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Local perspectives on marine ecotourism development in a water-insecure island region: the case of Bocas del Toro, Panama

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As a dimension of a blue economy, marine ecotourism should, in theory, not only increase economic viability and environmental sustainability but, most importantly, pursue socially equitable outcomes. In tropical and sub-tropical island regions, where substantial tourism development is often coupled with widespread strains on public infrastructure and services, including water access, there exists a need to better understand the expansion of this industry is felt at the community level; more importantly by individuals who are reliant on these infrastructures and services. Through a case study of the Bocas del Toro Archipelago, where water insecurity is becoming acute, we draw on and mobilize stories from local community members, alongside non-participant observations and document collection, to 1) document the experience of some community members with water insecurity and shortages, including how they perceive the roles played by the central government and marine ecotourism sector, and 2) examine how community members feel about how communities feel about policies and investment priorities of the central government regarding water insecurity, including the extent to which they view marine ecotourism development as undermining or promoting local needs. Our results underline the complex nature of marine ecotourism governance and infrastructure development outcomes in a resource-insecure island region, demonstrating that current issues are greatly impacted by historical and social underpinnings of neo-colonialism and systemic racism, misalignments of community vs. government development priorities, and eroded political trust, that shape local experiences with sustainable development and local residents' perceptions of the ability of marine ecotourism to address issues of water insecurity. Moreover, while our focus is on the marine ecotourism industry, the significance of these findings contributes to a growing body of literature that places local experiences at the forefront of research into the implications of sustainable development in island regions.

KEYWORDS

marine ecotourism, water security, blue economy, island systems, Bocas del Toro, sustainable development

Introduction

The marine ecotourism industry is considered to be a dimension of a 'blue economy'; an ocean-wide sustainable development strategy proposed by Small Island Developing States (SIDS) in 2012 to "promote economic growth, social inclusion, and preservation or improvement of livelihoods, while at the same time ensuring environmental sustainability" (World Bank and UN DESA, 2017, p.1). In theory, marine ecotourism should not only increase economic viability and environmental sustainability but, most importantly, pursue social equity—a "distinctive system of individualized justice" (Minow, 2021, p.173). In island regions, where substantial tourism appeal is often coupled with widespread issues of water insecurity (Cole, 2012; Gössling et al., 2012; Gossling, 2015), this study explores questions regarding the ability of a blue economy strategy, rooted in marine ecotourism, to equitably address both development and well-being in the eyes of those local to island regions. In this paper, we refer exclusively to tropical and sub-tropical islands when discussing 'islands' or 'island regions.'

In island regions, local blue economies are often heavily reliant on the marine tourism industry (UNWTO, 2023). However, as per Leposa (2020), large volumes of tourists, and the services required to support them (e.g., transportation, accommodation, food and beverage, recreation, etc.), can exacerbate existing issues of local public utility access, often due to infrastructural deficiencies or inherent vulnerabilities to climate change. Important to this study, in particular, is the relationship between the marine ecotourism industry and the availability and management of water resources.

To our knowledge there exist few studies that sit at the intersection of marine ecotourism and water insecurity in island regions specifically; less so those that are guided by, and draw conclusions from, the experiences of those individuals that most closely feel their impacts. As the push for blue economic development continues to grow (Cisneros-Montemayor et al., 2021; Pace et al., 2023), and water insecurity becomes increasingly prevalent in climate-vulnerable regions (Winters et al., 2022; Crisman and Winters, 2023), failing to capture how the two intersect and are felt at the community level could pose risks of conducting research with communities as the 'subject' rather than active participants and beneficiaries of the research process (Israel et al., 2019), and/or informing policies that do not capture the nuances of community interests and needs (Freudenberg and Tsui, 2014; Cisneros-Montemayor et al., 2019).

Marine ecotourism can be described as a "nature-based; environmentally educated; and sustainably managed" ocean tourism industry involving activities such as recreational fishing, snorkelling, whale watching, and SCUBA diving, for example (Blamey, 2001, p.6). Modern definitions also include dimensions of local benefits (Sakellariadou, 2014; Das and Chatterjee, 2015; Ramos-García et al., 2017; Tuwo et al., 2021). This can entail increasing market demand for locally produced goods, the use of, and investment in, local facilities and infrastructure, opportunities for local entrepreneurship, and the generation of new revenue streams that remain within a community, for example (Sakellariadou, 2014).

Unlike traditional mass tourism models, marine ecotourism adopts aspects of environmental conservation and promotes community involvement. However, when these tenets are not upheld, due to a variety of reasons (e.g., poor management, lack of community involvement, limited enforcement regimes, etc.), the industry can promote unsustainable practices on all fronts—economic, social, and environmental (Hoyman and McCall, 2013; Rahman et al., 2022; Zeng et al., 2022). As such, recent scholarship has called for a re-prioritization of social sustainability within blue economic development (Pascual et al., 2014; Bennett et al., 2019; Leposa, 2020; Nugraheni et al., 2020; Osterblum et al., 2020; Campbell et al., 2021; Cisneros-Montemayor et al., 2021), with concerns raised regarding the implication of developing marine industries in areas where there is significant need to consume and manage resources sustainably.

The United Nations (UN) refers to water security as the ability of a population to safeguard sustainable access to adequate quantities and quality of water for the support of livelihoods, human well-being and socio-economic development (UN Water, 2013). In this sense, water *in*security is the condition in which at least one of the above variables (i.e., quantity, quality, or accessibility) is not met, threatening human well-being. While many island regions have some degree of established water infrastructure, the coincidence of 'dry season' and peak tourist landings can perpetuate regional instabilities in water security, where local residents compete for this essential yet scarce resource; both with tourists and between communities (Gheuens et al., 2019).

In this study, we draw on and mobilize stories of local residents in a heavily touristed island to better understand how the relationship between marine ecotourism and water insecurity manifests at the community level. We explore the case of Panama's Bocas del Toro Archipelago (henceforth referred to as 'Bocas del Toro' or 'the archipelago'), where substantial tourism appeal and infrastructural issues coexist, as a microcosm of the paradox of pursuing a marine ecotourism-based blue economy in a water insecure island region. Through integrating non-participant observations and collected documents with a series of semi-structured interview responses we aim to 1) document the experience of some community members with water insecurity and shortages, including how they perceive the roles played by the central government and marine ecotourism sector, and 2) examine whether community members feel as though water insecurity and shortages have influenced policies and economic investment and the extent to which marine ecotourism development may undermine or promote changes.

Our results underline the dynamic and complex nature of marine ecotourism governance and infrastructure development outcomes in a resource-insecure island region, highlighting the historical, political, and social underpinnings that shape perceptions of, and poor experiences with, blue economic. While our focus is on the marine ecotourism industry, the significance of these findings contributes to a growing body of literature that places local experiences at the forefront of research into the implications of sustainable development in island regions.

Island development and marine ecotourism

Although often associated with 'paradise' (Baldacchino, 2012), island nations are considered, by the UN, to be some of the world's 'least developed' nations (UN, n.d.), with island regions often referred to as 'vulnerable,' given their narrow resource bases, remoteness, and susceptibility to natural hazards and external economic shocks (Baldacchino, 2012; Belmar et al., 2016; Lucas et al., 2017; Nunn and Kumar, 2017). That said, it is important to note that this explicitly reflects the barriers that may limit attempts to garner increased economic prosperity and/or development capacity rather than island societies as a whole.

As described by (Grydehøj et al., 2021, p.4), in reflecting upon Hau'ofa (1994), the modern development and governance of island resources is also often heavily steeped in colonialism, where Western standards for 'successful' development are far too narrow in their economic, geographic, and cultural views. Dating back to the 15th century, island states have faced oppression from the United States, France, Spain, England, and the Netherlands (Keegan and Diamond, 1987; Leposa, 2020). While there remain proponents of some aspects of the colonial legacy (Feyrer and Sacerdote, 2009), Kay (2010) maintains that colonialism, in Latin America specifically, has led to harmful *endo*-colonial relations that sit at the root of present-day developmental inequities. In the Caribbean, Sealy (2018) notes that colonization has not only impacted the regional ethnic makeup, but that the perpetuation of globalization as a neo-colonial structure has created a larger dependence on investments from the Global North. Overall, there exists a small body of literature that discusses the role of the blue economy in perpetuating or combating neo-colonialism. However, scholarship surrounding the colonization of islands maintains that neo-colonialism can propagate harmful outcomes of sustainable development projects such as marine ecotourism (Heim, 2017; Durokifa and Ijeoma, 2018; Grydehøj et al., 2021).

Typically, 'tourism intensive' island regions derive a substantial proportion of their economic development from the marine ecotourism industry (Adamiak and Szyda, 2022). McElroy (2006) refers to tourist-driven island economies as SITES ('Small Island Tourist Economies'), describing the expansion of tourism as a prominent development strategy for small economies, where there exist large dependencies on the industry. While, marine ecotourism can lead to a host of benefits, research in the island context specifically, more often notes the potential consequences of such development in destinations considered to be on the 'global periphery' (Dodds and Graci, 2012). For example, while ecotourism may produce local job opportunities, Das and Chatterjee (2015) posit that community members are more often placed in low-skill and/or low-pay roles. Moreover, Harrison and Prasad (2011) found that in Fiji, for example, there exist high levels of benefit leakages to foreign investors. In Bocas del Toro, specifically (Scott et al., 2024, p.2), explain that tourism-related development can lead to inequitable impacts through the promotion of real estate ventures in culturally significant areas, like mangroves, where investors may view the local environment as "obstacles to achieving 'paradise.'"

Bocas del Toro, Panama

Located off the Caribbean coast of Panama, Bocas del Toro is one of the country's top ecotourism destinations. It consists of approximately nine islands and 200 islets and is home to a population of approximately 22,500 across the larger Bocas del Toro district (INEC, 2021). Attributable to a history of colonialism, the construction of the Panama Canal, and the cultivation of a plantation economy, among other reasons, the region is also home to a variety of distinct racial and cultural groups including Ngäbe peoples (those indigenous to present-day Panama and Costa Rica), Panamanians, Afro-Antilleans, and Chinese individuals, for example (Guerrón-Montero, 2006; Carse, 2014; Suman and Spalding, 2018). Moreover, Bocas del Toro's most developed islands have become increasingly inhabited by lifestyle migrants—relatively affluent individuals with the capacity to move to destinations, typically in the Global South, with warmer climates, a lower cost of living, and a seemingly higher quality of life—from the United States (Benson, 2013; Spalding, 2013).

Although not formally considered an autonomous state, Bocas del Toro displays many of the hallmark characteristics of a SIDS as per the UN Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States (UN-OHRLLS, 2022). It is home to both a distinct societal makeup and unique marine ecosystems (Seemann et al., 2014; Pleasant and Spalding, 2021), and faces documented issues of infrastructural development and geographic isolation from larger global markets (Tilmans et al., 2014; Pleasant and Spalding, 2021).

Bocas del Toro's economy is predominantly supported by the tourism industry; across the larger Bocas del Toro province, tourism makes up 95% of all economic activity, greatly exceeding the national average (Klytchnikova and Dorosh, 2013). The most lucrative form of tourism is referred to by the Autoridad de Turismo de Panama (Tourism Authority of Panama; ATP) as 'island ecotourism' (ATP, 2020), with the most popular destinations being Starfish Beach, Red Frog Beach, and Isla Bastimentos National Marine Park (Camarca de Turismo de Bocas del Toro, 2022). While the ATP does not explicitly refer to 'marine ecotourism' in their reporting, for the purposes of this study, 'island ecotourism' and 'marine ecotourism' will be considered synonymous, as their accepted definitions align greatly.

Common marine ecotourism-based businesses in the region include boat tours and taxis, restaurants, hostels, and gift shops, with much of the region's tourism development concentrated in Bocas Town, Isla Colón, where an average of 150,000 tourists visited annually pre-COVID-19 pandemic (Gray et al., 2015). Strikingly, although Bocas del Toro now sees approximately 225,000 tourists per year, the Bocas del Toro province remains one of the poorest in the nation (CECOMRO, 2018; ATP, 2020).

Moreover, to appreciate the nuances of Bocas del Toro's current socioeconomic landscape, one must also understand its economic history, which is closely tied to colonial resource extraction. In the early 20th century, the construction of the Panama Canal and the establishment of the U.S. Canal Zone cemented the United States as

a major player in the Panamanian economy. In Bocas del Toro, specifically, this presence was predominantly felt through the establishment of the United Fruit Company (UFC), an American-owned corporation trading in Latin American-grown fruit, namely bananas (Pleasant and Spalding, 2021). Typically supporting the UFC's operations were Afro-Caribbean and Ngäbe workers, as well as labour migrants from China and Italy (Spalding, 2011). This created harmful shifts in power, as Black and Indigenous individuals were often exploited and marginalized through the imposition of a globally capitalistic system (Amin, 1978). While small-scale operations remain (now Chiquita Brands International), the UFC's presence in the archipelago declined greatly by 1990 due to war, crop diseases, and labour losses (as a result of poor pay and working conditions) (Guerrón-Montero, 2006), making way for a burgeoning tourism industry by the 2000s, as many large-scale housing developments were left vacant and global interest in the region increased following the 1991 earthquake.

Today, the archipelago's socioeconomic and environmental systems are inextricably linked to the marine ecotourism industry, attracting individuals looking to experience its vibrant culture, beautiful beaches, and ocean life (Klytchnikova and Dorosh, 2013; Spalding et al., 2015; Lucas, 2019; ATP, 2020; Mach and Vahradian, 2021; Pleasant and Spalding, 2021; Bocas del Toro Tourism, 2023). That said, tourism infrastructure across Bocas del Toro has been deemed 'suboptimal' by the ATP, specifically as it pertains to the limitation of physical space and the overload of basic services, such as water provisioning (ATP, 2020). Critical to this study, Bocas del Toro is also home to widespread issues of water insecurity; the majority of households across archipelago do not have access to running water supplied by the *Instituto de Acueductos y Alcantarillados Nacionales* (Institute of Aquaducts and Sewers; IDAAN), with 23% of the population instead turning to bottled water or drinking unfiltered rainwater respectively (CNA, 2016) (Figure 1). In fact, just 1.9% of the total residences connected to IDAAN's services reside in the Bocas del Toro province (IDAAN, 2022). As such, water insecurity is among the region's most precarious issues.

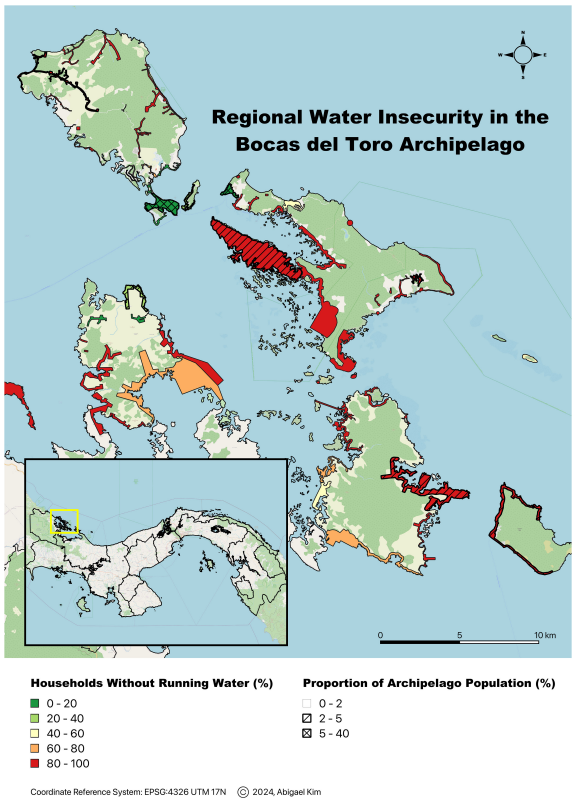

FIGURE 1
Regional water insecurity across the Bocas del Toro Archipelago represented by the percentage of households in each census region without access to running water. The population density of each region in relation to the archipelago's total population is also represented. Uncoloured areas represent regions outside of the archipelago or those not captured by the Panamanian Census. Created using the 2010 Panamanian Census Data, accessed from the STRI GIS Data Portal (2019).

Methods

In this study we employ a multi-method approach—the combining of two or more methods to expand one's research base when investigating a research question or phenomenon (Roller and Lavrakas, 2015)—that is firmly rooted in local experiences and perceptions. This includes the use of semi-structured interviews, non-participant observation, and document collection. While our approach pulls from that of political ecology, we do not attempt to formally mobilize methods typically used in such studies (e.g., Cole, 2012), but rather utilize participant responses to deduce the governance processes, historical events, etc., that frame their experiences with marine ecotourism and water insecurity. It should be noted that the data collection period in Bocas del Toro (May 25th, 2023 to June 27th, 2023) also coincided with a water shortage; declared an environmental emergency on June 9th, 2023.

Semi-structured interviews

A member of our research team travelled to Bocas del Toro from May 25th, 2023 to June 9th, 2023 to conduct semi-structured interviews; asking participants open-ended questions to elicit information regarding one's research topic (Adeoye-Olatunde and Olenik, 2021). During this time, a total of 16 individuals, including members of the Bocas del Toro Chamber of Tourism, property owners, business owners, tour guides, labourers, and concerned citizens, were interviewed. Participants in this process—those older than 18 years of age and who have lived in the region for over 5 years—were identified through a purposive snowball method (Weiss, 1994), beginning with contacts provided by a local informant.

Topics discussed (i.e., water shortages, infrastructure, economic and tourism development, and overall welfare) were drawn from a pre-determined interview guide developed through preliminary document collection and with guidance from researchers in the region (see Supplementary Table 3). While the guide was used to facilitate conversation, it adapted as more information was provided and new events occurred (i.e., the onset of an environmental

emergency during the interview period). Interviews lasted an average of one hour and, depending on the participant's level of comfort, were conducted in both English and Spanish (with an interpreter translating responses). Due to participant location and the accessibility of each island, interviews took place across three of Bocas del Toro's nine main islands—Isla Colón, Isla Carenero, and Isla San Cristóbal (Table 1).

Non-participant observation

To support responses collected during interviews, non-participant observation—observing and documenting an event without actively participating in activities (Becker and Geer, 1957)—was used to explore how ecotourist attractions function across the archipelago and further understand how communities respond to, and navigate, water shortages. Observed events were identified through community contacts established during the interview period as well as local WhatsApp groups; typically used to share important information across the region. They included waiting in line at public wells, visiting an ecotourist attraction, observing protests regarding water access, and attending a public meeting with IDAAN (further event details available in Supplementary Table 4). The average observation process lasted approximately one hour and involved taking notes regarding what did and did not occur, what demographic of individuals were present, and the overall tone of those present.

Document collection

Given that this is the first study to investigate topics of marine ecotourism and water insecurity in Bocas del Toro, supplementary grey literature was sought out to provide wider context and breadth to the study. Documents were found by searching for qualitative phrases related to drought, water, and tourism in Bocas del Toro in Google and the Bocas Breeze Newspaper database. Documents collected include government policies, local news articles, and regional reports.

Analysis

The analysis of the data was guided by an inductive, constant comparative approach, as per Hodkinson (2008) and Glaser (1965), whereby we sought to increase our understanding of potential underlying theories and identify emergent themes through a constant back-and-forth engagement with the data. In practice, this first involved transcribing and digitizing interview responses and observation notes. The data was then coded categorically (e.g., the codes 'GOV-TOURISM' and 'GOV-WATER' were utilized whenever a participant described how they felt about and experienced tourism and water governance respectively), and supplemental documents were reviewed to compare and contrast with interview and observational data.

Results

In an effort to mirror the anecdotal nature of the data collected, here we weave together interview responses, observational notes, and document insights to describe how the economic development of Bocas del Toro, governance processes, experiences with water shortages, and future development in the region, shape local experiences with, and perceptions of, marine ecotourism and water insecurity. Figure 2 demonstrates a timeline of events and governance developments described by participants, as well as relevant events to contextualize the case.

Beaches as the new bananas–shifting to a tourism-based economy

With increased neoliberal capital interest, government incentives to purchase land for tourism, and an abundance of global interest, tourism in Bocas del Toro effectively 'exploded' by the year 2000, signifying, as put by Pleasant and Spalding (2021), a shift from a banana-based export economy created by the UFC to a tourism-centric economy based on the region's beaches and biodiversity. Despite this shift, the UFC's presence in Bocas del Toro remains prominent, as it had become integrated into the region's social and infrastructural fabric (e.g., the creation of communication networks, railway systems, power plants, medical facilities, and housing developments) (United Fruit Historical Society, n.d.). Furthermore, when asked about the UFC in Bocas del Toro, participants described how a dependency on a singular industry and foreign entity resulted in harmful losses of traditional livelihoods, such as fishing and agriculture—"we used to be farmers who could feed ourselves, now we've lost this completely," said one property owner.

Among those participants directly employed by the tourism industry, all spoke positively about the renewed economic benefit it brings. As one tour operator put it, "the money is in tourism, the experiences." Of those participants situated outside of the

TABLE 1 Socioeconomic and geographic description of interview locations/study sites.

Island	Population	Description
Isla Colón	~9000	Location depicted in Figure 1. Home to a mix of locals and lifestyle migrants, Isla Colón is the most developed and inhabited island in the archipelago, with most of this growth occurring in the southern tip. The northern region of the island is primarily rainforest, agriculture, and dispersed pockets of residences.
Isla Carenero	~800	Location depicted in Figure 3. Approximately 100 meters from Isla Colón, Isla Carenero is a long and forested island, home to a few notable tourist accommodations and a mix of locals and lifestyle migrants.
Isla San Cristóbal	~1300	Location depicted in Figure 1. A forested island in the west of the archipelago, Isla San Cristóbal is located near the center of Almirante Bay and is home to a large number of Ngäbe communities.

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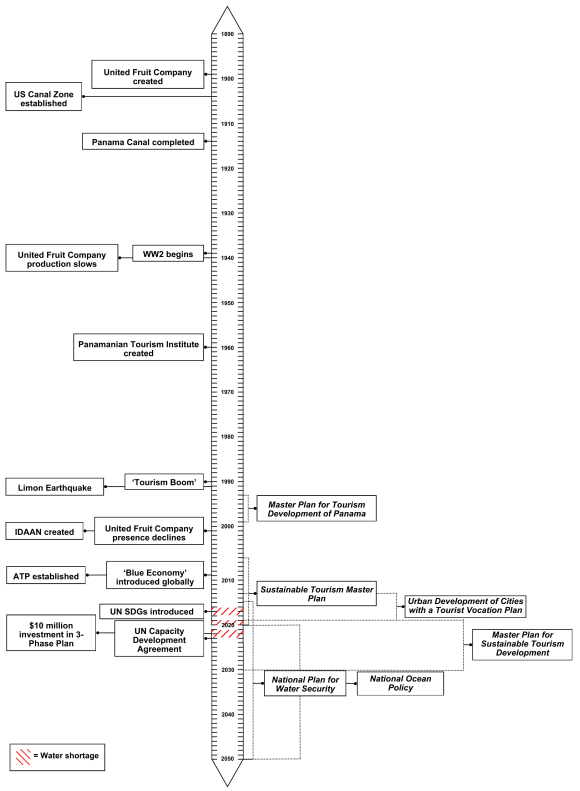

FIGURE 2
Timeline of events and developments regarding ecotourism and water security in Bocas del Toro, Panama. The timeline presented is not exhaustive of all related moments in history, but rather those relevant to this particular study. Entries on the left of the timeline represent historical events, while those on the left represent policies and plans. ATP refers to the Tourism Authority of Panama; IDAAN refers to the Institute of Aquaducts and Sewers.

industry, a majority also acknowledged that marine ecotourism does play a major role in supporting the local economy— "tourism is good," noted a construction worker we spoke with, "yeah it's good because it makes work and brings in money to us when it's done right."

That said, there remains great skepticism across all participants surrounding the industry's future in Bocas del Toro:

"I used to fully believe that tourism was the key to successful cities with no opportunities.

But then we have fragile societies like we have in Latin America, and there's not a strong

government that actually tries to implement human development. It is not taking us to the

right place," said a member of the Bocas del Toro Chamber of Tourism.

When asked what she believes to be the largest development project in the community, one business owner responded:

"Tourists. But it grew alone. It grows alone … It's incredible. Bocas [del Toro] has been developed in many ways, but not in basic things. It keeps growing, growing, growing, and I don't see [public utilities] growing with it."

Navigating an era of sustainable development – tourism and water governance

In contextualizing participant responses, we offer a brief exploration of relevant actors, plans, and policies as they pertain to marine ecotourism and water governance in Bocas del Toro. The overarching development of Panama's marine sector is directed by the *Ministerio de Relaciones Exteriores* (Ministry of Foreign Affairs), *Ministerio de Ambiente* (Ministry of the Environment; MiAMBIENTE), and the UN Development Programme via the *Política Nacional de Océanos de Panamá (*National Ocean Policy of Panama; NOP). Ratified in 2022, the goal of the NOP is to pursue a 'Blue Panama,' where "marine and coastal resources are protected, conserved, valued, and used sustainably, positively impacting the quality of life of citizens in an inclusive and participatory manner" (MiAMBIENTE, 2022, p.13). To do so, blue economic development, internally defined as the "sustainable use of marine and coastal resources…, approaching marine-coastal activities under the prism of balance between the three social, economic and environmental dimensions," is prioritized as one of 4 strategic axes (MiAMBIENTE, 2022, p.21). Central to this, under Goal M. 27, is the "promotion of sustainable tourism development linked to the oceans" (MiAMBIENTE, 2022, p.21), where the NOP yields much of the responsibility around this directive to the ATP.

Since 2008, the ATP has been responsible for "the development, promotion, and regulation of tourism as an activity"; maintaining tourist resources, protecting the ecological balance of the land, and respecting the customs of its inhabitants (Decreto Ley No.4, 2008, p.1). When asked about their feelings towards the ATP, virtually all participants expressed concern regarding tourism governance in Bocas del Toro, and its ability to "make things happen." According to one individual, tourism in Bocas del Toro is "governed by people who don't have morals, they are just selfish. If it doesn't make them money, they don't do it." At the community level, tourism in Bocas del Toro is monitored by the *Cámara Turismo Bocas del Toro* (Bocas del Toro Chamber of Tourism), a non-profit community organization that works to organize the local tourism sector and protect its longevity (CTB, 2023). Nonetheless, the Chamber of Tourism is not afforded government funds or jurisdiction to carry out and/or enforce such endeavours and does not play a large role in high-level decision-making regarding tourism in the archipelago (ATP, 2020). According to a member of the Chamber of Tourism, this creates issues surrounding community input, whereby the community is neither adequately consulted nor are their ideas accurately integrated into development plans:

"We are a private sector, but we have no say or worth in the final decision. [The ATP] says: 'We met with the Chamber of Tourism and the chamber is approving [the development]'. But later, when we come and tell you all the things wrong with the plan, they say 'Oh no, you came up with this idea, the Chamber approved it'…We don't want that; we don't need that. We need real things."

At large, plans for tourism development in Bocas del Toro are organized under the *Plan Maestro de Desarrollo Turístico Sostenible*

2020-2050 (Master Plan for Sustainable Tourism Development 2020-2050; MPSTD), with goals to promote Panamanian tourism, improve global competitiveness, decentralize tourism operations, and develop state tourism policies (ATP, 2020). In Bocas del Toro, the MPSTD's Action Plan includes a total of 19 actions and 75 projects. Of this, 6 projects fall under Action 2.4.4. Improvement of Basic Infrastructures, including a project to, in tandem with IDAAN, "improve the drinking water supply system on Isla Colón" by 2022 (ATP, 2020, p.316). Despite this, participants were wary as to whether these plans would ever "hit the ground," as put by one individual. "The [MPSTD] is a plan," said a member of the Chamber of Tourism, "but if you do nothing to implement it, it's not going to change. I haven't seen any real action." "You don't need the government. The government is not going to do it. Because the government has no brain to think," expressed another member of the community.

The implementation of these projects is largely overseen by IDAAN, with more specific water infrastructure improvement plans for Bocas del Toro listed in Panama's *Plan Nacional de Seguridad Hídrica 2015-2050* (National Plan for Water Security 2015-2050; NPWS). The NPWS serves as a roadmap for ensuring that "every person in [Panama] has sustained access to quality water and basic sanitation," with a focus on "eliminating inequalities of access in an inclusive and equitable manner" (CNA, 2016, p.65). In pursuit of this, the NPSW budgets 3.3 billion USD to address issues of drinking water in Isla Colón exclusively, including improvements to catchments and sewage systems (CNA, 2016). However, while the NPSW projects that all individuals in the Bocas del Toro province will have access to drinking water by 2025, as will be described in subsequent sections, participants note that, as of 2023, they are skeptical as to whether this goal will ever be reached. As one business owner put it, "it's only plans plans. But when you go to practice? No, nothing happens."

Accessing water in Bocas del Toro – a myriad of methods

Very limited formal documentation on water infrastructure and distribution processes in Bocas del Toro is publicly available; as put by one participant, "nobody really knows exactly how the water works [in Bocas del Toro]." Despite this, with insights from community members, we attempt here to establish a clearer picture of water distribution across the study sites (Figure 3), highlighting the intensity of water insecurity in Bocas del Toro and inform how marine ecotourism might impact water access.

Residents of Isla Colón typically access water through IDAAN's public distribution system, and/or via public or private wells. IDAAN services over 9,000 individuals across the southern region of Isla Colón through an underground pipe system powered by gravity and a select number of pumps. While it is widely understood this water, supplied by a local reservoir ('Big Creek') (Figure 3, Point 3), is filtered at a nearby plant (Figure 3, Point 4), the efficacy of this process remains highly debated (Corea, 2016; Telemetro, 2022; Albaez, 2023; Godoy, 2023; Ortiz, 2023). When asked whether she would drink water from her tap, one shop owner responded, "I'm not gonna do that," while her partner added that the water is often "yellow or brown" in colour. This system is also subject to the impacts of 'dry season' in the Caribbean (October to April), when services are often limited by IDAAN to two hours in the morning and evening. Regions of the island not serviced by IDAAN rely on rainwater collection (Figure 3, Point 5) or the use of public or private wells (Figure 3, Point 2). As of today, there exist eight IDAAN wells in Isla Colón, with only four in constant operation, while private wells on the island are typically located in regions populated by lifestyle migrants and affluent families. That said, virtually all wells across the archipelago require electricity, of which the local supply is highly unpredictable.

In Isla Carenero, those residing along the island's perimeter typically rely on underwater pipes that distribute water sourced from IDAAN's system in Isla Colón (Figure 3, Point 7). That said, participants noted that this process is unreliable, as there is often not enough water pressure from Big Creek to reach the shores of Isla Carenero. According to a local restaurant owner, "[Isla] Carenero has huge water problems. When there is no water there, [they] struggle the most." Participants from Isla Carenero also noted that it is common to utilize rain collection systems (Figure 3, Point 8) or to travel to Isla Colón to purchase jugs of water. Furthermore, many restaurants and tourist operations on the island utilize private wells to service their patrons, while lifestyle migrants are also known to have access to private wells.

Isla Colón and Isla Carenero are the only islands (out of nine that are inhabited) to have direct access to IDAAN's services. Other islands, like Isla San Cristóbal, rely on community-led initiatives or the purchasing of water jugs from Isla Colón. As described by a local tour guide, approximately 600 individuals on Isla San Cristóbal access water via a natural catchment system and man-made storage and distribution point developed through a fundraising project by local and international organizations (Figure 3, Point 9). The storage point collects water from the island's northern mountain region, filters it for solids, and distributes it to the community via gravity and underground pipes (Figure 3, Point 10). According to a local tour guide, this process is quite reliable; during times of drought, residents of other islands have looked to him for water.

Frustrations run high – a history of water shortages

Bocas del Toro has faced (documented) water shortages in 2016, 2017, 2019, 2022, and 2023. One restaurant owner noted that, while "water has always been an issue in [Bocas del Toro]," the problem "has never been this bad." Following a prolonged period of drought and water restrictions, as well as pressure from MiAMBIENTE, a State of Environmental Emergency was declared by the Cabinet of Panama in both 2022 (November 8th) and 2023 (May 30th) (Resolución de Gabinete No. 127, 2022; Resolución de Gabinete No. 48, 2023). Doing so authorizes IDAAN to enact the region's 'Contingency Plan', involving the assignment of water trucks to

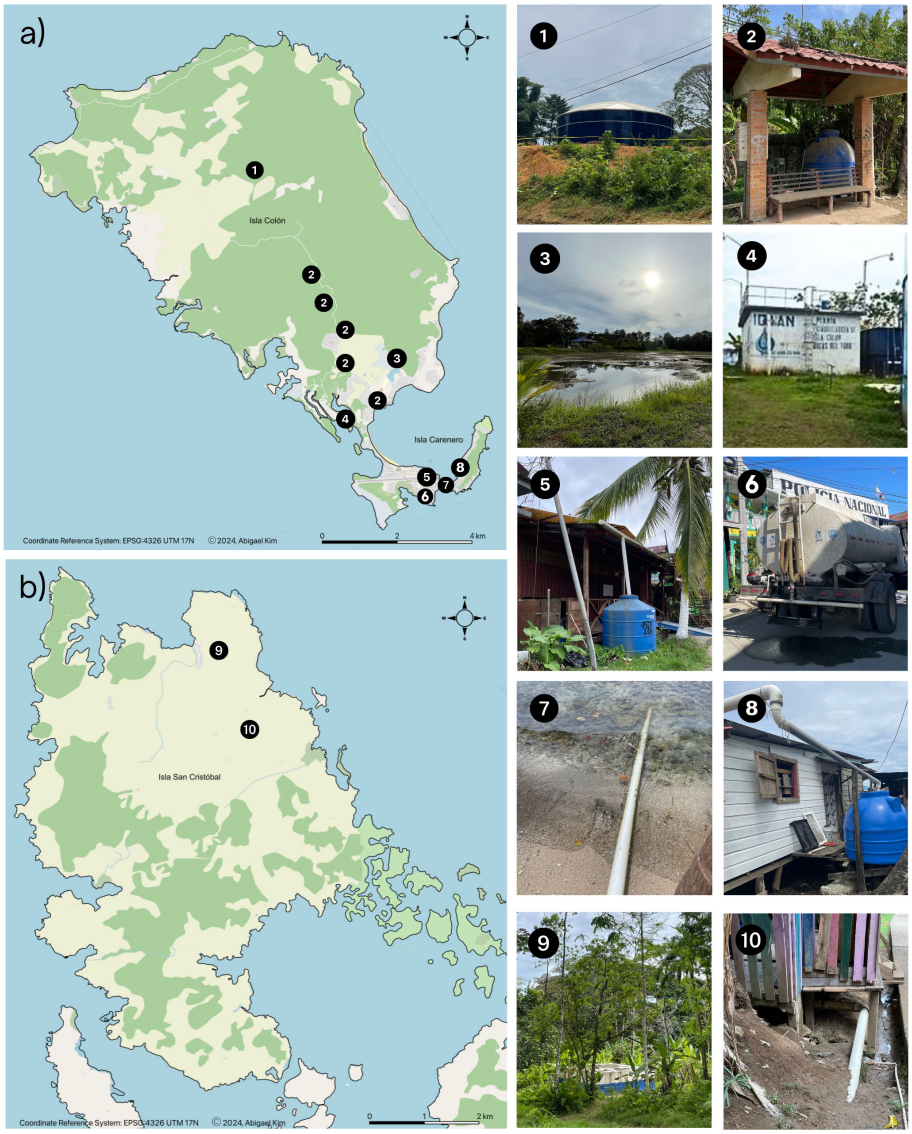

FIGURE 3
Maps of approximate locations of examples of water infrastructure across Isla Colón/Isla Carenero **(A)**, and Isla San Cristóbal **(B)** as described by participants. Image 1—a newly constructed water reserve tank. Image 2—a typical public well in Isla Colón. Image 3—Big Creek Reservoir. Image 4—IDAAN water processing station. Image 5—a typical rain catchment system in Isla Colón. Image 6—a water tanker deployed during water shortages. Image 7—water line that connects Isla Colón and Isla Carenero. Image 8—a typical rain catchment system in Isla Carenero. Image 9—water catchment station in Isla San Cristóbal. Image 10—underground pipe system in Isla San Cristóbal. Images 1-3 and 5-10 were taken by Abigael Kim. Image 4 is reprinted from the IDAAN Water Treatment Plant Database (https://sig-idaan.hub.arcgis.com/apps/0a722564d72f421798b33b902ebef781/explore).

distribute potable water to affected businesses and residences on Isla Colón and Isla Carenero, the increase of water conduction line diameters, the activation of additional wells, and the increase of regional technical support (IDAAN, n.d.).

During this type of Environmental Emergency, those without private well access typically purchase water jugs from local shops, fill their household tanks at public wells, or fill up smaller jugs from IDAAN trucks (Figure 3, Point 6). However, participants mentioned that such alternative methods are not sufficient, leaving many without water for days on end. One souvenir vendor, for example, mentioned that she had not been able to shower in "over 8 days." Moreover, as lines for local wells grow, business owners mentioned that these trucks are extremely challenging to access, having to "choose between running [their] shops and getting water."

Overall, aside from climate change as a catalyst, there is no largely agreed-upon answer or government consensus as to why water management and infrastructure are so precarious or why Bocas del Toro feels droughts so intensely. However, participants speculated that they have something to do with the coinciding of 'dry season' and tourist season in the fall. As mentioned in the Bocas Breeze Newspaper in response to the 2016 shortage:

"In recent years, sometimes it doesn't rain for a while or excited tourists flood the island in

record numbers and when you turn the faucet, you are met with the depressing sound of a

'drip, drip, (silence)…' Maybe you left your toilet running and your tank has gone empty, or

perhaps the town reservoir has gone dry" (2016).

Undoubtedly at the center of these frustrations is IDAAN, more specifically as it pertains to the uneven distribution of water and lack of government accountability. According to IDAAN, water trucks are to deliver water to both city centres and residential areas. However, almost all participants mentioned that this system is not well executed, citing disparities in where water was being delivered during the 2023 shortage. "Unfortunately, there is a bad distribution of the water and trucks," one tour operator said, "they don't have a good plan for giving out the water, so they pass me by." More specifically, many participants mentioned that hotels are often prioritized, and speculated that truck drivers were being paid a premium by these establishments to visit them first. "A government truck should be for the community," said one community member, "but it doesn't happen in Panama."

Participants also expressed frustration with IDAAN's accountability during these shortages. "I don't look to the government for water," said one individual, "I pray to God." During the 2023 shortage, in particular, many community members were left with unanswered questions, as the regional IDAAN phone line for Bocas del Toro was disconnected, and public meetings with IDAAN were continuously cancelled. As was seen on multiple occasions during the 2023 shortage, such feelings often led to public displays of frustration, in the form of road blockades and protests; "we don't just wait for water, we have to block the streets for water," said one shop owner.

In June 2023, after over a month without reliable access to running water, IDAAN announced the connection of two additional wells to supplement Big Creek while precipitation levels remained low (Ortiz, 2023). Despite these developments, residents of both Isla Colón and Isla Carenero still face water insecurity at large, with water remaining a contentious issue across the archipelago.

A potential paradox? – Future plans for water infrastructure and marine ecotourism

Looking towards 2050, Bocas del Toro is the topic of numerous development projects in both marine ecotourism and water infrastructure. However, participants expressed disappointment about the priorities of the central government's plans and were skeptical of their potential outcomes.

In 2022, under the NPSW, IDAAN announced a 10 million USD investment in the "study, design, construction, operation, and maintenance of improvements to the components of the aqueduct in Isla Colón" (Ortiz, 2023, p.1). According to Albaez (2023), this includes a 3-Phase Plan to develop a more reliable 24-hour public, potable water supply system:

- Phase 1—Well drilling/maintenance and construction of a water storage tank with a 700,000-gallon capacity.
- Phase 2—Construction of well-housing units and pumping equipment.
- Phase 3—Construction of supplementary desalinization plant and improvements to water treatment plant and dispensers.

Despite reports that 60% of the project has been completed as of May 2023 (Ortiz, 2023), including the totality of Phase 1 and the maintenance of public well systems from Phase 2, none of the participants indicated that they had seen improvements in their water supply, but instead questioned the efficacy of IDAAN's projects. For example, one participant referred to the early release of 5 million USD of the 3-Phase Plan investment during the 2022 shortage to rapidly increase water infrastructure quality and capacity (Resolución de Gabinete No. 127, 2022), of which they had yet to see the effects of:

"They would come around and promise us that they would solve the problem, and it never

happened … They released 5 million dollars. Where does it go? It's like ice in the sun, nobody knows where it goes … A week after they got the money the water came like lemonade, and we got it once a day".

All participants were critical of where the Government of Panama's plans for the development of water infrastructure sit on the list of priorities, as compared to tourism. Those directly employed by the tourism industry made note of the Urban Development of Cities with a Tourist Vocation Plan; a 6-year 100 million USD loan (2019-2023) for the development of tourism infrastructure, management, and governance, including that of public utilities in Isla Colón (Inter-American Development Bank, n.d.). However, when asked whether they had seen any benefits from this investment, all pointed to the development of more hotels, attractions, and restaurants rather than improvements to existing infrastructure. "When I see that [investment] here, it's in building hotels," mentioned one property owner, "but they're not building up the community with it, you know? 'Why is that?' I ask all the time". Another participant mentioned that "[Bocas del Toro] is so marketed as a tourism place that there is nothing else [the government] does. We have culture and needs but they don't see."

While not explicitly discussed with participants, an important development in this case came in July of 2023, when Panama signed on to the UN's Water Capacity Development Initiative (CDI) for SDG 6; the first country in the world to do so. The CDI serves as a vehicle for inter-agency cooperation on capacity development related to freshwater, sanitation, and hygiene (UN Water, 2021, p.1). Its goal is to enable the UN system, and its partners, to coordinate support for participating countries based on their unique needs. While it is too early to predict the efficacy of this initiative, it does indeed promote "national-level ownership" and capacity building, rather than a "simple transfer of mechanisms" (UN Water, 2021, p.1). As Panama continues to pursue a blue economy rooted in marine ecotourism as well as improved water

security, questions remain as to whether there is indeed a balance to be struck between the two; one that aligns government aspirations for development with the realities and needs of those living in Bocas del Toro.

Discussion

Contextualized around the potential paradox of developing a blue economy in a resource-insecure island region, this study examines how the relationship between marine ecotourism and water insecurity, in particular, manifests at the community level through a case study of Bocas del Toro, Panama. Guided by local experiences and perceptions, our findings highlight the role that socio-historical shifts, central plans and policies, and ongoing crises play in shaping the realities of local residents and their attitudes toward sustainable development and the government as a whole. In this section, we situate key findings within the literature, teasing out applicable lessons learned, making inquiries into the reasoning behind our results, and contemplating areas for future research.

The role of colonialism and race in marine ecotourism and water governance

Our results further perpetuate the widely accepted notion that issues of island development and resource governance must be considered within the context of colonization and systemic racism. In particular, studies in the 'island tourism' field (e.g., Cywiński (2015); Guerrón-Montero (2006); Grydehøj et al. (2021)) would describe the lasting impacts of losses in traditional livelihoods at the hands of the UFC, and its role in directing Bocas del Toro's economic development, as a function of *neo*-colonialism. Along this vein, Grimwood et al (Grimwood et al., 2019, p.1) posit that the production and consumption of tourism have the propensity to "(re)inscribe colonizing structures, systems, and narratives across time and space," while (Eyisi et al., 2024, p.154) note that the pace and manner of tourism development is often an artifact of "tourists from colonizers becoming the source market for the colonized". For example, a study of wildlife tourism by (Mach et al., 2023, p.1474) found that wildlife tourism boat guides learned what tourists (many being from Europe and North America) "wanted to see and seemed to enjoy most (e.g. pretty beaches and charismatic wildlife) and itineraries evolved accordingly," often changing the actual names of destination, commonly used between locals to simple English, in order attract more tourists (e.g., 'Sloth Island').

A discussion of colonialism in this context, that being inherently racially formed, also brings us to the role of systemic racism. While the Panamanian government has enacted laws surrounding racial discrimination, in an effort to reconcile past and present harms [e.g., the dispossession of Afro-Caribbean farming communities (Chapman, 2014), infringements upon Ngäbe land rights (Finley-Brook and Thomas, 2010), and the attempted assimilation of Afro-Caribbean identity into mestizo society (Corinealdi, 2022)], Afro-Panamanians and Ngäbe individuals still make up some of the poorest groups in the nation, often residing in some of the least invested-in regions, with limited access to social services, water included (INEC, 2021). While drawing a causal relationship between race and water insecurity is not within the scope of this research, the 2020 UN World Water Report does explicitly relate water insecurity and intersectionality, especially regarding race and class (UN Water, 2020). Peer-reviewed studies on this issue, however, overwhelmingly exist in the North American context (e.g., Deitz and Meehan, 2019; Dickin and Gabrielsson, 2023; Harrington et al., 2023; Méndez-Barrientos et al., 2023; Workman and Shah, 2023). For example, a spatial analysis of water insecurity across the United States by Deitz and Meehan (2019) found that deficiencies in household water infrastructure are concentrated in regions typically inhabited by racialized groups. Specific to Bocas del Toro, our research highlights disparities in access to water between social and racial groups, as determined by foreign and ethno-racial status. For example, participants note that, during water shortages, wealthier lifestyle migrants and hotel operators have the financial capital to purchase water and/or pay truck drivers to deliver it.

The government-community disconnect

Central to this case is an evident disconnect between the Government of Panama's aspirations for marine ecotourism development in Bocas del Toro and the needs of those living in the region, with many participants believing the government to be prioritizing marine ecotourism development over plans to improve water infrastructure. While a more intensive study, one which highlights the interconnectedness of climate change impacts and water management within larger government policies, is required to support this notion, our findings suggest that local realities may perpetuate the narrative that the government is 'leaving behind' social sustainability in pursuit of a viable marine ecotourism industry. In the Caribbean context, Peterson (Peterson, 2020, p.20) argues that "growth, rather than development, remains the overriding focus," whereby "the quality of life for residents and, in turn, the quality of experience for visitors have not always met the various principles of sustainable tourism." Furthermore, Srivastava and Mehta (2023) and Scott et al. (2024) propose that this outcome can indeed be "further exacerbated by neoliberal development policies and the notion of [Bocas del Toro] as a 'resource frontier.'

As found by Wortman et al. (2016)'s examination of local opinions on foreign tourism investment in Mauritius, our results suggest that the sheer profitability of the marine ecotourism sector may incentivize governments to continue to pursue its growth in terms of investment and future planning. They describe the tourism industry as "a variant of outward-oriented development strategies," where the services required to host a successful industry may eclipse the services required by the local population. This is of extreme relevance in island regions, where tourism is a major contributor to national economies, motivating governments to continue to pursue 'tourism-led growth,' as put by Lee and Chien (2008), and attracting increasing amounts of foreign direct investment (Tecel et al., 2020; Broner et al., 2023).

If Bocas del Toro's marine ecotourism sector continues to grow without the development of essential infrastructure alongside it, the region may indeed hit the point of 'over-tourism', where the arrival of excessive numbers of tourists at a destination imposes negative impacts on local communities (Dioko, 2017). Peterson (2023) notes that over-tourism, in the Caribbean specifically, is often an artifact of "neo-liberal outward-oriented tourism policy., largely based on private and political interests to the exclusion of societal values and community interests." Notably, reaching this point may, in fact, incentivize governing bodies to prioritize the development of public utility infrastructure to ensure that marine ecotourism remains an economically viable industry.

The importance of trust

The prevalence of mistrust in the Government of Panama expressed by participants can be described as a lack of 'political trust'; trust in institutions and governance actors stemming from group membership, government policies, and/or general political support or satisfaction (Bauer and Freitag, 2016). Our results demonstrate that local *perceptions* of corruption can mold residents' opinions of marine ecotourism development, and its ability to act on issues of water insecurity. While we are not aware of any studies that explore the role of government corruption in affecting local perceptions of sustainable development, more broadly, Karst and Nepal (2022) note that a lack of established trust between communities and actors that oversee ecotourism development can lead to an array of management challenges and stakeholder conflicts.

Political trust is also often tied to the ability of actors to deliver quality public services and respond to citizen demands (Murtin et al., 2018). In this study, participant responses indicate skepticism regarding the effectiveness and accountability of government actors and policies. As described by Fragkou and McEvoy (2016), in an investigation of community attitudes surrounding water scarcity in Latin America, traumatic and frequent experiences with water scarcity can foster concerns regarding political accountability, further erode trust in utility providers, and perpetuate poor opinions of future developments that could potentially improve water access, like desalinization plants. Enqvist and Ziervogel (2019) also found that when compounded with historically tense relationships between communities and policymakers, the mishandling of water shortages can signal to local residents that government action is ineffective and subsequently untrustworthy. Eyisi et al. (2024) review of tourism in Nigeria also found that negative opinions of tourism development can be tied to a history of unfulfilled government promises. In the case of Bocas del Toro, participants often pointed out a lack of follow-through on the MPSTD. Nilsen et al. (2023) describe what it means to be a 'periphery' region on an *intra*-national scale, where the development of rural or isolated regions may fall victim to an 'urban bias' (Lipton, 1977). We witness this in Bocas del Toro as participants note that management schemes from the national level often overlook their interests as compared to more urbanized provinces closer to the core of Panama City.

Study limitations and future research avenues

While we believe the stories and perceptions shared with us to be of the utmost value to understanding our research questions, we acknowledge that our results represent the experiences of 16 individuals across the archipelago. Although a smaller sample size can enhance the validity of an in-depth inquiry (Crouch and McKenzie, 2006), a larger sample size can better account for diversity within and between stakeholder groups (Boddy, 2016). As the pool of research in this field begins to expand, we recommend that not only do future studies adequately account for community experiences and perceptions, but that they aim to include a variety of stake- and rights-holders, determining sample size as a "matter of judgment and experience … evaluating the quality of the information collected against the uses to which it will be put," as per Sandelowski (Sandelowski, 1995, p.179).

This research begins to fill knowledge gaps in the literature surrounding marine ecotourism development and access to water in island regions. To ensure that community realities and interests do not effectively 'fall through the cracks,' there exists a need to pursue community-centric research on the impact of a blue economic agenda on a variety of essential public utilities and human needs (e.g., electricity, food, housing). Furthermore, valuable insights can be drawn from studies that compare and contrast, in-depth, cases across island regions to better understand the norms of the community impacts of blue economic development in resource-scarce societies. Concerning Bocas del Toro specifically, there is a great need for continued research into all areas of marine ecotourism development and the equitable distribution of resources (both in relation to one another and independently), as ours is one of a handful of studies within the region (e.g., Spalding, 2013; Spalding et al., 2015; Spalding, 2017; Mach and Vahradian, 2021; Pleasant and Spalding, 2021; Mach et al., 2023; Sandelowski, 1995; Pigram, 2000; McElroy, 2006; Pascual et al., 2014; Sakellariadou, 2014; Roller and Lavrakas, 2015; Pierskalla, 2016; Nunn and Kumar, 2017; Ramos-García et al., 2017; Murtin et al., 2018; Nugraheni et al., 2020; Osterblum et al., 2020; Peterson, 2020; Phelan et al., 2020; Mach and Vahradian, 2021; Minow, 2021; Pleasant and Spalding, 2021; Ministerio de Ambiente de Panamá, 2022; Rahman et al., 2022; Resolución de Gabinete No. 127, 2022; Méndez-Barrientos et al., 2023; Nilsen et al., 2023; Ortiz, 2023; Pace et al., 2023; Resolución de Gabinete No. 48, 2023; Scott et al., 2024).

Conclusion

In this study, we mobilize local experiences with marine ecotourism and water insecurity to better understand how the relationship between the two manifests at the *community* level. Our results highlight issues, of colonialism and systemic racism, misalignments of development priorities, and eroded trust, that shape local experiences with sustainable development, and residents' perceptions of the ability of marine ecotourism to address issues of water insecurity.

Moving forward, as the Government of Panama pursues a 'Blue Panama,' and the global community continues to adopt the blue economy as a framework for sustainable ocean development, there

exists a need to re-center and internalize social sustainability, primarily issues of equity, as the leading goal of blue economic development. More specifically, in order to adhere to the original intent of a blue economy, this must not only include the prioritization of social equity throughout marine ecotourism and water governance, but also address the issues that underpin such misalignments, as found in this study. This can include an approach that focuses on the power disparities between groups through a socio-historical lens. Singh et al. (2023) refer to this as an 'anti-inequity' approach, whereby it is critical to investigate and understand the processes that perpetuate inequities in, in this case, water security.

Overall, this research has demonstrated that the 'balance' between community well-being and development in the pursuit of a blue economy in island regions is a matter far greater than 'growth,' 'infrastructure,' or 'development'. There exist important historical and social underpinnings that define the relationship between decision-makers and the communities in which they make decisions for, who proves to benefit from a blue economy, and perceptions of sustainable development as a whole. Ultimately, marine ecotourism cannot be considered part of a blue economy strategy if it does not prioritize social equity. As such it is pivotal that future research within this field understand how relevant plans and policies may manifest at the community level, directly from those communities that may face existing barriers to social well-being and sustainability.

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 humans were approved by Marine Affairs Program Ethics Review Standing Committee, Dalhousie University. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

AK: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Visualization, Writing – original draft, Writing – review & editing. CS: Conceptualization, Funding acquisition, Investigation, Project administration, Resources, Supervision, Writing – review & editing. WS: Conceptualization, Funding acquisition, Investigation, Project administration, Resources, Supervision, Writing – review & editing.

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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.

Publisher's note

Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fmars.2024.1377053/full#supplementary-material

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