectory. Thompson gave an example of a physiotherapist who tends to fragile feet and so showed how minute and intimate acts of care can speak volumes about larger systems. His metaphor of "ferment beneath our feet," which points to overlooked fungal threads which sustain life, offered a rich and thoughtful prompt: what happens when we stop looking for grand narratives and instead attend to the minuscular, dispersed, and entangled?

1.1. Methodological Strategies

Methodologically, this article combines narrative accounts from key participants and visual imagery which we assessed to trace the evolution of DSF with particular attention to its resonance with Thompson's conceptual metaphor of mycelial fungi, which emphasizes entanglement, emergence, and relational networks. The main findings from our citizen science research that inform this article emanate from developments in the Narok County in Kenya. As mentioned above, the initial phase of DSF took place in Limpopo, one of South Africa's poorest provinces, which we first documented in *Keep the Flow* (Goldin et al., 2023). It involved community-based monitoring of groundwater levels in wells where a simple cost effective technologically appropriate tool, a dip-meter, was used to determine water levels. This phase foregrounded the emancipatory potential of citizen science, not only because of its contribution to water resource management but also for its role in enhancing individual and collective well-being in the involved communities. The methodological approach was primarily informed by the work of Klenk (2018) and Ingold (2015) and emphasized the analysis of lived experiences in a dynamic context, constituted by knots and flows rather than by fixed structures.

In the second and third phases of DSF, which we discussed in *Pedagogy with a Heartbeat* (Goldin & Suransky, 2024) and in *Decolonization of Education through citizen science* (Goldin & Suransky, 2024a), the project, while still based in Limpopo, transitioned to a youth-focused participatory model. It was implemented in partnership with seven schools and involved approximately 420 learners. In this phase we focused on surface water

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quality monitoring and foregrounded the participating schools as dynamic and collaborative ecosystems. By observing and documenting experiential learning activities which were conducted both inside and outside the classroom, we noted that students engaged with local water systems and so made scientific inquiry personally meaningful and grounded in their own lived contexts. In the next and fourth phase, which we named *DSF_Goes_Global*, the project expanded into a global community of practice. Aligning with Day et al. (2022), who conceptualize science as constituted through "precise moments of happening" or "wonder," this phase emphasizes the performative and emergent aspects of citizen science. Rather than adhering to strict protocols, the fourth phase of DSF privileges adaptive practices and relational networks, which are captured metaphorically as "a-mazement," pointing to an entangled and processual orientation which is akin to fungal mycelium.

During this phase, a new partnership was established with the Mara Basin Conservation Forum (MBCF) in the Narok County in Kenya. This extended the project to 20 additional schools where we adapted the participatory model to new geographical and cultural contexts. Empirical data from this phase continues to be collected through water quality sampling, participatory observations, narratives, and visual documentation, with an emphasis on local epistemologies and co-created knowledge.

Our analytic approach did not follow a single formal method but was shaped through an iterative and participatory process. Data were generated through field observations, participant interviews, visual documentation, and narrative accounts across multiple sites in South Africa and Kenya. These materials were reviewed collectively by project facilitators and researchers in reflective workshops, where emerging patterns, metaphors, and tensions were discussed. Rather than coding data into fixed categories, we engaged in a process of interpretive sense-making that is attentive to context, affect and the relational dynamics of each site. This approach aligns with a feminist ethic of inquiry that values situated knowledge and collective interpretation. Here we draw too on the ideas of Ndlovu-Gatsheni (2023) and his emphasis on the colonization of the cognitive processes and Mbembe (2020) who also challenges eurocentric modes of knowledge production. We recognize the need for transparency in this approach and our insights were co-constructed through dialog with participants and grounded in the lived realities of the involved communities. This process-oriented methodology mirrors the fungal metaphor which is at the heart of the article, namely branching, entangled, and responsive.

2. The Fungal as (Dis)Organizing Frame

Our interest in the fungal in relation to citizen science is not how it can advance fungal conservation (see for instance Haelewaters et al., 2024 or Shumskaya et al., 2023), but rather we wonder how fungal conservation can advance citizen science and help us to understand the value that citizen science efforts can have at the minuscular level or, as Thompson put it, in "the minor key." Through the lens of the fungal turn, we aim to better understand what is happening as DSF_Goes_Global. Our new perspective opens for us, as Belabes (2023) claims, an analytic field which admits quite candidly that scientific analysis is partial and biased. We simply endeavor to look more deeply, and with a sense of wonder, at the fungal turn as it unfolds through new and imperfect connections.

We lean into the idea of "ecology of practices" that Stengers (2005) uses because this takes us away from what is believed to be an exclusionary field which is "science" and into a field of shared knowledge and practices of knowing. Belabes (2023) acknowledges the way Stengers addresses deeper questions by navigating between multiple languages, between the visible and the invisible, opening up new possibilities to relate. It is not always possible, or even useful, to explain everything through discursive means; instead, it may be more productive to cultivate the effects of diverse practices rather than forcing them into a single mold of a predetermined method. Here again, the image of fungal hyphae, as described by Sheldrake (2020) as a living labyrinth, shows us that it is about choosing many paths or routes rather than just one "as one tip becomes two, becomes four, becomes either, yet all remain connected in one mycelial network. Is this organism singular or plural …. I'm forced to admit that it is somehow, improbably, both" (2020:51). Sheldrake was fascinated to see how only a small part of the fungus touched the wood and yet the behavior of the entire network changed so that "after a few days the network was unrecognisable. It had completely remodeled itself" (2020:52).

Researchers struggle to reconsider their practices as they are more often than not prompted by theoretical concepts, budgets, timeframes or administrative constraints that compel them to walk their path in a straight and predetermined way. And yet, we noticed that as the spores of DSF were released in new locations, what began as a focused, clear-cut citizen science project, which meant gathering data on well water levels in Limpopo and later sampling river water quality, increasingly came to resemble a mycelial network, "where one mycelial network

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can fuse with many others to make sprawling "guilds" … where does one cell start and stop? Where does one network start and stop? These questions are unanswerable" (Sheldrake, 2020, p. 266). And again, using Sheldrake's words, "seemingly unchanging entities keep on emerging, both growing and decaying. If we consider them over a long enough time period we don't know when this means flourishing or ceasing altogether to be" (Sheldrake, 2020, p. 267). We were prompted by Nicholson and Dupré's (2018) insight in their edited volume *Everything Flows*, where they note that much of science's hidden dimensions remain underexplored. Engaging with the entanglements of citizen science, we found, can open up forms of learning that stretch beyond conventional scientific frameworks. Nicholson and Dupré's observation offered us fertile ground to reflect on some of citizen science's more ambiguous aspects, particularly its porous boundaries, which tend to be blurred, unstable, and provisional. Framing this ambiguity through the image of the fungal as a (dis)organizing principle allows us to contrast it with the more rigid image of science as a container; two metaphors that diverge significantly in how they conceptualize knowledge, order, and transformation.

3. Why Put Science in a Container?

Regulatory frameworks that deal with synthetic biology in Western countries are typically centered around the notions of "containment" and "release." This leaves little room for the myriad ways in which the impacts of different genetically modified organisms or processes fall somewhere outside of that dichotomy (Sundaram et al., 2023). The impulse for scientists to keep things in a container appears to be strong. We too have been tempted to see the citizen science world as a container with its illusion of stability.

> "…the container doctrine is fundamental to our thinking; it forms the basis of set theory and relational logic. It is very deeply rooted in our human nature: all western languages share it, even ancient ones. To identify an object as a container, we must establish its boundaries as precisely as possible. Where and when does it begin? Where and when does it end? We instinctively crave for clear and rigorous answers to such questions. And yet, the world is full of fuzzy boundaries and unconsidered, perhaps even sometimes imprudent possibilities… Our fixation on static things leads to fallacious patterns of reasoning, within biology and elsewhere, the fallacy of misplaced concreteness" (Nicholson & Dupré, 2018:12)

In the context of citizen science research, this implies that reality is not fixed but emerges from processes. As Peter Simons puts it, things can be understood as the "precipitates" of these ongoing processes (2018: 21):

> "The reproduction of a lichen, for instance, requires the independent reproduction of a fungus and a photosynthetic bacterium or alga, and the subsequent merger of the various offspring with suitable new partners, which are not necessarily of exactly the same kind as their parents, to form new lichens. … Given all this, we should certainly not expect the tracking of entities over time to be a fully determinate matter. This may strike us as a problem, but the truth is that it is only a problem if we already assume that it should be possible to perfectly track entities through time in the first place, in accordance with the essentialist stance generally associated with substance ontology" (2018:42)

Nicholson and Dupré's (2018) ontology of processes proves helpful to reframe new research questions and offer fresh perspectives which help us to understand empirical research that liberates us from the burden of fixed expectations. Sheldrake (2020: 54) captures this sense of "everything flows" in his description of morphological composition made of hyphae by recognizing mycelium as a "polyphony in bodily form" or "streams of embodiment." Similarly, Victoria Jara (in *Mackey and Sendur's Special Issue, Fungal Turn*, 2024: 80) borrows a concept from music to describe a composition that blends simultaneous sounds into a harmonic whole. This form includes a plurality of voices, each with an independent and unmistakable consciousness. Together, they portray diverse ideologies and worldviews which appear as a mosaic of voices. As Tsing illuminated, these can be understood as polyphonic assemblages, as "gatherings of ways of being" (2015: 157), which bring assemblages into overlapping trajectories of world-building (Gan & Tsing, 2018, p. 103). These insights lead us back to Thompson's invocation of the "minor key" and its significance for rethinking care from a citizen science perspective.

Although we critique the image of science as a rigid container, we do not reject the value of rigor or the utility of the scientific method. Rather, our concern lies with the ways in which scientific practices are often decontextualized from the social and political environments in which they unfold. In citizen science, and particularly

within the DSF initiative, we maintain careful protocols for data collection, such as consistent use of water quality testing kits, yet we also acknowledge that scientific rigor is shaped by local realities: access to resources, environmental unpredictability and community involvement. What we advocate is not a dismissal of accuracy, but an integration of scientific methods with an ethics of care that accounts for context, responsiveness, and mutual learning. This allows citizen science to be both methodologically sound and socially embedded. In this way, the fungal metaphor complements rather than contradicts rigor and aims to offer a model of science that is entangled, iterative and grounded in precision as well as participation.

4. Caring in the Minor Key

In the article *Citizen Science as Decolonization*, Goldin and Suransky (2024a) proposed citizen science as a tool to decolonize knowledge and democratize science. By thinking about citizen science in this way, we aimed to open up to the unexpected and for instance, to Harraway's idea of "*staying with the trouble*," the title of Harraway's book (2016). With this in mind, we understand Jara's (2024: 77) presentation of the fungal as a novel mode of imagination and relationality, as an alternative to eurocentric structures of power. Her article helps us to reconsider our own intention to "stay with the trouble" by inviting a shift in perspective. For DSF, this shift suggests moving away from viewing the production and consumption of data as endpoints. Instead, it opens up an invitation to attend to the mycelium, or the minuscular, not as a precursor to some grand event or data set, but as an unfolding process in which the process itself *is* the event. This gaze allows us to contemplate on "everything that we can do to maintain, continue and repair "our world" so that we can live in it as well as possible … interweaving in a complex, life sustaining web" (Tronto, 1993, p. 103). Thus, in caring, or repairing, fungi relationships with other organisms depend on the ability of the fungus to "interpret chemical emissions of others" that "negotiate a series of complex trading relationships" (Sheldrake, 2020, p. 41).

We explicitly situate Joan Tronto as a key feminist scholar whose work informs our conceptualization of citizen science "in the minor key." Our article is grounded in feminist scholarship, particularly Joan Tronto's Ethics of Care, which challenges conventional ethical frameworks by emphasizing relationality, interdependence, and the political dimensions of care. Tronto's concept of *caring-with* (2013), which extends care beyond dyadic relationships to encompass broader social and political structures, offers us a vital lens to understand the unfolding dynamics of the DSF initiative. Through this lens, citizen science is not simply a method of data collection, but a practice of ethical and situated engagement which is attentive to the lived realities and entanglements of marginalized communities. By drawing on Tronto and additional feminist thinkers such as Haraway (2016) and Bozalek and Zembylas (2023), we build on traditions of feminist interventions that critique dominant, masculine models of science and instead prioritize co-creation, responsiveness, and care. The mycelial metaphors we employ, of entanglement, emergence, and subterranean connectivity, echo longstanding feminist commitments to decentralization and epistemic humility. In doing so, we aim to articulate a vision of citizen science that is attentive not only to scientific outcomes, but also to the ethical textures of collaboration, responsibility, and repair.

Our stance, grounded thus in feminist philosophy and shaped by years of participatory action research, has sensitized us to the concepts of co-creation and entanglement. We recognize how grand narratives often overshadow contextual meaning-making and critical engagement—an insight aligned with Jackson et al.'s (2023) critical feminist scholarship. As Jackson et al. observe, our positionality remains "fluid within an ever-evolving social landscape" (2023:1). Our work is deeply informed by decades of feminist critical thinking, participatory practices, and a sustained commitment to an ethics of care. It is also shaped by what we call our "fungi relationships"—shifting patterns of connection, disconnection, and the experience of being "othered" or marginalized within academia. These experiences often stem from our non-traditional research approaches and our emphasis on a politics of care, which frequently challenge the dominant positivist paradigms of science and knowledge production.

As DSF networ(ld)s extend into uncharted geographical terrains, the application of an ethics of care, coupled with fungal imagery, offers a valuable lens to interpret the unexpected murmurs and indeterminate textures that characterize our unfolding DSF journey. We could see that "wonder" and "a-mazement" are both welcoming and chilling in a world where young learners do not have acceptable sanitation or drinking water at school. A world in which human-non-human encounters can be terrifying when a child may be bitten by a crocodile or charged by a hippopotamus when collecting water from the river—as is the reality in Kenya. These possibilities form part of a complex articulation of climate disaster, as an expansive macro-level phenomenon, but one that becomes more

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Figure 1. Boetse Secondary School (Limpopo) learners transition from classroom theory to fieldwork at nearby water body to test for nitrates, phosphates, and turbidity.

accessible and intelligible through its micro-scale manifestations at precise moments which are marked by both enchantment and disenchantment, by pain as well as joy. We find that with her concept of *caring-with*, Tronto (2013) allows us to expand the ethical scope of care beyond relationships between caregivers and care receivers to encompass broader social and political structures within which care is situated. *Caring-with* thus denotes both emotional and practical engagements with others, foregrounds relationality and aligns closely with principles of inclusion (Joorst, 2021).

Within the DSF project, this expanded ethics of care has been enriched through collaborative partnerships that have enabled us, as researchers, to imagine and acknowledge our entanglements with others, both human and non-human, to critically (re)consider our caring practices. We find that these subterranean imaginings challenge dominant patterns of extractive behavior and the impulse to control, inviting alternative ways of relating grounded in mutuality, responsiveness, and interdependence. Elsewhere, we wrote about feelings of joy and curiosity (Goldin, 2015; Goldin & Suransky, 2024) and how these emotions sparked a passion for science in young learners while offering teachers prompts and lived experiences that enrich classroom learning. However, our gaze has since shifted: from the visible moments of excitement to the less perceptible, yet vital, undercurrents of learning. We see that, like mushrooms, which are merely the visible bloom of vast subterranean networks, these experiences are rooted in hidden systems of nourishment, exchange, and unexpected bifurcations. It is within these invisible processes that we started to find deeper meaning.

4.1. DSF in the Limpopo Province, South Africa

In order to contextualize this discussion we will turn to current activities within the Narok County, Kenya while first offering a brief revisit to DSF in the Limpopo province of South Africa.

Since 2019, DSF has been active in Limpopo, and 6 years later, its impact continues to resonate. In 2023, Boetse Secondary School learners (see Figure 1) were part of the extended DSF school program that shifted their learning process from classroom theory to field work at nearby waterbodies to test for nitrates, phosphates, and turbidity.

At Mara Primary School, young learners were delighted to work with educational materials that focused on water literacy (see Figure 2). Teachers observed a surge of enthusiasm and curiosity among the students, as the resources sparked lively discussions and hands-on learning activities. This initiative is part of DSF's broader mission to promote environmental awareness and encourage sustainable water use.

DSF designed, in collaboration with teachers, a water literacy program around basic concepts of the water cycle as well as the notion of upstream/downstream catchment management. Young learners were shown how behavior of

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Figure 2. Limpopo Province: Mara Primary School (left) and Boetse Secondary School (right) receive learning materials.

an upstream water user—in particular pesticide use or pollution of water bodies, affects water users downstream. Water sampling was included in the water literacy "curriculum" and the understanding of whether or not a water body had high concentrates of nitrates, phosphates, or/and turbidity. Through its water literacy program, which has a dimension of learning inside the classroom first and then taking lessons outside the classroom to the water body, DSF is not only nurturing informed, environmentally conscious youth but also fosters a culture of sustainability that has the potential to extend across generations. In the words of one of the principals "we do not have a science lab—now the river is our laboratory."

Young learners watch with fascination how the color change of the test paper from pale pink to dark pink in the presence of nitrates indicates a chemical reaction between the nitrate ions in the water and a reagent embedded in the test paper. Nitrate levels are measured using the Griess reaction, where zinc reduces nitrate (NO_3^-) to nitrite (NO_2^-), followed by a colorimetric detection process, taking about 3 min. Phosphate (PO_4) is detected via a reaction involving 4-amino-antipyrine and a phosphatase enzyme that produces hydrogen peroxide, which then undergoes a colorimetric reaction completed in 5 min. Typically, such test paper contains the compound that reacts with nitrate ions to form a colored complex. The intensity of the pink color correlates with the concentration of nitrates, darker pink indicating a higher concentration. By learning that nitrates are common in agricultural runoff and can contaminate drinking water, affecting both human health and aquatic ecosystems, young learners add to their knowledge on water literacy. Learning about this introduces environmental science in a tangible way as watching a color change makes abstract chemical concepts more concrete and memorable, especially for visual learners. As the learners interpret the color changes, linking them to invisible substances (such as nitrates and phosphates), scientific reasoning and critical thinking are encouraged.

By equipping both learners and educators, DSF aims to create a collaborative model that supports long-term behavioral change. DSF's continued presence in the Limpopo serves as an example of how targeted educational initiatives can make a meaningful difference in rural communities.

When the primary school reopened in January 2025 after the summer break, local citizen scientist Catherine Basson observed:

> "*Amazing how the kids answered. So enthusiastic. All Diamond related questions. I felt so proud of Diamonds … I see DSF really making a difference in schools and the community. Teachers also said that the kids are so much better and enthusiastic about science. I think that we are busy building scientists for the future*" (interview extract March, 2025)

In the extract below, we note that DSF, in breaking down the walls of the container, recognizes the blurred and fuzzy boundaries that arise when working in rural communities, where diverse aspects of life are deeply entangled, again as noted by Catherine Basson:

> "*…It is helping me a lot that I am with the police forum and that I wear a police jacket on top of my Diamonds T-shirt—I am not just one thing, I am many things here. Because today the topic isn't just about water but today it is about bullying and human trafficking. Young kids at school are being paid for sex. We are giving pamphlets now to school children. The Community Police Forum (CPF) didn't have access to schools but now, through DSF, they are here inside the schools and telling young girls and boys that being paid for sex is bad*" (interview extract, March, 2025)

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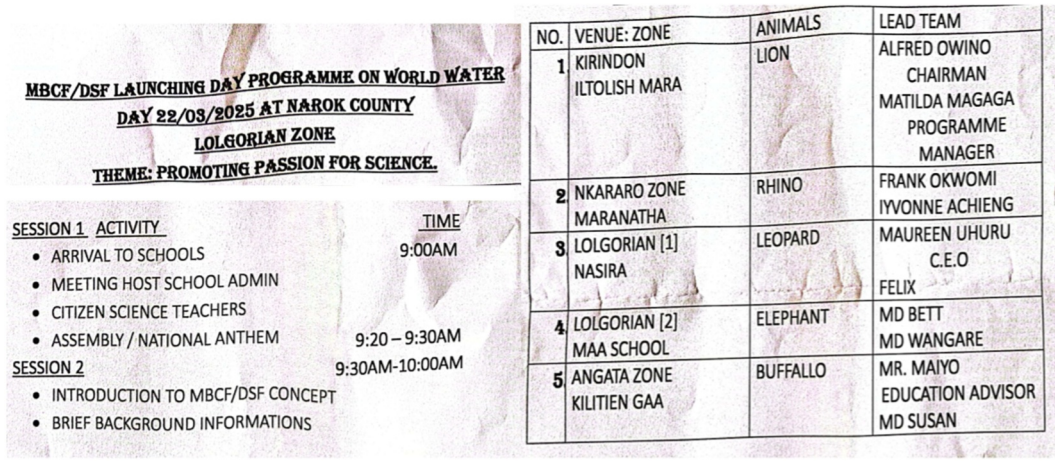

MBCF/DSF LAUNCHING DAY PROGRAMME ON WORLD WATER DAY 22/03/2025 AT NAROK COUNTY LOLGORIAN ZONE

THEME: PROMOTING PASSION FOR SCIENCE.

SESSION 1 ACTIVITY	TIME
• ARRIVAL TO SCHOOLS	9:00AM
• MEETING HOST SCHOOL ADMIN	
• CITIZEN SCIENCE TEACHERS	
• ASSEMBLY / NATIONAL ANTHEM	9:20 – 9:30AM
SESSION 2	9:30AM-10:00AM
• INTRODUCTION TO MBCF/DSF CONCEPT	
• BRIEF BACKGROUND INFORMATIONS	

NO.	VENUE: ZONE	ANIMALS	LEAD TEAM
1	KIRINDON ILTOLISH MARA	LION	ALFRED OWINO CHAIRMAN MATILDA MAGAGA PROGRAMME MANAGER
2	NKARARO ZONE MARANATHA	RHINO	FRANK OKWOMI IYVONNE ACHIENG
3	LOLGORIAN [1] NASIRA	LEOPARD	MAUREEN UHURU C.E.O FELIX
4	LOLGORIAN [2] MAA SCHOOL	ELEPHANT	MD BETT MD WANGARE
5	ANGATA ZONE KILITIEN GAA	BUFFALLO	MR. MAIYO EDUCATION ADVISOR MD SUSAN

Figure 3. Schools divided into zones for World Water Day activities.

The extract above bears witness to a surprising relationship between a police forum and DSF, which prompts us to reflect on the mycelial networ(l)ds at play, those sprawling, entangled systems of connection. This is also in line with the Care and Support for Teaching Learning (CSTL) Program, a Southern African Development Community (SADC) initiative that was adopted by Education Ministers in 2008. The goal of the CSTL Programme is to realize the educational rights of all children, including those who are most vulnerable, through schools becoming inclusive centers of learning, care, and support (see also Goldin & Suransky, 2024. Pedagogy with a heartbeat: the transformative potential of citizen science in education).

When one mycelial strand touches another, the landscape begins to shift (see also Figure 12). These moments of contact, which are often surprising, can alter trajectories, open new pathways and fundamentally transform terrains of engagement. Another expression of these underground, unpredictable outcomes is captured in the following extract from a conversation with citizen scientist Brendan Basson:

> "*You know, now, we have this vegetable garden in Mara Primary. And we now have mini-ambassadors. That wasn't planned when we started the project. And our learners went to the snake park to learn about snakes. They were so scared of snakes and just wanted to kill them all but now they know some snakes are not going to bite them—and they also know which snakes may be dangerous, so it is good. I say that DSF is not only about water. Our mini ambassadors know a lot about where they live*" (interview extract, March, 2025).

5. Entangled Worlds: Reflections on DSF in Narok County, Kenya

For the launch of DSF in Kenya, in March 2025, twenty schools in the Narok County were grouped into five zones (see Figure 3), each represented by an animal: the lion, rhino, leopard, elephant, and buffalo. The principal of each school identified with the trait of a particular animal. The animals were carefully selected for their symbolic resonance, embodying traits such as strength, focus, speed, resilience, and character. Although the zones were differentiated in this way, the twenty schools valued the symbolic attributes of all five animals. The use of these animal symbols serves a dual purpose: to reflect the values that citizen science seeks to cultivate in learners and to inspire a deep-rooted passion for science through locally meaningful imagery. By linking animal characteristics to educational zones, the initiative is better able to foster scientific curiosity and cultural relevance.

As the DSF initiative was rolled out in the Narok County, it again revealed how citizen science can unfold as a vibrant and relational process of environmental stewardship, cultural engagement, and community transformation. What emerges from the voices of those who are involved: students, educators and community leaders, is not only a growing scientific literacy but also a profound entanglement of care, creativity, and commitment to place.

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Figure 4. Nasira Primary School, Lologorian Zone on World Water Day, 22 March 2025.

As June Bartuin from the Endorois Indigenous Community, Kenya, shared:

> "*I am interested to join DSF_Goes_Global because it is an impactful project that has global ideas meant for local solutions and as a practical and simplified science that bring out local climate change solutions toward water, art and education fostering community of practice. DSF_Goes_Global is one of the initiatives that will break barriers by helping indigenous communities in Kenya understand the link between science and climate change… am inspired by DSF's commitment to environmental stewardship and its innovative use of art to engage with indigenous communities. This initiative resonates with my passion for sustainability and my belief in the power of creative expression to drive change*" *(Extract, June Bartuin, Endorois Indigenous Community of Kenya, March, 2025).*

June Bartuin's reflection underscores the project's deeper significance: it is not merely about measuring water quality or teaching science. Rather, it is about reimagining how indigenous communities can encounter science on their own terms, through the lenses of art, cultural expression, and environmental ethics. This observation echoes Skarlatidou et al.'s (2024) emphasis on trust-building in citizen science, where authentic, value-transparent conversations become the fertile ground for meaningful engagement. We thus aim to create a pedagogy of connection, one that links ecology, identity and imagination. Beth Magaga, in the Narok County, who heads the Yemini Organization captures this spirit:

> "*We are teaching the kids how to clean water, how to make soap and also how to plant trees. Learning is home to school and school to home. for DSF we shall sing and we shall dance, we shall make music with the child*." (inteview extract, Beth Magaga, Yemini Organization, Hamisi in the Vihiga County, March 2025)

Engaging young learners in activities such as tree planting, soap making, and river clean-up efforts holds significant academic and pedagogical value, particularly when these activities are integrated into a core learning experience centered around water quality monitoring, representing a holistic, experiential approach to environmental education. This pedagogical strategy aligns with constructivist learning theories, which posit that learners construct knowledge most effectively through meaningful, real-world experiences. Integrating tree planting, soap making, and river cleaning with water quality monitoring provides a rich experiential learning ecosystem. It enables learners to grasp the complexity of environmental systems, practice scientific inquiry, engage with their community, and internalize the values of sustainability and stewardship. This pedagogical model not only enhances learning outcomes but also cultivates informed, empowered, and environmentally literate citizens.

Here, science is not abstract or distanced; it is embodied, joyful, and relational. As seen at Nasira Primary School during World Water Day celebrations (Figure 4), learning is not confined to the classroom. Rather, it flows from

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Figure 5. Narok County, Kenya. Kilitien School in Ang'ata zone showing elephant skull and buffalo horns.

home to school and back again. The children's expressions of pride and curiosity reflect how science can become a source of enchantment when rooted in lived experience.

At Kilitien School in the Ang'ata zone, the physical presence of elephant skull replicas and buffalo horns (see Figure 5) acts as a visual mnemonic which links the present-day learning environment to the deep ecological and cultural histories of the Great Rift Valley. This landscape, one of the world's most biodiverse, becomes not just a backdrop but an active participant in the educational process. Conservation, here, is not taught as an abstract duty but as remembering of what is already known, already cherished.

The reflections of Enock Kiminta, Executive Director of *KeNAWRUA*, *Kenya National Association of Water Resources Users Association*, affirm the initiative's power to foster local ownership:

> *"What stands out to me about DSF is its commitment to community-driven initiatives that empower individuals and foster collaboration. MBCF's proactive approach in integrating DSF principles into its initiatives not only amplifies these efforts but also creates a sustainable impact in the communities we serve" (interview extract, Enock Kiminta, Executive Director, KeNAWRUA)*

MBCF staff and teachers (see Figure 6) received training from KeNAWRUA on how to collect water samples using the freshwater quality monitoring kit. As a key actor in water quality monitoring across Kenya, KeNAWRUA brings valuable expertise to the initiative. The insights of its Executive Director underscore how DSF not only aligns with but actively contributes to broader national efforts in citizen-led environmental monitoring.

> "*The roads are really bad. I was so pleased that MBCF still came to my school—they came despite the road conditions. If one school finds a solution, others will follow. DSF is already creating change in the community. It's beginning. It takes time and passion, but that's what makes things move more easily.*" (interview extract, Headmaster, Kilitien School, Narok County, March 2025)

This reflection points to the persistence and dedication which is required to make community-based science education work in contexts such as the Narok County. The region's geographical and social landscape presents formidable challenges. Communities are dispersed across vast areas, often connected by unpaved or severely deteriorated roads. During the rainy season, these roads become treacherous, rendering travel slow and unsafe. Many schools are located kilometers apart (see Figure 7), which forces students and teachers to walk long

Figure 6. Teachers, MBCF staff (Mathilda Mgaga on left and Alfred Owino on right in white t-shirts) and children from Mailolong and Ololoonkolin schools in the Kirindoni Zone, Narok County, World Water Day, 22 March 2025.

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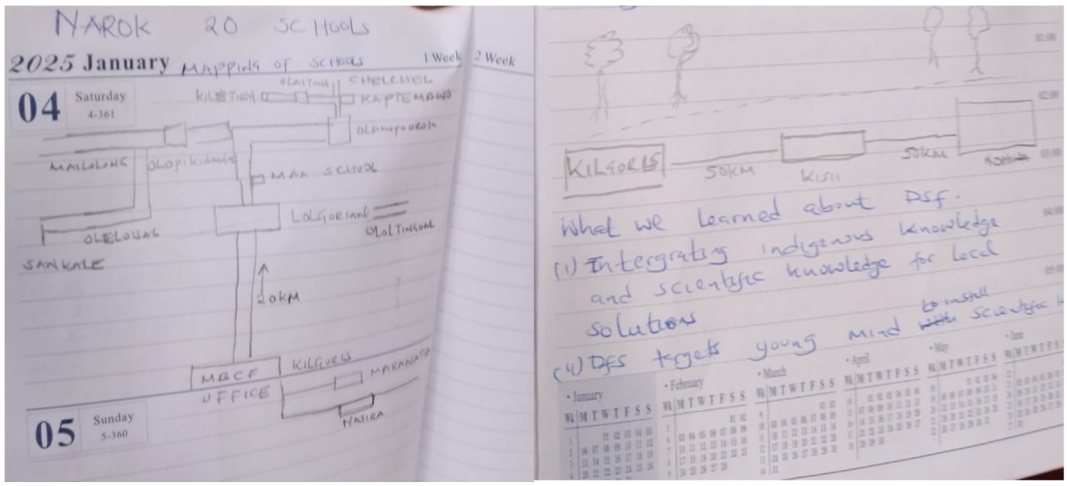

Figure 7. Indicting distances between some of the targeted schools.

distances or to depend on unreliable transport. These obstacles are not merely infrastructural. In some areas, students must also navigate natural hazards, including wildlife encounters with elephants, hippopotami, snakes, or big cats. These risks, which are compounded by long travel times, poor road conditions, deteriorating infrastructure, contribute to irregular school attendance, dropout rates and unequal access to education, particularly for younger children and girls.

Yet, it is precisely within these challenging conditions that DSF finds its strength: by fostering local ownership, building trust and offering flexible, embodied forms of learning that travel alongside the people: on foot, across rivers, through forests. DSF meets communities where they are, not just geographically but also culturally and relationally planting seeds of scientific curiosity in remote rural classrooms.

6. Citizen Science in Context: A Big Tree With Golden Fruit

Unpacking what citizen science means to young learners in Kenya reflects a dynamic interplay between the aims of DSF and the foundational principles of Kenya's Competency-Based Curriculum (CBC). DSF's hands-on, community-rooted approach cultivates key competencies embedded in the CBC, such as problem-solving, critical thinking, communication, collaboration, self-efficacy, and lifelong learning. When learners themselves articulate what citizen science means to them, they highlight a complementary set of qualities: skills development, creativity, teamwork, cooperation, positive attitudes, knowledge, and values (see Figure 8). These reflections suggest that citizen science is more than a method for scientific inquiry, but rather it emerges as a transformative educational experience.

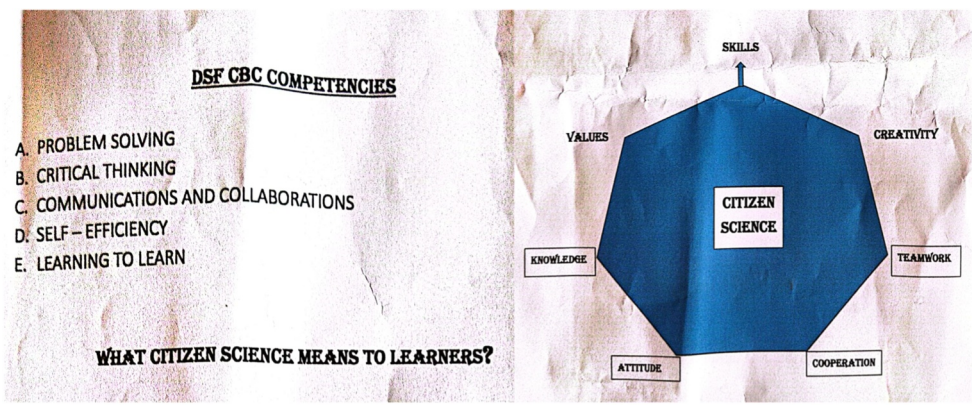

Figure 8. What citizen science means to learners.

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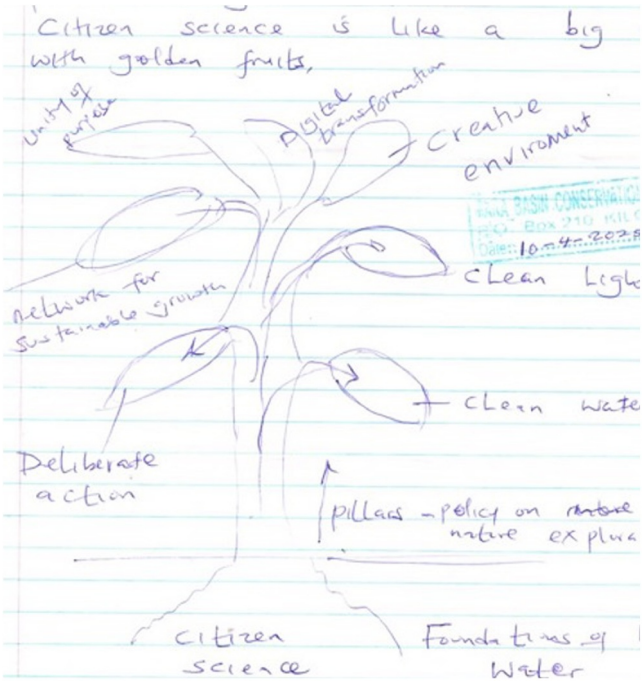

Figure 9. A big tree with golden fruit.

By engaging both cognitive and socioemotional domains, DSF helps to prepare learners to navigate the complexities of real-world challenges. It fosters a sense of agency and interdependence and encourages young people to see themselves not only as students of science but also as contributors to their communities and stewards of the environment.

Citizen science is described by the Chairperson of MBCF as "a big tree with golden fruit" (Figure 9). It encourages deliberate action, has the potential to inform policy, raises awareness about water quality and nurtures digital skills and scientific literacy. Expressions such as "you are really making little scientists here" or "I didn't know what a nitrate is, but now I know and I want to become a scientist" are reflections of scientific literacy.

7. Staying With the Trouble

Moving beyond the metaphor of the container invites us into the unpredictable spaces of entangled encounters, that is, moments that provoke both connection and discomfort. The school images above, along with those below, become visual and emotional sites of such entanglements, in other words: places where educational, emotional, and political realities collide in unexpected ways.

At Mailolong Primary School in the Kirindoni Zone, and at Oloshur and Nasira Primary Schools, the photographs of seemingly ordinary classrooms and toilets challenge us to "stay with the trouble." These schools are not neutral spaces, rather they are layered with histories of marginalization, infrastructural neglect and community resilience. They resist tidy narratives and urge us to remain with the discomfort, the messiness and the unresolved tensions they evoke.

Such encounters, which are often emotionally charged and ethically complex, also compel us to reflect on our own positionalities as academics. In educational and development contexts especially, we are called to engage not from a place of knowing, but from a place of attentiveness. As we wrote elsewhere (Goldin & Suransky, 2024), this observation resonates with Bozalek and Pease's (2020) concept of *privileged irresponsibility* and their call to foster *response-ability*. Response-ability is not a prescriptive response but an ethical posture: a willingness to be present with what emerges, especially when it unsettles our expectations or challenges our assumptions. It demands a relational engagement grounded in care. Here we ask not "What should we do?" but "How can we respond *with* care?"

As Skarlatidou et al. (2024) remind us, trust-building is shaped by a constellation of internal and external factors, often deeply embedded in specific local contexts. In this light, the visual and experiential narratives of these schools become more than documentation. Rather they are invitations to think and feel differently. They urge us to resist the impulse to fix, explain away or simplify, but instead to cultivate the capacity to remain present with the troubling complexity of it all.

This is the generative tension between disquiet and enchantment. Although enchantment is often framed as a positive, even uplifting force, it is not always a comfortable one. As Herman (2015) explains, "enchantment, commonly used as a catch all term for a variety of different embodied and emotional engagements, can be seen as a powerful way to connect individuals and places. Enchantment is also inherently unsettling and provokes feelings of vulnerability, disquiet and even anger" (2015:22).

> *Kids need toilets, laboratories in most schools are missing, don't have facilities. And when there is water we must know is the water clean, can it cause diseases. Children drink where the cows are* (extract Alfred Owino, Chairperson, MBCF)

The list of 20 schools below (see Table 1 below), confirms the poverty of classroom facilities, water source, and toilets as does the extract that follows this table:

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Table 1
Narok County 20 Schools Showing Location, and Infrastructure Needs

Name of school	Location	Poor water source	Need classrooms	Need latrines
Nasira Nkujit Primary	Along Lolgorian Road	Yes	Yes	Yes
Chelchel Primary	Chelchel Village	Yes	Yes	Yes
Kaptembwo Primary	Kaptembwo Village	Yes	Yes	Yes
Kilietien Gaa	Kilieteng Village	Yes	Yes	Yes
Maranatha Faith	Nkararo Village	Yes	Yes	Yes
Olaitong Primary	Olaitong Village	Yes	Yes	Yes
Olesoilal Primary	Olesoilal Market	Yes	Yes	Yes
Olooltingual Primary	Olooltingual Village	Yes	Yes	Yes
Sankale Primary	Sankale Village	Yes	Yes	Yes
Enkiwancha Primary	Enkiwancha Village	Yes	Yes	Yes
ACK Primary	Kilgoris ACK Faith	Yes	Yes	Yes
Iltolish Mara Primary	Iltolish Village	Yes	Yes	Yes
Kabusa Primary	Kabusa Village	Yes	Yes	Yes
Ereko Primary	Ereko Village	Yes	Yes	Yes
Maa Lolgorian Academy	Lolgorian	Yes	Yes	Yes
Mailolong Primary	Mailolong Village	Yes	Yes	Yes
Oloonkolin Primary	Oloonkolin Village	Yes	Yes	Yes
Oloosinoni Primary	Oloosinoni Village	Yes	Yes	Yes
Olopikidongoe Primary	Olopikidongoe Village	Yes	Yes	Yes
Oloshur Primary	Oloshur Village	Yes	Yes	Yes

> *"60%–70% of government schools here in Kenya struggle, learners are supposed to do hands on but the small fund the government gives every year is a drop in the ocean. We have 100 learners in one class but we are supposed to have 45. Here we have a Curriculum Competence Based Curriculum but you know there are no labs in our school, so the river becomes the lab. These are our science lessons. But the river is also a dangerous lab because there are crocadile and hippos—last week when we launched DSF in our school on World Water Day a man was killed by a crocodile" (interview extract: Headmaster School, March, 2025)*

To stay with the trouble is to acknowledge this disjuncture, where enchantment and discomfort co-exist, and to allow ourselves to be shaped by it. It is here, in this space of affective ambiguity, that new forms of learning, relating, and responding might begin to take root.

8. Care Ethics, Place, and Citizen Science

Caring-with is both an emotional and practical orientation toward others. It is an inherently relational act, which is conceptually tied to inclusion (Joorst, 2021). Tronto's (2013) expansion of care ethics introduces this concept to encompass not just the immediate interactions between caregivers and recipients, but rather within the wider socio-political context in which care unfolds. In DSF, this ethic has taken root through partnerships that compel us, as researchers, to imagine and acknowledge our entanglements with other bodies, both human and more-than-human and to (re)consider our own practices of care. Our engagements with the subterranean, both material and metaphorical, disrupt habitual patterns of consumption and control, and instead evoke a relational and receptive ethic.

Immersive citizen science (Day et al., 2022; McKinley et al., 2024) has opened spaces for these shifts. The wonder it evokes is often implicit, woven through ordinary practices of observing, listening, touching and responding. As

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Thompson noted in his keynote address "*it is the ordinary*, *fleeting practices that weave*, *break*, *dislocate—miss these interactions and we fail to foster the resource that sustains life*." The first phase in Tronto's feminist ethics of care, which is attentiveness, is precisely about this capacity to notice: to recognize needs and to attend to what is often unseen or unspoken. In the DSF context, this means paying close attention to places and people who have been rendered invisible by systems of neglect or abstraction. The underground, conceived here as both physical terrain and metaphor, thus becomes a site to rethink the aesthetics and ethics of care. Mycelial networ(l)ds offer a relational ontology that prompts us to dwell with the minor, minuscular, and hidden. Through this fungal lens, care is not a grand event but an unfolding entanglement, a co-flourishing within messy and overlapping relational fields.

Mapping, often a tool of colonial erasure and spatial control (Mathers & Kruger, 2008), is re-encountered in DSF not as domination but as re-inscription. Immersive citizen science resists the colonial impulse to name and claim. Instead, it affirms place as alive with social ecologies: fluid, reciprocal and resistant. Eitzel et al. (2021) remind us that decolonization is not a completed project but rather a continuous one, precisely because colonialism persists in multiple forms (Mbembe, 2020; Ndlovu-Gatsheni, 2023). For Ryan et al. (2023), place and partnership are entangled: the material and moral textures of place reshape how we come to act, think, and relate. The place is not passive but recalibrates responsibility.

We locate these concluding reflections within a broader framework of care ethics as outlined by Bozalek and Zembylas (2023), where attentiveness leads not just to action, but to action that is contextually and ethically aligned. As Ryan et al. (2023) note, place is more than a backdrop; it is an assemblage of human and more-than-human, memory and materiality, affect and action. Ethics of place extends our obligations beyond other humans, encompasses non-human entities as well as the material world and challenges us to think and act beyond anthropocentric frames.

Decolonial research, as Denscombe (2024) argues, is not only about understanding the world, but about using that understanding for transformation. It is not about extracting data, but participating in slow, deep and relational change. This philosophy which fits well with citizen science embraces entangled existence and the "a-maze-ment"—a term that gestures toward wonder, but also disorientation and discomfort—that such entanglement provokes. As seen in the images, a-mazement is also about accepting that discomfort. Tesar et al. (2021) advocate for a pedagogy of unease: one that welcomes uncertainty and does not seek closure. This aligns with an ethic that resists the logic, or rather profoundly illogical, aspects of coloniality and sits with its illogic, its ruptures and residues.

Living these ethics is not easy. Drawing attention to place-based concerns (Ryan et al., 2023) requires more than awareness; it demands recognition: of other actors, other ways of knowing and being. Tronto's (1993) classic definition of care—"everything that we do to maintain, continue and repair "our world" so that we can live in it as well as possible"—grounds this ethic in ongoing, messy, collective labor. At its most radical, a place-based ethics of care weaves together custodianship and enchantment (Ryan et al., 2023) and so turns memories of displaced places into resources for activism and preservation. Feminist care ethics have long questioned the masculine abstraction of dominant ethical frameworks. They emphasize relationality, locality and interdependence over detached rationality. What emerges is an ethics that is attuned to context and grounded in connection; a mode of care that dwells in the minor key.

9. The Fungal Turn and Its Implications for Citizen Science

The sudden emergence of the mushroom, which happens brief, ephemeral, and wondrous, is a visible expression of complex, subterranean processes (Sheldrake, 2020). It reminds us that life is not a fixed state but an unfolding process. In this sense, mushrooms offer more than a biological metaphor; they become a lens to reimagine ecological entanglement and the often-invisible networks that shape our understanding of science, learning, and care. They help us conceptualize our own "forests and fungi," namely the tangled, confusing formations of our entangled selves.

This fungal sensibility is well articulated in the work of Sheldrake (2020), Tsing (2015, 2017), O'Brien (2018), Jara (2024), Ingold (2017), and echoed in Thompson's keynote, and it has encouraged us to rethink our foundational assumptions. We started wondering: what kind of scientific and cultural knowledge might emerge if we

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began not from the container or the bounded object, but from the fibrous, leaking, relational entanglements of the underground? As Thompson at the Care Ethics Research Consortium Conference in the Netherlands in January 2025 emphasizes, this is not a rejection of the overground, but an invitation to look beneath it, to notice what sustains life beneath the surface.

This ethos is embodied in what unfolds at the participating schools in the Narok County. The small moments, such as a dip-meter which is submerged into a rural well or a child marveling at a nitrate test as the solution shifts from pink to purple, are not trivial. They are precipitates of a mycelial pedagogy, traveling across contexts, never contained, but always entangled and generative. To be attentive, as Bozalek and Zembylas (2023) remind us, is to bracket our assumptions, our need to control, and instead remain present to the immediacy and intensities of the moment. This attentiveness aligns citizen science with broader frameworks of responsible research and innovation (Tauginienė et al., 2025), which is grounded in responsiveness to societal needs and structural injustices. Such responsiveness is not neutral. It implicates us. It asks not only *what* we are doing, but *how* and *with whom*, and whether our engagement deepens connection or reproduces extractive logics.

This leads to urgent and uncomfortable questions: How does citizen science implicate us as researchers? What are our response-abilities in contexts that are shaped by inequality, precarity and histories of erasure? What would it mean to cultivate not privileged irresponsibility, but situated, accountable engagement? As Sardo et al. (2025) note, participatory research humanizes the researcher thereby revealing entanglements we might otherwise deny. Response-ability, in this sense, is not about resolution, rather it is about being willing to enter messiness, to negotiate compromise between scientific aims and the lived realities of participants.

What if, following Ingold's provocation, we took mycelium as our model for being and knowing? It would mean that biology and sociology (for instance) would look radically different. Instead of imagining individuals as bounded, autonomous units, we would begin with lines, with leakages, with crossings. We would see the social not as a network of nodes, but as living, breathing fields of entanglements. Citizen science, particularly when practiced outdoors and in place-based contexts, echoes this model. Rooted in specific environments and shaped by local histories and cultures (Eitzel et al., 2021; Ryan et al., 2023), these practices are most powerful when they become personal and affective; when they move from observation to embodiment. The more sensorial and situated the experience becomes, the more the voices within those places are amplified. Place, such as fungi, is not fixed. It seeps. It resists being pinned to coordinates. It manifests as a zone of entanglement, of movement and meaning (Haywood et al., 2024).

And so, perhaps the very idea of a "model" misleads us. Looking through a fungal lens, models collapse into containers, rigid and closed. We are not seeking templates but attend to textures. DSF is not replicable in the traditional sense, it is fungal. It spreads by contact, by affinity, by relational nourishment.

In closing, we return to the idea of *networ(ld)s*, with which we mean the mesh of relations that stretch in all directions, neither linear nor hierarchical. Tim Ingold, who draws inspiration from his father, a mycologist, once described the "mycelial person" a human not as a bounded self but as a mesh of lines. Anthropology, he proposed, is a fungal science, that is a study of the lines that form people and places and their mutual, unfolding co-constitution.

This is what citizen science becomes when approached in the minor key: not a tool for data collection, but a practice of co-becoming which is relational, responsive, and alive.

10. Concluding Reflections: In the Minor Key

Once we took citizen science out of the container, we began to inhabit a space where encounters became unpredictable, often uncomfortable and occasionally deeply troubling. By resisting the impulse to command, to classify and to control and by resting instead in the *minor key*, meaning in the unfolding process rather than the singular event, we allowed ourselves to become entangled. In such space, disenchantment becomes not a failure but a form of ethical sensitivity: a willingness to experience vulnerability, discomfort, and at times (for instance provoked by Figures 10 and 11), anger.

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Figure 10. Classrooms in Oloshur and Mailolong Primary School in Kirindoni Zone.

If we are sincere in our commitment to recognize the needs of participants, then we must remain open, not passively, but actively, to the tensions and contradictions that arise. This openness is not neutrality; it includes deliberate and ethical acts of adaptation. It demands that we hold space for surprise, for disruption and for change, especially when such changes unsettle the familiar frameworks we have come to rely on.

In this light, the gathering of data is not merely an act of measurement. It becomes a conversation. In DSF, the images presented reflect the lived textures of school communities, sketching their aspirations, struggles and resilience. It becomes the foundation not of a top-down intervention, but of an unpredictable and co-created process. It reminds us that behind every data set is a human story, a relationship, a place. Moreover, in doing so, it reclaims the deeper purpose of open science: not just to generate knowledge, but to empower and transform.

As researchers, we often ask ourselves how to make citizen science sustainable. But perhaps this question needs to be inverted. Rather than asking how citizen science might be sustained, we ask: *How does citizen science sustain us?* How can it contribute to more just, attentive and ecologically grounded ways of being in the world? How does it offer pathways, and not toward a perfected system, but toward entangled, caring, and responsible relationships?

Figure 11. Nasira Primary on left showing toilets for 250 learners and Oloshur Primary on right.

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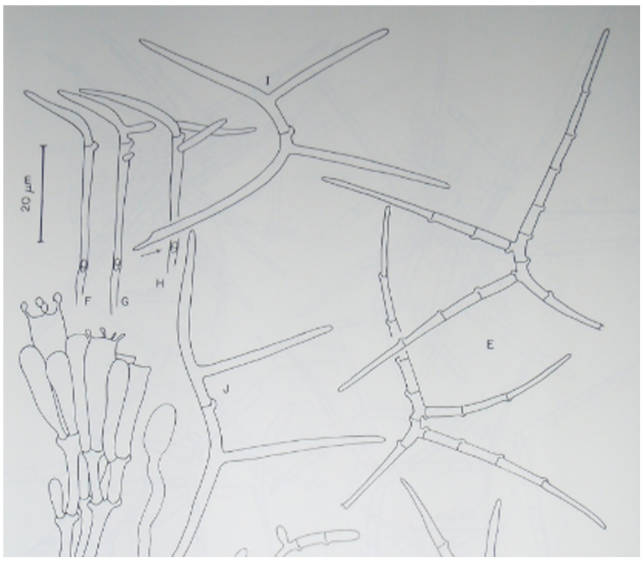

Figure 12. The drawing of conidia of the fungus Ingoldiella fibulata named after Ingold's father.

In his opening remarks at the Ethics of Care Conference, James Thompson invited us to dwell with the unpredictable. DSF, as it continues to take shape on a global stage, echoes what has come to be known as the fungal turn. It is a slow, uneven unfolding process which is marked by rupture and repair, growth and decay, strength and fragility. Similar to mycelium, DSF links, stretches and occasionally breaks, and so reflects the very nature of care as a practice that is adaptive, relational, and deeply embedded in contexts.

Citizen science offers alternatives to traditional science and new ways to avoid falling into the trap of simply extracting scientific data. Being attentive to the minuscular encourages the pursuit of a different science, one that is attentive to the embodied reality of the everyday. Perhaps, in revising our ideas around science, it is also time to revise our understanding of care. It is not simply the transformation of our world so that *we* may live in it more comfortably, but the sustained attention to the worlds that *others* inhabit. As Tronto and Fisher (1990) asked, if we do not seek to fix what has been broken, *then what?* We allow a-mazement, a wonder that is also disorientation that embraces complexity without the compulsion to resolve it. In this mode, citizen science becomes more than method. It becomes a way to dwell, it is tentative, open and minor, and a means to cultivate care in a world that desperately needs it.

Conflict of Interest

The authors declare no conflicts of interest relevant to this study.

Data Availability Statement

Data were not used, nor created for this research.

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