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## EDITED BY

Michael J. Liles,  
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United States  
Richard William Stoffle,  
University of Arizona, United States

## \*CORRESPONDENCE

Rachel M. Cohn  
✉ rachelcohn@uri.edu

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# Carrier bag storytelling with coastal Kenyan families: sharing food, illustrations, and knowledge for tangible environmental justice impacts

Rachel M. Cohn<sup>1\*</sup>, Ruth Mbeyu<sup>2</sup>, Catherine Sarange<sup>2</sup>, Francis Mboghohi<sup>2</sup>, Christopher Cheupe<sup>3</sup>, Joaquim Cheupe<sup>3</sup>, Andrew Wamukota<sup>3</sup>, Elizabeth Kamau<sup>2</sup> and Melva Treviño<sup>4</sup>

<sup>1</sup>Department of Marine Affairs, University of Rhode Island, Kingston, RI, United States, <sup>2</sup>Department of Human Nutrition, Egerton University, Nakuru, Kenya, <sup>3</sup>Department of Environmental Sciences, Pwani University, Kilifi, Kenya, <sup>4</sup>Department of Fisheries, Animal, and Veterinary Sciences, University of Rhode Island, Kingston, RI, United States

The small-scale fisheries food system, in which individuals achieve food security independently or in small groups through fishing livelihoods and/or subsistence activities, provides food sovereignty for millions globally. However, this arrangement has inequitable engagement due to strictly enforced gendered roles in many communities, including coastal Kenya. Recently, critics across environmental research disciplines have called for social justice in science through anticolonial, feminist methodologies and interdisciplinary praxis. This resistance may take form through the “carrier bag” ability of fiction: an allusion to Le Guin’s visionary analysis of containers as the first cultural device and evidence of the power of a story or personal sovereignty to tell one’s story. Drawing from creative, service-driven methodologies emerging from collaboration among international research team members and Indigenous research participants, this project uses the “carrier bag” framework to support local environmental justice and food sovereignty goals through a science storybook resource created and shared with fishing families in Kilifi County, Kenya. We investigate how stories shape interpersonal relations in the context of this collaboration and how health knowledge, environmental science, and representational imagery can be tools for justice by examining the connections between social identity, family values, and social-ecological change in this food system. Having a deeper understanding of the experiences, changing ecosystems, and research feedback of these families allows this work to support fisheries management and nutrition interventions in Kenya and communities elsewhere.

## KEYWORDS

environmental justice (EJ), Kenya, subsistence fisheries, food sovereignty, science communication

## Introduction

Uniformly prescriptive ideals of how communities or states should develop and become “adapted,” “sustainable,” or “resilient” to Anthropocene climate chaos color our imaginaries and discourses of possibility within and outside of the scientific academy. While most top-down food system action (including government funded research) resides within this

reiterative realm of positivist possibility, Indigenous, feminist, and non-Western ways of knowing and being persist alongside the central dialogue despite the pressures of the current system to exclude a plurality of adaptation visions. The reductionist process of change-making within academic scholarship no longer serves our current climate crises, so discussions of a radical adaptation otherwise must be brought to the forefront of theory and practice (Haraway, 2016; Leeuw and Hawkins, 2017; Escobar, 2018; Haverkamp, 2021; Liboiron, 2021). Recent scientific publications of anticolonial methodologies reference feminist scholar Susan Leigh Star in their work on *otherwise* and alterlives in science, to emphasize that there have been “other definitions of and relations to” pollution (Liboiron, 2021), but also of science, knowledge, or fisheries. There is a slowly emerging understanding of the need for multiple methodologies and praxes of resistance into a pluriversal process of becoming with and through multiple ontologies and epistemologies (Escobar, 2018). Otherwise is limitless in its application. It can always still be otherwise, and if we are putting our work out into the world in this era, we have a responsibility—an ethics of care according to our abilities and positionality (Kenney, 2019)—to engage with these speculative futures.

This paper enacts a speculative future by retelling a social-environmental science communication methodology through a rhetorical research narrative in four parts. Initially, we detail the background of the food security research collaboration and various positionalities of authors within the group, as well as the relationships and spaces the project inhabits in the Kenyan development and food security spatialities. These histories do not exist without a critical reading of capacity building and stakeholder education research as potential neo-colonial tools that may result in deficit-based relations. To engage with what might be otherwise, we cite literature on the benefits and anticolonial opportunities associated with the food sovereignty movements and extend that framework to highlight knowledge sovereignty as a transformational pedagogical tool of collaboration and creation. This ethical framework resulted in the creation of a carrier bag creative communication methodology to illustrate food sovereignty through a children’s storybook resource, which we describe the collaborative creation process behind. Finally, we discuss our continued engagement with otherwise in the context of this project, discuss impact and areas for improvement of our anticolonial collaboration, and call others toward work that engages with multiple more livable futures alongside this methodology.

## Background

### Casting our net: learning communities brought together with family and fish

To understand the relevance of these speculative methodologies, we must first situate ourselves alongside the historical catalyst of this particular otherwise: an international food security research collaboration of scholars, nutritionists, fisheries scientists, fishers, and families. Coastal Kenyan families are often directly dependent on small-scale fisheries-based livelihoods to achieve food security, yet as is the case with populations who engage in small-scale food production in general,

are still disproportionately affected by poverty and malnutrition (Béné et al., 2016). In part for this reason, the United States Agency for International Development (USAID) has recently funded numerous sustainable development studies in the area to investigate childhood fish consumption and fisheries sustainability (Cartmill et al., 2022). The “Samaki Salama” (“secure fish” in Swahili) project, investigated the impacts of a nutrition social marketing campaign and fishing gear incentive intervention on fisheries productivity, dietary diversity, and child growth among subsistence fishing families in coastal Kenya (Blackmore et al., 2022). As an intervention strategy, sustainable fishing gear alongside fisheries and nutrition “social marketing” (education campaigns with cooking demonstration sessions and training) have potential to address local food security. In 2022, this project was developed as a complementary research collaboration with the same 400 fishing families in Kilifi County, Kenya.

## Legacy of top-down development

There is a legacy of settler colonialism in present day scientific research and development fields. In the colonial (often subconscious) worldview, land, creatures, and data are seen as resources to possess. Land is not just the physical space and material existence of a place but rather the relations between that material world and the semiotic/social/spiritual world(s) of “histories, spirits, events, kinships, accountabilities, and other people that aren’t human” (Liboiron, 2021). Land does not exist without these relations, and to ignore them for capitalist development, scientific appropriation, or imperialist education is to deny Indigenous autonomy. Academic enfoldment of Native people into the research process can actively dispossess Indigenous communities of their autonomy and identity, in a way that even the stated anti-racial goals of many fields may resist anti- and decolonial action (Reardon and TallBear, 2012; Mignolo and Walsh, 2018). Scientific colonialism can occur stealthily through lessons and messages under the guise of “sharing knowledge,” “stakeholder education,” or “capacity building,” when it displaces traditional local knowledge or autonomy.

USAID first funded and organized development projects in Kenya during the 1960s, concurrent with the “Decolonization” movement of the colonial British government. The subsequent decades of local population growth alongside healthcare restructuring, introduction of Western school systems, and capitalist cultural imposition allowed Kenyan development to slip quickly back into neo-colonial “progress” (Thiong’o, 1992), as critical development scholars remind us that “decolonization is not a metaphor” (Tuck and Yang, 2012). Decolonial action is the literal return of Indigenous Land and autonomy of life; these ideas do not coexist with Western knowledge structures built on disseminating knowledge through top-down organizational powers from other nations.

The re-colonization of Kenya through private and public development offered ample opportunity for neo-colonial science and research agendas to take hold. Western marine science and conservation research occurred from the 1970s on, alongside the advent of the global Cold War nuclear surveillance programs and

the need for international “collaboration” (Friedberg, 1996). As has been shown in many fields, access to the means of production is a precondition of power in scientific research (Traweek, 1988). In Kenya, access to environmental data and the naturecultures of BIPOC (Black, Indigenous, and People of Color) peoples are preconditions of power in conservative sustainability science (Subramaniam, 2014; Vaughn et al., 2021)—and international geopolitics. Though the academic field changes, the balance of power that underpins it remains the same. From this thread, USAID’s presence and that of American researchers in Kenya is premised on the preeminence and instantaneous reinstatement of a Western system of knowledge (from British colonial government to United States colonial development), and is, therefore, colonial if anticolonial steps are not taken to understand and serve the community’s explicit desires outside of Western research and reporting agendas.

While science and aid are separate technologies, deficit models are the stigma that allow development interactions to act as tools of perpetual recolonization through local cultural dispossession, specifically through the violence of racist and sexist language, policies, and actions. By framing cultural difference as *less* than (e.g., “un”-civilized), colonizers use moral condemnation to dispossess with the ultimate goal of “development” reaffirming colonial knowledge (Muchie, 2004). The power structures and white supremacist, masculinized, deficit models are the foundational belief on which most Euro-American aid and development is predicated and can be especially harmful when working with communities of color, women, or other marginalized identities.

Even if we take the idea of aid or development to be appreciative or equitably intentioned, strict hierarchies of knowledge and existence emerge from the way in which “capacity building” educates Indigenous peoples in a neo-colonial world. Critiques of capacity-building—or training, or development; “a catch-all to mean everything and nothing”—from development scholars like Deborah Eade suggest that these exchanges are ultimately about reasserting power, rather than empowering community partners (Eade, 2007). As a tool of the plantationocene, USAID programs often incorporate a food or resource-based scientific technology, such as “junk trees” for timber, or gated traps for fishery sustainability, reshaping the indigenous mind and landscape with “imperial imaginaries” of neo-colonial extraction (Moore, 2021). The implication herein is that USAID knowledge is superior to millennia of local ecological and cultural knowledge, and that foreign resources should only be used for foreign extractive needs (read: colonialism). While many in the natural scientific and Western academic literature have touted the importance of local ecological knowledge in the past several decades, the pretense is still that we must rely on Western science to interpret and manage “lesser” knowledge. Pedagogically, this is unidirectional, deficit-based teaching, paying lip-service to indigenous peoples and reinforcing boundaries of existence. Even more jarringly, this can teach the value of “arrested autonomy,” which reinforces colonial power and restrains freedom through implied dependence (Salazar-Pareñas, 2018).

For sustainable development projects working in Indigenous Kenyan communities, research participant behavior has historically been mediated through capacity-building or social marketing

agendas, and the intersectionalities of power and identity in the context of food security (and food sovereignty) have been largely ignored. A combination of academic observation, rote and semi-structured information-delivery in the national Swahili language, and published reporting reinstate the power-structures of neo-colonial dispossession under the guise of education. This is standard for the goals and protocols of most international development projects currently, but critical to reflect on as we aim to understand and serve these communities rather than reassert historical power structures. The power dynamics inherent in development relationships must be addressed in any methodological approach that engages with these complicated social-ecological dynamics for the purpose of enacting environmental justice.

## Food and knowledge sovereignty as a foundation for global environmental justice

How do we resist deficit models and embrace anticolonial methodologies to better communicate across disciplinary and cultural boundaries for the benefit of both people and the environment? Environmental justice issues, like sustainability, have their roots most deeply in questions of livability. Can we survive, and what stands in our way? Environmental and social indicators like human wellbeing, our measured values, agency, and inequality indexes are useful measures to elucidate where livability is scientifically at risk (Hicks et al., 2016), but sometimes quantifying unlivability does not help. Environmental justice *actions* utilizing these types of observations and measures have been taken by communities for decades with legal outcomes, policy implications, and some measurable, lived improvements for populations under previously unbearable conditions. One issue that stands is that much of the global environmental movement is still operating from a top-down conservationist approach, rather than an ethics of care or justice for people and living others, running right up against environmental justice, especially in the case of food justice (Purifoy, 2011). Even environmental restoration actions can have the effect of dispossession for communities through the ways that they often redefine resource relationships and access (Vandenberg, 2020). While there is no one definition as a woven strand of the environmental justice movement, food justice aims to address barriers to food insecurity by ensuring access, the means to produce, and the ability to consume healthy and appropriate foods. When research takes an “intervention” approach to sustainability and food security, it risks this reconfiguration of access, so addressing the environmental justice impacts of intervention through careful observation has always been a part of the broader project methodologies and is central to these lines of empiricism and action.

While observing food security in terms of fisheries landings and household consumption is a great step toward measuring environmental justice outcomes, it can be argued that employing a food *sovereignty* framework would extend the livability of this system, by putting the emphasis on the rights of people to *define for themselves* what their needs are, democratically and personally (Jarosz, 2014). The “fish as food” framework identifies

how central small-scale fisheries are as a source of food sovereignty for many people, and highlights the power-dynamics between management/commercial sectors and subsistence users that have previously been in place in many fisheries sustainability contexts (Levkoe et al., 2017). This framework fits well with our observations of the role of fish within the households that we visited in 2021: fish is a key source of protein, sometimes the only animal product available to households, and certainly a positive nutritional component of the diets of all family members. By recontextualizing fish as a direct tool of agency and life-giving relation for millions of people, food sovereignty in the context of coastal Kenya becomes a critical social justice issue that was fundamentally absent from the food security content that other aid and development projects shared with these Kenyan communities. To address this gap, one aim of this approach is to communicate food sovereignty goals and contextualize them within the actionable interactions of these communities' livelihoods and daily practices to enact food justice through tangible, useful resources.

Indigenous knowledge exists without the intervention of Western research, so employing anticolonial methodologies that center on not only understanding and reporting but further making space for the express needs of the communities we work with, allows us to embark on change-making from a more collaborative and just place (Smith, 1999; Walsh, 2010). In some cases, this may lead to research refusal, a reason to forgo publication or a line of inquiry abandoned on the basis that the knowledge production is not what the community seeks (Tuck and Yang, 2014; Zahara, 2016). At the end of the day, knowledge sovereignty means that we are working for these communities, and the research is their intellectual property to empower and inform; taking care to ensure data access, methodological engagement, and ownership of results is key (Reardon and TallBear, 2012; Latulippe and Klenk, 2020). Without beginning from knowledge sovereignty as the foundation of our practice of international collaboration and research, we cannot hope to practice research ethics as a humble service to these communities.

One of the primary challenges that communities face when encountering environmental inequities and their associated violence is the vast disconnection between the causative agents and the environmental issues that just action seeks to address. In this case, the environmental injustice that we explore is a food sovereignty issue (access to subsistence fisheries resources), but the causative factors (e.g., overfishing, climate change, habitat degradation, neoliberal capitalism, and colonialism) are unable to be cleanly disentangled from the myriad actors and histories involved. As a result, research may deign to show a lack of interaction or any uniformly sufficient solution. In response to this, critics across many academic fields and research disciplines have more recently called for social justice action through anticolonial methodologies and interdisciplinary praxis. The roots of this movement in research can be traced back to the reflexive questions of Science and Technology Studies (Latour, 1987), but have been occurring more covertly (i.e., in the humanities, arts, and other more liberal disciplines) for longer (Freire, 1968; la paperson, 2017). As these critical thinkers have studied, we cannot disentangle our physical, social, and political ecologies, and so a just response requires that we subvert power structures by freeing the bounds of knowledge and pursuing justice through any means necessary

for the benefit of the diversity of life on earth (Subramaniam, 2014; Haraway, 2016; Vaughn et al., 2021). Proponents of interdisciplinary thought and speculative futures have highlighted this danger by commenting on how “ghostly” the connections between natural phenomenon and human social worlds can be (Subramaniam, 2014). To practice science that does not obfuscate these crucial connections, taking a naturecultural approach allows us to highlight the ways that historical political power has affected our lived experiences, ecologies, and environments in real and everyday ways, none more salient than observing that the food that we eat is a fundamental part of our naturecultural experiences. Unitary genealogies of thought, on the other hand, can be dangerous: our disciplines bind us to tools, measures, and syntax that cannot hope to address the naturecultural conundrums we are embedded within.

A departure from historical disciplinary thought begs the question of how we may alternatively enumerate these issues, and more importantly, how to take action to avoid further harm. One answer comes from anthropologist Tim Ingold, who posits that art and anthropology are two historical disciplines with future-oriented praxis that give space for both observation and speculation (Ingold, 2019). While these are not the only spaces that include such imaginaries—environmental science communications and education are other key examples that may engage with elements of both—the speculative nature of work in these disciplines is *central* to their contributions to the future continuity of life. These actions span vast realms of speculative methods like science fiction writing, historical criticisms, anticolonial science methodologies, co-created and community reviewed experiments, philanthropy, the arts, and more (Smith, 1999; Muchie, 2004; Liboiron, 2021), and they are the basis for the methodology of this work. On the moving target that is the effects of human activities on our planet, work without radical action for a more livable world must be seized by all means necessary, especially in the less inhibited spaces that creative imaginaries and speculative methods allow.

## Imagining it otherwise

While there are many forms that resistance to neo-colonial research and development can take, Donna Haraway discusses in their book *Staying with the Trouble* the “Carrier Bag” theory of fiction, which is an allusion to Ursula K. Le Guin’s visionary analysis of containers as the first cultural device (Guin, 1986). Speculative fiction as a form of environmental communication goes further than the facts alone and challenges conservative statistical narratives, testing possibilities for more just outcomes through case study and creativity (Benjamin, 2016). Not only do stories provide a space where new ideas can grow, but they harness language and imagery, two methodological tools with the power to include (or exclude) based on identity, experience, and ability. As radical educator Paulo Freire says, “the call for language clarity is an ideological issue, not merely a linguistic one” (Freire, 1968). Human brains connect with different information based on their experiences, and culture is a central part of this background (Hammond, 2015), which means that a social-justice based methodology must employ language and other sensory information

with careful consideration of its power. With story containers as a methodological tool for data collection and experimentation, we take this idea as further support of the power of storytelling and individual human sovereignty to enact anticolonial food security and resilience as the framework for our research engagement.

## Methodology

### An emergent otherwise: ethnographic engagement

As a graduate student researcher and project manager, the lead author participated in household visits as part of the Samaki Salama project for 2 weeks in August 2021 and conducted ethnographic scoping alongside other research team members to better understand families' engagement with and further research desires. Families lived in over twenty villages under five Beach Management Units in Kilifi County, namely: Mayungu, Uyombo, Takaungu, Kuruwitu, and Kanamai (see [Figure 1](#)). Ethnographic methods employ participant observation as a key methodology ([O'Reilly, 2012](#)); research from a service perspective enhances these observations by stressing the importance of "being with" and deeply listening as a central methodology. [Kearns \(2005\)](#) exemplifies how listening is the foundation for the creation of all forms of communications—especially science communication—and cautions that when overlooked as a methodological praxis, communications can be useless or worse: extractive or detrimental. As a white, American research student entering Indigenous Mijikenda participants' communities and homes, it was critical to take time to first examine the impacts that positionality, identity, and kinships had on research relationships in the context of what could potentially be a neo-colonial data collection process. Listening as a method allowed space to authentically understand research "needs" and communicate effectively in collaboration with community members and other researchers.

One key gap that emerged from conversations with community members and amongst the broader research team was the need to communicate the impacts of the study and the nutrition education with the broader community, including "control" families (who did not receive social marketing nutrition education). With children under 5 years of age and larger families as key participants of this collaboration, accessibility of this communication methodology to multiple family demographics was a grounding force that eventually led us to the idea of a picture book science communication project. When asked about the idea of a storybook, our local Kilifi collaborator Francis Mboghli reflected:

*In the African setting many messages are passed through stories. Stories are passed to people, and it is easy to identify messages from stories. I thought a book is a good avenue of passing a story through a lesson.*

Not only do stories and pictures allow us to communicate findings and nutrition education in the context of this research, but the process of creating a storybook opened a bridge between the research team and the families that were part of this project: a mutual need for communication, feedback, and continued

collaboration. As [Haverkamp \(2021\)](#) explains, bridging allows us to "cross between worlds," adapting to climate chaos by addressing the genuine desires of each other in collaboration: shattering the one-world narrative in lieu of a mosaic of adaptations otherwise according to ourselves. Our storybook was co-authored and created with collaborators who are researchers but also who have a deep knowledge of and lived connection to communities in Kilifi County. Some of us have extended family in the project and others currently reside in these communities. As such we bridged, supported, directed, and revised the project in a way that only our dual-identities (researcher-community member) could allow. By serving this need raised and supported by the community, providing a bottom-up space for collaborative communication and knowledge sovereignty through a story book, we not only recognized and learned from our different experiences, but we joyfully engaged in a connective activity that has led us into continued collaboration together.

### Illustrating food sovereignty for the future

So, what can this just, community-oriented outcome from a sustainability and food security research collaboration look like? This question drove our combined efforts to collaboratively construct a nutrition education and environmental communication resource for fishing families who participated in our research collaboration. To communicate food sovereignty goals, we employed language and media as a tool for community members to enact environmental justice in their lives. It is critical to discuss that this methodological goal arises not only from theory and engaged interaction with community members, but also from another anticolonial goal: community knowledge sovereignty. As researchers, we are empowered by the academy to produce knowledge in the service of society. While this opportunity can intersect with Indigenous families' goals, it can also very easily clash, so taking a reflexive approach that makes relationships and listening central to understanding research needs is key to true collaboration ([Datta, 2018](#)). Knowledge sovereignty means that community members were involved in the creation of the stories and that feedback was a key part of our research process, identifying future needs and continuing to learn together.

One of the most important norms that our communication work needed to counter was the cross-language barrier. Not only has language been a historical tool of oppressors to reinforce colonial power, but as importantly, engaging in inter-cultural translation work has been shown to advance environmental justice outcomes in multiple contexts ([Banerjee and Sowards, 2020](#); [Onís, 2021](#)). Working in an international context with participants and collaborators that speak at least three mother-tongues (Mijikenda, Swahili, and English), it was important to our process that we translated knowledge so that it was accessible to as many as possible: we selected Swahili as the primary language due to its role as the national language in Kenya and local collaborators' fluency and cultural connection to the language. We also included an English translation as many of the connected resources and references were written in English, and that English is to this day one of Kenya's national languages taught in public school. While the lead author

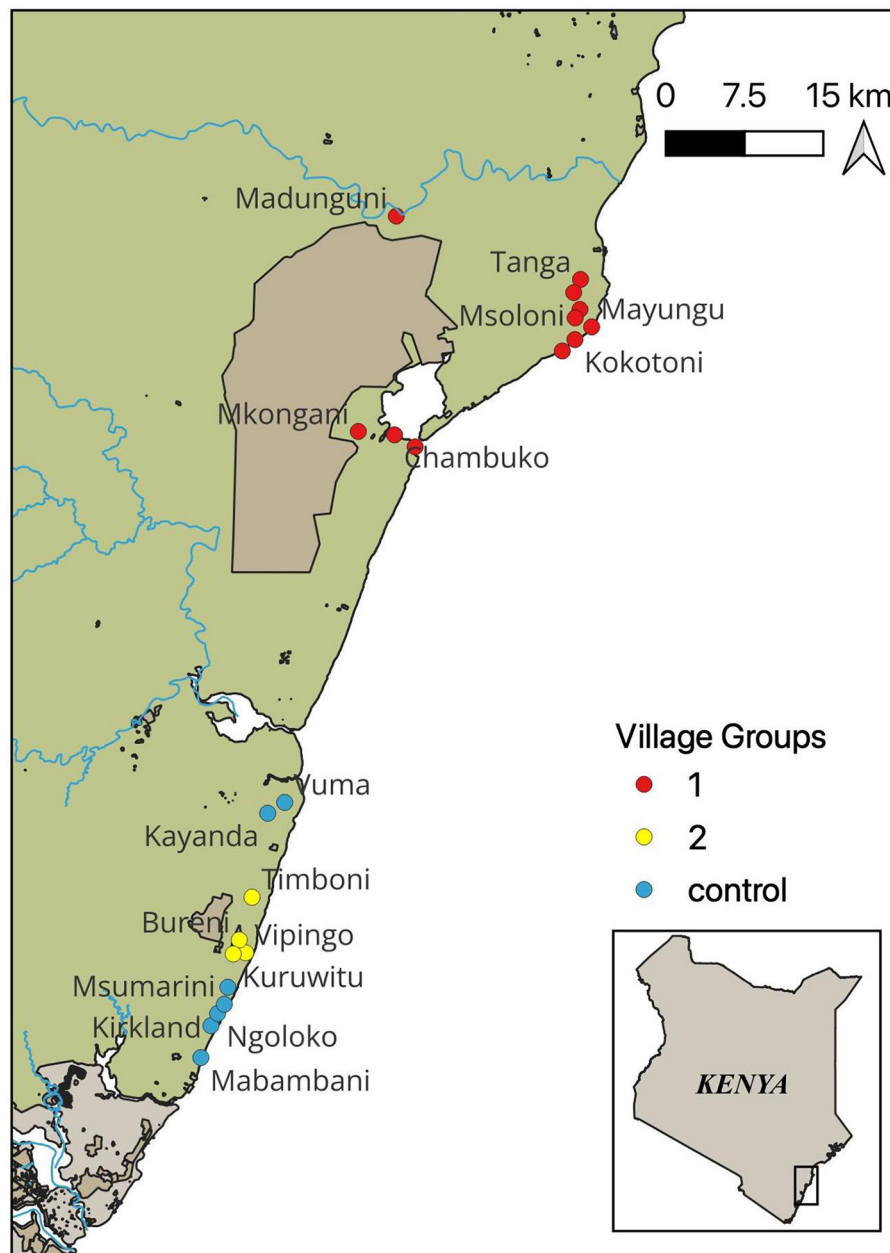


FIGURE 1  
Map of the study area.

came to this project with no background in Swahili language, they have taken two full-time language training courses to connect with the culture and to be able to communicate more effectively with those that they serve in this work.

While science communication is often limited to certain audiences not only by English language but also by the technical jargon of the field, a storybook format allowed us to use anticolonial bilingual translation (between English and Swahili) with the added benefit of semiotic communication through illustrations and photographs. This allows even folks who may not be literate to encounter environmental and health messages including species diversity, sustainable resource

harvesting, and nutritious meals, in color and imagery that needs no translation. The story narrative also engages people in a way that empirical text may not: it connects the mind to imaginaries that social change often requires, putting us in others' shoes and expanding visions for what is possible (Yusoff and Gabrys, 2011; Benjamin, 2016; Nightingale et al., 2020). Science communicators in other contexts have also stressed the value of spreading environmental justice messages to children in particular (Onis, 2021), and the story book format allows us to do so, translating content into a digestible format and centering the interests and modes of communication most accessible to those we hope to impact.

With these intentions in mind, we produced *Haki ya Chakula kwa Familia!* (Food Justice for Families!): a collection of stories, recipes, and illustrations in Swahili and English. The anthology was collaboratively constructed in 2021–2022 with two short stories and many more conscientious environmental communications (see Figure 2). The first story focuses on the nutrition and health benefits of eating fish, while the second defines and describes the environmental and food sovereignty themes that these resilient communities engage with. Kenyan nutrition educators Francis Mbogholi and Catherine Sarange, who live in Kilifi and have spent extensive time with families involved in the study, drafted the first story, *Samaki ni Zawadi*, and an illustrator then created images from the USAID Advancing Nutrition-UNICEF IYCF Image Bank ([iycf.advancingnutrition.org](http://iycf.advancingnutrition.org)), which use a Photo-to-Illustration methodology to create culturally relevant imagery from local East African communities. It was important to Mbogholi and Sarange that we incorporated information about the importance of fish for the health of children and families, to break the cycle of malnutrition by connecting with families through culture and identity, but their story also provides important examples of sustainable fishing and women's health practices. Student researcher, Cohn, complemented the first story with a metaphorical tale surrounding local marine species and their anthropomorphic journeys to understand the concept of food sovereignty, which was written and illustrated in a cheeky, watercolor format attractive to young listeners. The story about food sovereignty highlights the impacts that individuals make in everyday interactions with their foodways and the diverse life or ecosystem services that this community is connected to. Sandwiched between are two recipes for mama (or baba, or bibi) to make for dinner with fresh fish, which were sourced from recipes prepared at the various cooking demonstrations that were part of local social-marketing interventions (Blackmore et al., 2022). As such, they use local ingredients to prepare culturally relevant and nutritious meals. Finally, the book closes with additional resources and references to teach about environmental justice and sustainability, allowing an opportunity for further engagement for those who may be interested in learning more, connecting with additional content via the internet, and providing a glossary in English and Swahili of useful terms.

## Carrier-bag storytelling in coastal Kenya

As we constructed this anthology to amplify the theory and action for environmental and food justice in Kilifi County, it was of paramount importance to us that we give this resource to community members and encourage further collaboration as a tool for food justice. To do so, we printed 400 copies of the story book for our research participant families (via [Smartpress.com](http://Smartpress.com)), and in September and October of 2022, research coordinators Ruth Mbeyu, a local of the area, and Rachel Cohn, an international collaborator, disseminated physical copies of the resource to all families who had been enrolled in the program. With help from the local network of Community Health Volunteers (CHVs) in each village—who have collaborated with the project since its inception—we distributed the resource to the main caregiver

of each family enrolled in the study (usually a mother or grandmother) and offered the opportunity for a feedback interview, as well as a read-aloud if the family members were interested at that time. Because our publications of this resource and interactions regarding it constitute a human research project, we obtained ethical approval from the Pwani University Ethics Review Committee, the National Commission For Science, Technology and Innovation, and the University of Rhode Island's Institutional Review Board before conducting interviews. An informed consent script was read to respondents who were interested in an interview, and verbal consent was obtained. Consent was positive and voluntary in all cases. Most interactions occurred outside the home of the respondent, but several were moved indoors or to another private location. We spoke with caregivers who had engaged with our book from over 20 villages in Kilifi County. Caregivers were anywhere from 18 to 64 years old and from a variety of ethnic, religious, and geographic backgrounds. They included mothers, stepmothers, grandmothers, aunts, fathers, grandfathers, and older siblings.

We wish to emphasize that feedback interview interactions would not have been possible to the same extent (or nearly as logistically feasible) had it not been for the historical rapport built by team members and CHVs: the relationships between CHVs and research families in this case offered further opportunities for collaboration, which we were sincerely grateful for. As one grandmother/caregiver reflected when speaking to us, “When I see you,” referring to the research team, “I see the siblings of my child. You do the same job”. The respect and trust offered in this statement through an allusion to her own adult children is reflective of the relationships that our research team has created with so many of these 400 families through the multi-year project, and relations that this lead author, as an outsider, was careful to tread gently within. Babies are passed around, children want to say “hi” and show off for the visitors, neighbors are interested in the commotion (and at times quite jealous of any material resources brought along)... we are honored to speak with family members who have such an attachment to research relationships in their communities, but want to emphasize that this also underscores the responsibility that research teams and funding organizations have to consider the long-term implications of their interventions on community expectations, welfare, and resilience. As this storybook project is led by a student researcher who plans to graduate from their program in the coming year, emphasizing to participants that we may not ever have the chance to follow up on their concerns was a difficult but necessary part of interactions.

Semi-structured interviews allowed us the space to not only ask for direct feedback about the storybook, but further serve as a continued carrier bag of knowledge and food security goals (see Figure 3 and Supplementary Figure S3 for interview guide). During interviews, after the consent protocol, we collected an audio recording and took detailed notes, which were transcribed in Swahili, translated to English, and analyzed in the following months. Through 20–60-min conversations, we were able to probe families' relationships with their foodways, ask questions about environmental change and current food security, and center the conversation on areas that they hope the collaboration or local knowledge will continue to grow in. This not only allowed us to gauge the efficacy of this methodology through qualitative analysis,



FIGURE 2

Cover of the storybook resource created for this environmental justice communication methodology. See supplement for full text and images.

but to complement other fisheries research in the area through additional perspectives—that of women and children, sub-groups who are often underrepresented in fisheries sustainability and food security research otherwise. Analysis was conducted later by the lead author. After copying content that was relevant to storybook feedback into a data frame by respondent ID and study arm (1, 2, or control), data was uploaded into Dedoose™ (a computer-assisted qualitative data analysis software) (Dedoose, 2022). Data was then coded to understand insights and themes (O'Reilly, 2012).

Finally, we want to emphasize how freely distributing hard copies of the storybook to community members is a form of temporal and material resource sustainability: families can access this tool at will and hopefully the story will be shared and passed on, indefinitely, as a part of this methodology of collaboration. While physical resources are the most useful in this particular context as families do not always have access to electricity or internet, we also wanted to extend this resource to the digital sphere where the project has other possibilities that were limited in print format. For this reason, we included a QR code in the printed book that tied the anthology to a website where additional resources and community connection are possible (<https://sites.google.com/uri.edu/cohn/picture-book-project>). Digital media provided an opportunity to record a read-aloud of the book (further increasing accessibility), freely publish a digital version of the stories that

would be accessible from the time of distribution and create a space for community members to ask questions, communicate, and share more stories or recipes, to continue learning together and supporting each other, indefinitely.

## Results and discussion

### Continued engagement with otherwise through feedback

While colonial othering can harm and/or disappropriate communities— even in food security, sustainability, and development work— this project shows us that co-producing knowledge with research participants and focusing on the sovereignty of these knowledge and resources within the communities we serve allows us to coopt the research process as a tangible tool for crafting anticolonial food futures, together. For us, the way that we have engaged with the otherwise in this collaboration required (1) critical inquiry of the project background and research purpose, (2) refocusing our methods to honor the sovereignty of the lives and Land relations we work with, and (3) now conducting continuous collaboration and community review processes to keep our methods and rhetoric aligned with our participants' goals and needs.





FIGURE 3

The authors speak with a caregiver outside her home during the distribution of our food sovereignty storybook.

In an ideal circumstance, continuous collaboration and community review would mean an anti-hierarchical creative process that included leadership and guidance from resources users/creators at every stage: brainstorming, drafting, revising, illustrating, etc. Due to the COVID-19 pandemic and travel restriction-related time zone difficulties for much of 2020–2022, our community review feedback process between the authors of our storybook and the full community of research participants was restricted to after the storybook resource was printed. This made the collaborative creation and limited community review process conducted by our research team, which included some members of the study communities, even more important since the delay between production and feedback from all other users may affect its utility as a science communication tool. Even remotely from the United States, the lead author sought active collaboration with Kenyan research teammates during the writing phase of the storybook so that they could represent a culturally relevant and community-based array of materials in the finished project, as well as gain insights into how they perceived the materials through the eyes of a potential local user. Having culturally appropriate feedback when writing also aided heavily in the composition and translation of the stories and material during its creation. Such a dynamic, multifaceted creative process would not have been possible without the skills, identities, and creativities of this team, which is another positive effect of multi-disciplinary thinking and creation.

### Storybook sentiments

While feedback from community-based team members was invaluable, without broader feedback from more research families involved in the project, this would not have been the true

community collaboration we desired. Community-based research collaborations, especially in natural resource contexts, require program evaluation or analysis of implementation (Agrawal and Gibson, 1999; Dressler et al., 2010). The greatest positive feedback throughout this creative process was the amount of gratitude expressed to our team during the dissemination of the storybook. Affirmations from community members on the utility of our resource in terms of the health, environmental, and cooking knowledge pedagogy it offered were numerous, varied, and deeply encouraging as evidence of the benefits of our methodology. Feedback garnered from interactions during the distribution process has been magnificent, with over 40 family members giving us in-depth insights, encouragement, and multi-faceted opinions on the materials and their efficacy through semi-structured interviews during visits in 2022. Caregivers expressed happiness, a sense of security, comfort, and joy to our team as a result of the new content they engaged with. As one mother heartwarmingly put it, *“This story is beautiful. Most of the information I got from the book touched me and opened my eyes.”* They reflected on memories that the resource elicited, asked more questions about the research, and requested other content in various forms. They reflected that the resource was useful for them in a variety of ways, including the education it provided, the reminder it served as for other knowledge they have and can share with their communities, and the impacts that they perceive the knowledge has on their families’ health and happiness.

### Collaboration affirmation

In addition to expressions of gratitude and appreciation for the resource, we saw an affirmation of the impacts of our collaborative methodology emerge from collaborator interviews.

While observing participants engage with a book is a very passive means of collaboration, the connection between the research team and the book resource was not lost on families, who encouraged us to bring them more teachings so that we could “be together” and continue to share knowledge with their families. When asked what feedback they had about the book and project, one mother told us, “*Educate us more and make friends with us to know our situation and that of the children—that is a good thing for today’s life and tomorrow*”. She not only noted the impact of the project on her own knowledge but extended that to highlight the benefits of the research relationship and encourage future collaboration for the sake of her family’s wellbeing. In her view, being “friends” and collaborators was a good thing not just for her life today, but for her family’s life in the future—this sentiment was not unique to this individual, and reflective of the benefit that the public sees in research collaboration (Blasco and Hernández, 2012; Adams et al., 2014; McGreavy et al., 2021; Onís, 2021).

Perhaps most affirming, we witnessed the engagement of various other community members with the resource, including other fishers, neighbors, and even participants’ children. As one mother reflected:

*My children have also read the book, and they say it is good, because even when they leave for school, one of them catches it while reading it and runs back to school.*

We hope that this content recycling and community composting will continue to generate new questions, concerns, and collaborative creation, especially as this resource persists in the coming months and years. At the time of publication, engagement with the digital resource has been minimal, which underscores the efficacy of the material resources in this context, but our hope is that this model may be useful in other contexts and provide a template for other practitioners seeking to increase digital science communication engagement with their respective audiences. Overall, one of the key goals of this methodology was to bridge a knowledge gap left by the project for the control group families by providing the nutrition education offered in the social marketing workshops to families that were not able to participate. Six women in the control group commented directly about how they had learned something from the storybook during our interviews, even emphasizing that it was the “first time” they had encountered various nutrition, health, or fisheries related information. This was an affirmation of the pedagogical impact of the storybook, as the educational benefits likely extend to other families and family members in the control group as well.

## Accessibility insights

Just because we were able to distribute the storybook does not mean all families were able to engage with it to the extent that may be necessary for learning to take place. When asked about storytelling more generally, one mother reflected that, “*We lack the time to sit with them [the children] and tell them stories, because we are always busy.*” This is not a unique situation: several other families asked us to read them the book because they lacked time,

their children were distracting them, or they were not able to read the book for themselves. This leaves us to wonder how much engagement we had overall with the book, amongst the 400 families targeted. In an ideal situation, we would conduct a follow-up survey to gauge engagement and receive feedback on any accessibility issues participants found (Winowiecki et al., 2017), but at this time the resources necessary for that work are not available. While we had hoped that the online resources and a read aloud option may mitigate some of the issues with engagement by providing different modes of access (auditory, digital), the lack of engagement with them may suggest that they remain inaccessible due to electricity and internet needs, time necessary to engage with them, or a lack of general interest in pursuing digital resources.

Even so, examples of how we were successful at reaching our broad target demographics amongst the varied members of research participant families was evidenced through the feedback gained from interviews. Mothers let us know that their children of various ages appreciated the messaging in different ways, and we observed several fathers, siblings, and other family members engaging with the story during the interviews conducted at homes. The variety of reach we had amongst families is indicative of our success at reaching several of our accessibility goals, namely, that the book was broad enough to have something for the many identities of family members, and that they would enjoy reading it with their children as well. These observations may be indicative of the benefits that additional resources to community outreach and education programs would confer in this setting for similar health and nutrition related communications.

## Impact and areas for improvement in our anticolonial collaboration

### Gendered impacts

Outside of the direct feedback and gratitude expressed by our research community, this research methodology also uncovered community social values and continued desires underlying our collaborative research engagement, including ideas that may not have been otherwise observable through quantitative research in the area. One of these insights is the critical interplay that various family members have in the cycle of malnutrition and food security. While the hope of other research in the area is that gear-based fisheries improvements will result in increased household food security and child nutrition (Blackmore et al., 2022), several women we spoke with cast doubts that these system feedbacks would occur due to the inequitable gender dynamics within their households. One mother’s feedback stated directly that the role of men in household food security through the political-economic system may overpower the ability of mothers and caregivers to implement any nutrition knowledge gained through the project with their families. She explained to us that,

*Not all of them [the fishermen] are sending fish to their families in abundance, as we have seen Bakari [the character from the story]... he used to send to his wife fish in abundance. Now you find that you have heard the teachings as the mother, but how to cook, well—how will you cook well if the fish is not*

*brought as it should be? I'm thankful that my husband always gets a lot of fish and brings it to me. Even if he gets a little, he brings it to me. But those other fishermen's households... Okay, I haven't visited them all. But that day we went for cooking demonstrations there, my instincts told me that some of the mothers there might not be given fish.*

This result is not new in the broader context of Kenya's fishing community culture: [Darling \(2014\)](#) reports that women observe that their overall household wealth (i.e., available capital) and personal livelihoods (which are rarely involved in fisheries) have a greater impact on household food security than marine reserves or fisheries management efforts do. Even in vastly different geographic contexts, it has been shown that women in fishing families often serve this role as negotiators of household wellbeing ([Britton, 2012](#)), yet are undervalued in decision-making and excluded from fisheries value chains ([Matsue et al., 2014](#); [Hasselberg et al., 2020](#); [Lawless et al., 2021](#)). Mothers that we interviewed as part of our storytelling collaboration even spoke to this need for direct financial empowerment to help their children explicitly, saying, "Now I would [like to] see that you provide us with a project that we as mothers [can benefit from], because the mother is the one who takes care of the child. Not the father." This insight is critical to keep in mind alongside further intervention efficacy analyses and research/development plans in this space.

## Appreciation and empowerment

While the dynamics between family members and their political-economic realities play a significant role in food security outcomes, feedback we gathered uncovered several impacts of the storybook communication resource that may mitigate some aspects of gender inequities with these families. When speaking with caregivers, we were struck by the number of times (eight separate instances) mothers would reference the story of *Samaki ni Zawadi* and the fictional mother, Mapenzi, to comment on some empowering aspect of the representation of their own identity that they saw reflected through the story (see [Table 1](#)). One mom even went so far as to say, "I fell in love with this pregnant woman, I knew her importance." The positive emotion evoked by the knowledge that this story shared through the representational imagery of a pregnant mother, Mapenzi, connected with so many caregivers in a way that perhaps only a story can provide. This is the result of an intentional choice to include people with local knowledge who could help create a storybook with cultural relevance that could resonate directly with the intended audience. Our collaborators have deep knowledge of and connections to Kilifi County communities, and included a character they knew would resonate with the intended audience of mothers and household caregivers. Not only is this a critical result in terms of the evidence it provides for the utility of this storybook as a science communication resource, but it offers an additional perspective of the feminist power of storytelling in this context. Pregnant women and mothers who may not have seen themselves represented in media before in a way that helped them understand their experiences as mothers were offered support through Mapenzi's image. While we did not interview father/fishers, the hope was

**TABLE 1** Respondent discussion of the caregiver character, Mapenzi, in the food sovereignty storybook created for this research collaboration.

| Caregiver statement (translated from Swahili):   |
|--|
| I really liked what was written there. All the instructions that the girl did, I also follow them, that's what I do.                                     |
| The woman written [about] there made me happy.   |
| Mapenzi with her child is very good, and it can help my family.  |
| I loved the pregnant woman, it has represented me so that when I get pregnant, now I will know the importance of fish for me and the [baby] in the womb. |
| I fell in love with this pregnant woman, I knew her importance.  |
| I feel great (because), I get... I am being taught more and more about raising children and carrying a pregnancy.  |
| What has come to our attention is, fish is not only good for children, it is good for the pregnant mother.   |
| I liked the story about... of Mapenzi. For Mapenzi, she was pregnant and now the practices she followed made me happy, yeah.                             |

that the representational imagery of the father, Bakari, would also have this impact. We recommend that other science storytellers harness the power of character to connect with community in ways that further anticolonial, anti-patriarchal, and environmentally just outcomes ([Yusoff and Gabrys, 2011](#); [Houston, 2013](#); [Benjamin, 2016](#)).

Caregivers expressed appreciation for the health messaging, cooking knowledge, environmental knowledge, and general educational experience that they got from the book. Many responses insinuated that the book allowed them to encounter new knowledge, which was one of the goals of our science communication methodology, especially for families in the control group. Many interviewees expressed some food or cooking knowledge that they received from the book, and many went further to express how it taught them about parenting, nutrition, pregnancy, fisheries, and the environment. As one mother put, poignantly, "I learned a lot. As fish is important for children, it is also important for society." The connections between fish, nutrition, health, and family are communicated through stories such that folks came away with a greater understanding of their roles and power as caregivers.

## Insights into social values

Our conversations also illuminated several social values that many of our research participants held that may have impacts on further collaboration and research interpretations in the context of this work. Understanding individuals' social values when working on human-centered "sustainability" research is an under-emphasized factor that has a strong influence on intervention applicability and efficacy, so these insights are key to understanding overall impact of research on community wellbeing ([Coulthard et al., 2011](#); [Hammond, 2015](#); [Popa et al., 2015](#); [Nightingale et al., 2020](#); [Moore, 2021](#); [Vandenberg et al., 2021](#)). Several of these values seemed to have synergistic effects when considered in the context of our storybook collaboration, namely the value that caregivers saw in education, development activities, and family.

Others had more neutral effects but may be relevant to consider in science communication methodologies, including religious beliefs and respect for others.

Perhaps the strongest value signal that came out of our interviews was the inherent value that caregivers expressed concerning their family, especially children. While our interview questions were focused on feedback about the caregiver's perspective on the book, many of the responses we got were indicative of the broader interests of their families. As one caregiver put it, they see that "When we focus on these lessons, our families will be safe". Many respondents directly connected improvements in health of their family and children to the book or knowledge gained from other research projects. This is an affirming impact since caregivers have a large role to play in child health and a broader goal of past research has been to empower them to feed their children fish. It appears that most parents not only see the benefits of the knowledge shared personally, but also hope that they can pass on the knowledge itself to their children. One mother told us, "I always like my child to know something that will probably help her life in the future". In this way, the benefits of nutrition and health knowledge are passed down through generations.

This temporal knowledge recycling is likely due to the concurrent value judgments that many of these families expressed concerning education and development. The value that caregivers see in education for their children was very strong in certain cases. It is seen as the way to success: simply put, "I tell my children to put more effort in their studies. So that they can have a good life". School fees and the COVID-19 pandemic raised barriers to education in such a way that many caregivers commented on it during our interviews. When asked directly about the COVID pandemic, one mother told us,

*The children went back a long way. The corona epidemic hurt people because children have gone backwards. Now, children are rushed to cover the syllabus until the mind can't handle all that. He fails the test because they stayed at home too much, yeah.*

With education perceived as one of the most valuable assets by most of these families, the impacts of the COVID-19 pandemic were devastating not only in terms of current food security, but also in the ongoing struggles that their children have to catch up after a long-term disruption to their education.

The value of knowledge that many caregivers expressed, especially through formal education, may also influence their staunch support of development activities. This project offers an interesting link between physical human development and socioeconomic human development, which are not often connected in the broader field of international "development". In our case, families see that feeding children fish leads to human development impacts: "Fish is good for children and helps children with their health. That is, it develops the child well, even in the womb, he becomes well. Even for these pregnant mothers too". Mothers reported seeing changes in their families in terms of health and growth of their children, which is a metric that other research plans to quantitatively validate (Blackmore et al., 2022). On a less material level though, participants also see that the messaging has educational, social, or economic development benefits for

themselves and their families. One caregiver stated simply that, "I feel good about joining this project. I saw that it has development benefits, and it is useful in my family". These development benefits, while not explicitly stated here, were echoed in other responses, like one caregiver who stated, "This project is good, it gives me some success, because it took me from a place and took me to a place". The transitory power of health knowledge as a development tool allowed many families to perceive changes, and in this case, in a positive light.

Several other social values emerged from our interactions that are poignant to comment on, due to their potentially conflicting impacts on science communication efficacy. Religion played a prominent role in five respondents' conversations with us, and while this did not directly conflict with their perceptions of the knowledge shared in the book, religious values and beliefs held could supersede the importance of health knowledge gained, invalidating our science communication. Interpersonal relationships and respect also emerged as a strong value system throughout several of our conversations. While holding a social value of interpersonal respect highly is not necessarily tied to personal food choice and parenting, we noted that it could affect the responses we garnered from interviews, providing a more positive review than they internally hold, and withholding important feedback about the efficacy of the science communication storybook or project in order to sustain social relationships. Deceptive answers from respondents can always be an issue with ethnographic research (Bernard, 2017), but is good to be wary of in terms of stating any clear takeaways without further validation.

## Future desires

Our conversations with families left us with much room for future collaboration and co-learning, which is not only telling of the methodological impacts of our carrier bag storytelling experience, but also of the opportunities—and response-abilities—that research has going forward in this space. Some future needs expressed to us centered on the availability of fish resources, which are suffering due to social-ecological pressure on the fisheries, largely due to population growth and climate change. While that is largely out of our hands as researchers, there were several comments that we can attend to more directly. The first regards the preparation of fish with small bones: three respondents noted that they did not understand how to circumvent this safety issue and continue to provide their children meals with fish. More broadly, we deeply appreciated all the feedback we received asking for further educational activities surrounding health knowledge. Caregivers requested future "meetings," "fish knowledge," "trainings," and "teachings" to supplement that which they had received throughout the project. Unfortunately, some of these desires may come from a lack of retention, which one caregiver discussed directly, saying:

*In teaching, we are of the opinion that we should be strategized, that we should not be left behind so that we can get the teaching, that's why we will not forget, yeah. Because if they teach us like this, they will go a year, 2 years, we forget. We forget.*

The broader sentiment, however, is that knowledge is power, so continuing to affect food justice change in this setting will require

a sustained commitment to education, especially important for those families that did not receive education as part of research, previously. Continuing to affect change and provide resources in this context is not only possible, it should be built into the proposed research agendas for development work in this sphere, because maintaining positive research relationships may have a greater capacity for change not only for participant knowledge and outcomes, but further for scientific research methodologies and resulting policy.

## Conclusion

These reflections leave us with one more radical call for inclusive academic interdisciplinarity, without which, we may never fully stretch the limits of our collective consciousness for good. While academic “disciplines were constructed precisely to obscure their connections” and give the people within them power (Subramaniam, 2014), conducting anti-disciplinary projects that focus on the express requests of those we work with redistributes this power by shining a light on the inefficacies of the neo-colonial research system (Haverkamp, 2021). Our interdisciplinary team of nutritionists, fisheries scientists, and geographers found ourselves struggling against the (financial and temporal) rules of the measures and methods required by each of our disciplines (Escobar, 2018), which was in part a reason that this community carrier bag storytelling methodology had the space to emerge. These types of anticolonial efforts can be difficult, as they not only require diverse knowledge and expertise, but also that researchers and collaborators dedicate a lot of time and resources to them, which may not be available in all circumstances. By blending our disciplinary messages and methods though, we created opportunities for more types of knowledge and experiences to take part, including local community and environmental knowledge, speculative and creative methods, and even simply healthy human parenting. Without the labels and boundaries that often exclude, invalidate, or disempower, we can refocus on what matters: making new spaces for life in a challengingly unlivable world.

## Data availability statement

The original contributions presented in the study are included in the article/Supplementary material, further inquiries can be directed to the corresponding author.

## Ethics statement

The studies involving human participants were reviewed and approved by Institutional Review Board of the University of Rhode Island. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

## Author contributions

RC was the lead author. RM, FM, and CS contributed important ideas and content for the storybook. RM coordinated community collaborations and worked with RC on data processing. MT provided substantive edits throughout. All authors contributed as thought partners and collaborators in conceiving of the project design and have read and approved of the final manuscript.

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## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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## Supplementary material

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fcomm.2023.1173512/full#supplementary-material>

## References

- Adams, M. S., Carpenter, J., Housty, J. A., Neasloss, D., Paquet, P. C., Service, C., et al. (2014). Toward increased engagement between academic and indigenous community partners in ecological research. *Ecol. Soc.* 19, 5. doi: 10.5751/ES-06569-190305
- Agrawal, A., and Gibson, C. C. (1999). Enchantment and disenchantment: The role of community in natural resource conservation. *World Dev.* 27, 629–649. doi: 10.1016/S0305-750X(98)00161-2
- Banerjee, P., and Sowards, S. K. (2020). Working across languages/cultures in international and environmental communication fieldwork. *J. Int. Intercult. Commun.* 15, 1–21. doi: 10.1080/17513057.2020.1850844
- Béné, C., Arthur, R., Norbury, H., Allison, E. H., Beveridge, M., Bush, S., et al. (2016). Contribution of fisheries and aquaculture to food security and poverty reduction: assessing the current evidence. *World Dev.* 79, 177–196. doi: 10.1016/j.worlddev.2015.11.007
- Benjamin, R. (2016). Racial fictions, biological facts: expanding the sociological imagination through speculative methods. *Catalyst: Feminism, Theory, Technosci.* 2, 1–28. doi: 10.28968/cftt.v2i2.28798
- Bernard, H. R. (2017). *Research Methods in Anthropology*. Rowman & Littlefield.
- Blackmore, I., Wamukota, A., Kamau, E., Humphries, A. T., Lesorogol, C., Cohn, R., et al. (2022). Article Title: Samaki Salama - promoting healthy child growth and sustainable fisheries in coastal Kenya: a study protocol. *Front. Public Health.* 10, 934806. doi: 10.3389/fpubh.2022.934806
- Blasco, P. G., and Hernández, L. (2012). Friendship, Anthropology. *Anthropology Humanism.* 37, 1–14. doi: 10.1111/j.1548-1409.2012.01104.x
- Britton, E. (2012). Women as agents of wellbeing in Northern Ireland's fishing households. *Marit. Stud.* 11, 16. doi: 10.1186/2212-9790-11-16
- Cartmill, M. K., Blackmore, I., Sarange, C., Mbeyu, R., Cheupe, C., Cheupe, J., et al. (2022). Fish and complementary feeding practices for young children: qualitative research findings from coastal Kenya. *PLoS ONE* 17, e0265310. doi: 10.1371/journal.pone.0265310
- Coulthard, S., Johnson, D., and McGregor, J. A. (2011). Poverty, sustainability and human wellbeing: a social wellbeing approach to the global fisheries crisis. *Global Environ Change.* 21, 453–463. doi: 10.1016/j.gloenvcha.2011.01.003
- Darling, E. S. (2014). Assessing the effect of marine reserves on household food security in Kenyan coral reef fishing communities. *PLoS ONE.* 9, e113614. doi: 10.1371/journal.pone.0113614
- Datta, R. (2018). Decolonizing both researcher and research and its effectiveness in Indigenous research. *Res Ethics.* 14, 1–24. doi: 10.1177/1747016117733296
- Dedoose (2022). Dedoose Version 9.0.17, web application for managing, analyzing, and presenting qualitative and mixed method research data. Los Angeles, CA: SocioCultural Research Consultants, LLC. Available online at: [www.dedoose.com](http://www.dedoose.com).
- Dressler, W., BBüscher, B., Schoon, M., Brockington, D. A. N., Hayes, T., Kull, C. A., et al. (2010). From hope to crisis and back again? A critical history of the global CBNRM narrative. *Environ. Conserv.* 37, 5–15.
- Eade, D. (2007). Capacity building: who builds whose capacity? *Dev. Pract.* 17, 630–639. doi: 10.1080/09614520701469807
- Escobar, A. (2018). *Designs for the Pluriverse, Radical Interdependence, Autonomy, and the Making of Worlds*. Duke University Press. p. 25–48.
- Freire, P. (1968). *Pedagogy of the Oppressed*. Bloomsbury Publishing.
- Friedberg, A. L. (1996). Science, the cold war, and the American State. *Diplomatic Hist.* 20, 107–118. doi: 10.1111/j.1467-7709.1996.tb00254.x
- Guin, U. K. L. (1986). *The Carrier Bag Theory of Fiction*.
- Hammond, Z. (2015). *Culturally Responsive Teaching and the Brain: Promoting Authentic Engagement and Rigor Among Culturally and Linguistically Diverse Students*. Corwin Press.
- Haraway, D. J. (2016). *Staying With the Trouble: Making Kin in the Chthulucene*. Duke University Press.
- Hasselberg, A. E., Aakre, I., Scholtens, J., Overå, R., Kolding, J., Bank, M. S., et al. (2020). Fish for food and nutrition security in Ghana: challenges and opportunities. *Global Food Secur.* 26, 100380. doi: 10.1016/j.gfs.2020.100380
- Haverkamp, J. (2021). Collaborative survival and the politics of livability: towards adaptation otherwise. *World Dev.* 137, 105152. doi: 10.1016/j.worlddev.2020.105152
- Hicks, C. C., Levine, A., Agrawal, A., Basurto, X., Breslow, S. J., Carothers, C., et al. (2016). Engage key social concepts for sustainability. *Science.* 352, 38–40. doi: 10.1126/science.aad4977
- Houston, D. (2013). Environmental justice storytelling: angels and isotopes at Yucca Mountain, Nevada. *Antipode.* 45, 417–435. doi: 10.1111/j.1467-8330.2012.01006.x
- Ingold, T. (2019). Art and anthropology for a sustainable world. *J. Roy Anthropol. Inst.* 25, 659–675. doi: 10.1111/1467-9655.13125
- Jarosz, L. (2014). Comparing food security and food sovereignty discourses. *Dialogues Hum. Geogr.* 4, 168–181. doi: 10.1177/2043820614537161
- Kearns, F. (2005). *Getting to the Heart of Science Communication*. p. 103–131.
- Kenney, M. (2019). Fables of response-ability: feminist science studies as didactic literature. *Catal Femi. Theory Technosci.* 5, 1–39. doi: 10.28968/cftt.v5i1.29582
- la paperson (2017). *A Third University Is Possible*. Minneapolis, Minnesota: University of Minnesota Press. Available at: <https://manifesto.umn.edu/read/a-third-university-is-possible/> (accessed December 14, 2021).
- Latour, B. (1987). *Science in Action*. Harvard University Press.
- Latulippe, N., and Klenk, N. (2020). Making room and moving over: knowledge co-production, indigenous knowledge sovereignty and the politics of global environmental change decision-making. *Curr Opin Env Sust.* 42, 7–14. doi: 10.1016/j.cosust.2019.10.010
- Lawless, S., Cohen, P. J., Mangubhai, S., Kleiber, D., and Morrison, T. H. (2021). Gender equality is diluted in commitments made to small-scale fisheries. *World Dev.* 140, 105348. doi: 10.1016/j.worlddev.2020.105348
- Leeuw, S., and Hawkins, H. (2017). Critical geographies and geography's creative re/turn: poetics and practices for new disciplinary spaces. *Gen. Place Cult.* 24, 303–324. doi: 10.1080/0966369X.2017.1314947
- Levkoe, C. Z., Lowitt, K., and Nelson, C. (2017). "Fish as food": exploring a food sovereignty approach to small-scale fisheries. *Mar Policy* 85, 65–70. doi: 10.1016/j.marpol.2017.08.018
- Liboiron, M. (2021). "Pollution is Colonialism," in *Pollution is Colonialism* (Durham, NC: Duke University Press) p. 39–79. doi: 10.1515/9781478021445
- Matsue, N., Daw, T., and Garrett, L. (2014). Women fish traders on the kenyan coast: livelihoods, bargaining power, and participation in management. *Coast. Manage.* 42, 531–554. doi: 10.1080/08920753.2014.964819
- McGreavy, B., Ranco, D., Daigle, J., Greenlaw, S., Altvater, N., Quiring, T., et al. (2021). Science in Indigenous homelands: addressing power and justice in sustainability science from/with/in the Penobscot River. *Sustain. Sci.* 16, 937–947. doi: 10.1007/s11625-021-00904-3
- Mignolo, W. D., and Walsh, C. E. (2018). *On Decoloniality*. Duke University Press.
- Moore, S. S. (2021). "Plantationocene," in *Architectural Review*. p. 6–12.
- Muchie, M. (2004). Resisting the deficit model of development in Africa: re-thinking through the making of an African national innovation system. *Soc Epistemol.* 18, 315–332. doi: 10.1080/0269172052000343321
- Nightingale, A. J., Eriksen, S., Taylor, M., Forsyth, T., Pelling, M., Newsham, A., et al. (2020). Beyond Technical Fixes: climate solutions and the great derangement. *Clim. Dev.* 12, 343–352. doi: 10.1080/17565529.2019.1624495
- Onís, C. M. (2021). "La justicia ambiental es para ti y para mí": translating Collective Struggles for Environmental and Energy Justice in Puerto Rico's Jobs Bay Communities. *Front. Commun.* 6, 723999. doi: 10.3389/fcomm.2021.723999
- O'Reilly, K. (2012). *Ethnographic Methods*. Routledge.
- Popa, F., Guillermin, M., and Dedeurwaerdere, T. (2015). A pragmatist approach to transdisciplinarity in sustainability research: from complex systems theory to reflexive science. *Futures.* 65, 45–56. doi: 10.1016/j.futures.2014.02.002
- Purifoy, D. (2011). Food policy councils: integrating food justice and environmental justice. *Contemp. Sociol. J. Rev.* 40, 503–503. doi: 10.1177/0094306111412520d
- Reardon, J., and TallBear, K. (2012). "Your DNA is our history": genomics, anthropology, and the construction of whiteness as property. *Curr. Anthropol.* 53, S233–S245. doi: 10.1086/662629
- Salazar-Pareñas, J. (2018). "Decolonizing Extinction," in *Decolonizing Extinction* (Duke University Press) p. 1–30. doi: 10.1215/9780822371946
- Smith, L. T. (1999). *Decolonizing Methodologies: Research and Indigenous Peoples*. London: Zedbooks Ltd.
- Subramaniam, B. (2014). "Interdisciplinary Hauntings: The Ghostly World of Naturecultures," in *Ghost Stories for Darwin: The Science of Variation and the Politics of Diversity* (Champaign, IL: University of Illinois Press) p. 1–23. doi: 10.5406/illinois/9780252038655.001.0001
- Thiong'o, N. (1992). *Decolonising the Mind: The Politics of Language in African Literature*. Nairobi, Kenya: East African Publishers.
- Traweck, S. (1988). *Beamtimes and Lifetimes*. Harvard University Press.
- Tuck, E., and Yang, K. W. (2012). "Decolonization is not a metaphor," in *Decolonization: Indigeneity, Education & Society*, Vol.1. p. 1–40.
- Tuck, E., and Yang, K. W. (2014). R-Words: refusing research. *Humanizing Res.* 223–248. doi: 10.4135/9781544329611.n12

- Vandenberg, J. (2020). The risk of dispossession in the aquapelago: a coral reef restoration case study in the Spermonde Islands. *Shima Int. J. Res Island Cult.* 14, doi: 10.21463/shima.14.2.08
- Vandenberg, J., Humphries, A., Garcia-Quijano, C., Moore, A., Pollnac, R., and Abdullah, S. (2021). Assessing indicators and limitations of food security objectives in coral reef restoration. *Conservation Soc.* 19, 68. doi: 10.4103/cs.cs\_20\_33
- Vaughn, S. E., Guarasci, B., and Moore, A. (2021). Intersectional ecologies: reimagining anthropology and environment. *Annu. Rev. Anthropol.* 17. doi: 10.1146/annurev-anthro-101819-110241
- Walsh, C. (2010). Development as Buen Vivir: Institutional arrangements and (de)colonial entanglements. *Development.* 53, 15–21. doi: 10.1057/dev.2009.93
- Winowiecki, L., Smukler, S., Shirley, K., Remans, R., Peltier, G., Lothes, E., et al. (2017). Tools for enhancing interdisciplinary communication. *Sustain. Sci. Pract Policy.* 7, 74–80. doi: 10.1080/15487733.2011.11908067
- Yusoff, K., and Gabrys, J. (2011). Climate change and the imagination. *Wiley Interdiscip. Rev. Clim. Change* 2, 516–534. doi: 10.1002/wcc.117
- Zahara, A. (2016). *Ethnographic Refusal: A How to Guide. Discard Studies.* Available online at: <https://discardstudies.com/2016/08/08/ethnographic-refusal-a-how-to-guide/>.