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PERSPECTIVE

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Sea turtle conservation in São Tomé and Príncipe: Policies, practices, and insights from a community-based initiative

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Abstract

Unifying research and conservation objectives with the needs of local populations demands a profound understanding of the field. This perspective provides a brief policy and social-cultural context for the conservation of endangered sea turtles in São Tomé and Príncipe, Central Africa. It is illustrated by initiatives implemented from the 90s to the 2000s and complemented by a community-based intervention on Príncipe Island (2010–2014). The intervention focused on awareness-raising, economic-alternatives, capacity-building, and surveillances to deter poaching, collect scientific data, and increase outreach. It contributed to reduce sea turtle exploitation, train local conservationists, and increase awareness to economic alternatives. Securing stakeholders' support is vital for success, and endeavors like this provide a cost-effective approach, aligning biodiversity conservation strategies with local values and aspirations. Overall, this perspective underscores that failure to collaborate with those involved in wildlife subsistence livelihoods often results in delays and setbacks in reducing exploitation, while modest investments in local stewardship can efficiently improve ecosystems and human well-being.

KEYWORDS

Africa, alternative livelihoods, behavior change, building capacity, empowerment, Gulf of Guinea, island, marine, nonconsumptive use, traditional knowledge, wildlife take

1 | INTRODUCTION

Scientists working in underdeveloped locales face numerous limitations and unique challenges specific to their study areas (Lee & Renzetti, 1990; Smith & Heys, 2022). To have a lasting impact and contribute to the advancement of the field, they must share their expertise and provide practical support (Buxton et al., 2021; Sunderland et al., 2009). A collaborative process is essential, necessitating thorough comprehension of local culture and social integration (Catalano et al., 2019; Lilleyman et al., 2022). In addition, if engaging communities, the principles of Free, Prior, and Informed Consent should be respected and implemented (Buppert & McKeehan, 2013; UN, 2007).

Sea turtles have been exploited for centuries, but modern technology, particularly from the 20th-century onwards, led to an increase in commercialization of their products and interactions with industrial fishing (Bjorndal & Jackson, 2003). Today, all species are threatened (IUCN, 2023), primarily by fisheries bycatch and coastal development, followed by nest predation and

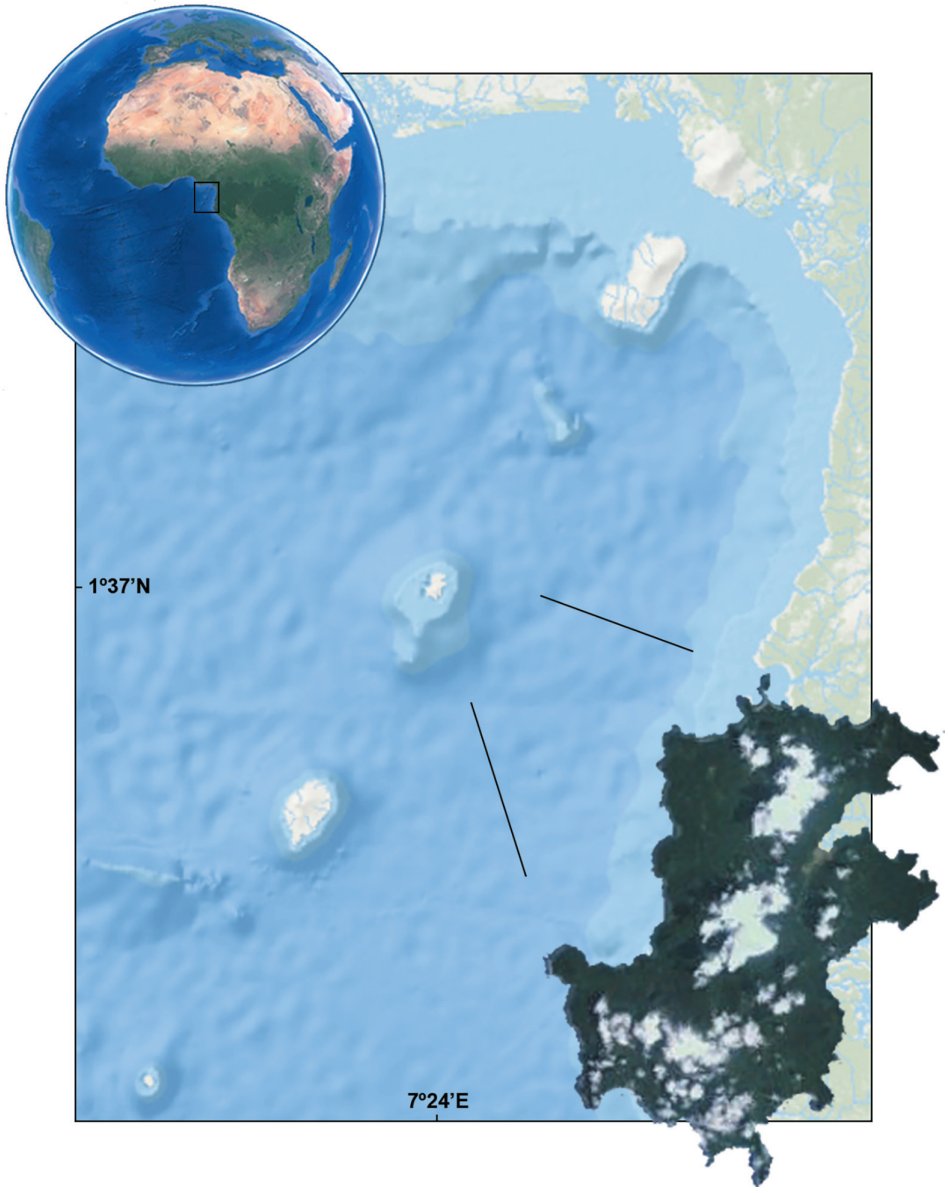

FIGURE 1 Location of the Gulf of Guinea islands relative to the African continent. Príncipe is positioned approximately at the map's center, with São Tomé to its south. To the north lie Bioko and further south Annobón, both part of Equatorial Guinea (*Data Source*: GEBCO and Google Earth).

direct take (Donlan et al., 2010). Of these, the last is a tangible political target to address global conservation awareness. Though enforcing laws against take is a valid strategy, its effectiveness is limited and may undermine community-based approaches if not integrated with encouraging and empowering residents for wildlife conservation (Challender & MacMillan, 2014; Cooney et al., 2017). Additionally, a sustainable strategy also involves exploring off-take methods, such as regulated trade and farming, and reducing demand trough marketing campaigns (Challender & MacMillan, 2014; Sainsbury et al., 2021). However, lack of documentation of field experiences, particularly unsuccessful, is hampering information dissemination to conservationists, scientists, and policymakers (Catalano et al., 2019; Sunderland et al., 2009). To address this gap, we provide a perspective on sea turtle conservation initiatives in São Tomé and Príncipe, enriched by insights from a community-based intervention on Príncipe Island.

2 | SEA TURTLES AND SÃO TOMÉ AND PRÍNCIPE

São Tomé and Príncipe, the second smallest African country, is a Portuguese-speaking two-island nation in the Gulf of Guinea, western Africa (1001 km^2; Príncipe, 140 km^2; Figure 1). The region, considered one of the 10 richest centers of marine endemism and listed among the top 25 biodiversity hotspots for conservation priorities (Myers et al., 2000; Roberts et al., 2002), harbors major nesting aggregation of hawksbills (*Eretmochelys*

imbricata) and leatherbacks (*Dermochelys coriacea*), well as significant rookeries of green turtles (*Chelonia mydas*) and olive ridleys (*Lepidochelys olivacea*) (Fretey, 2001; Schneider, 1990; for a biodiversity synthesis see Ceríaco et al., 2022). All occur in São Tomé and Príncipe, which holds the largest hawksbill nesting aggregation and the most genetically diverse green turtle stock in the Eastern Atlantic (Ferreira et al., 2019; Formia et al., 2006). Despite illegalized nationwide (law-decree 9/2014), all species are exploited for subsistence, especially hawksbills due to high price of their scutes (tortoiseshell) (Ferreira, 2015; Veríssimo et al., 2020).

2.1 | Basic socio-economics

Despite oil reserves, São Tomé and Príncipe remains primarily agricultural, with one-third of its estimated 228,000 inhabitants residing in rural areas in 2024, 9,500 on Príncipe (INE, 2015). Half of its population is under 18 years old, and although education levels are increasing, there is elevated poverty (World Bank, 2023). The country's fishing industry is small-scale artisanal, with 5,000 fishermen and 4,000 women fish-sellers reported in 2006, responsible for 80% of the total animal protein production (FAO, 2008). These sectors are largely people of *Angolar* ethnicity, a crucial element for the national identity but stigmatized as uncivilized and primitive by the dominant ethnicity, *Forros* (Feio, 2008; Seibert, 2006). Currently, nature-tourism, along with agriculture and infrastructure development, is considered a key driver for economic growth of this highly aid-dependent country but faces shortcomings in human capital, support infrastructures, and business environment (World Bank, 2023). For example, the country's university was created only in 2014. At the smaller island of Príncipe, although recent investments in tourism facilities and roads provided some relief, the structural deficiencies are exacerbated by its isolation from the main island and continent (Brito, 2021; Costa, 2023).

2.2 | Sea turtle exploitation

Prior to independence (i.e., 1975), sea turtle exploitation was not associated with subsistence as it is today, it was a small-scale traditional market for artwork, food, and medicine, with occasional informal exports by individuals working or visiting the country (F. Mendes and J. Almeida, farmers, personal communication, January 2006 and December 2009). However, after independence, the country faced operating with economic, social, political, and cultural models unknown to the majority of their inhabitants (UNDP, 2002). This lack of specialized knowledge and the exacerbation of negative social-institutional practices, such as corruption, resulted in decrease production and exports, leading to the division of plantations into small parcels among former workers (only the usufruct rights) to combat poverty (Seibert, 2006). These circumstances resulted in sea turtle exploitation becoming a significant source of income and subsistence, ingraining deep in local culture (Graff, 1996). In the early 1990s, for example, an estimated 200 hawksbill adults were harvested each year (Castroviejo et al., 1994). Yet, the localized pre-independence consumptive use, coupled with the small human population and the remoteness of the islands, likely shielded the country's sea turtle populations from the widespread 20th-century overexploitation.

3 | SEA TURTLE CONSERVATION POLICIES AND PRACTICES

In 2001, following the country's ratification to CITES and CMS, a fisheries legislation was enacted to preserve marine biodiversity within a sustainable use approach. Within this framework, and motivated by the commitment to the CMS Abidjan Memorandum in 2002, which recommends that sea turtle management consider the needs of local human populations, a legislative regulation for the turtle fishery was finalized but not enacted due to lobbying for a total ban policy (J. Bandeira, lawyer, personal communication, January 2006). The regulation would have permitted only the traditional capture of adults by licensed turtle fishers using spears, gaffs, or harpoons, at least 100 m from the coast, while prohibiting net-setting and the collection of eggs at nesting beaches (Fretey & Dontaine, 2001). Despite growing understanding that both consumptive and nonconsumptive uses of wildlife are valid and important for biodiversity conservation, conservationists typically advocate for total protection, especially of charismatic species (Frazier, 2007; Pritchard, 2002). Although traditional use may pose challenges (see Mrosovsky, 2000), it was a country-led initiative empowering authorities and authorized fishers to personally manage their resources, including backing sea turtle conservation staff with legal resources to dissuade poaching.

3.1 | Engagement challenges

Besides the above legislative efforts and ongoing protection of turtle eggs in hatcheries (Rosseel, 1997), an incentive payment program for live captured individuals was

implemented (Fretey & Dontaine, 2001) alongside the conceptualization of a reconversion of tortoiseshell artisans (Fretey et al., 2000). While the pay-for-release program was interrupted because it was incentivizing captures (Fretey & Dontaine, 2001), including by impoverish coastal citizens (Ferreira, 2024), the conversion of the artisans to fishing, trade, tourism, or agriculture ultimately failed because lack of training and financial support (Ferreira, 2015). Later, in response to growing awareness and impending prohibitions on sea turtle exploitation (Ferreira et al., 2006), some turtle fishers and most of the turtle fish-sellers formed a cooperative to abandon turtle exploitation by innovating and diversifying their economic activities, including fishing, processing, and setting up a store. Despite their efforts, obtaining basic support—financial or institutional—proved elusive mainly due to trust and communication issues with local conservation facilitators (RLF, personal observation, October 2007). Simultaneously, an attempt to shift artisans from tortoiseshell to bovine horn failed because of raw material scarcity and high tool costs (Ferreira, 2015). A list of sea turtle policy and conservation actions can be found in Table S1.

These failures to involve sea turtle professionals, including the nonenactment of the traditional-use law, resulted in unwarranted delays to a gradual and voluntary behavioral shift toward nonconsumptive uses of sea turtles. Instead, extensive capture, egg collection, and commercialization of turtle-derived products persisted for years, even after outlawed on Príncipe in 2009 and nationally in 2014. The ban ineffectiveness was predictable, considering the limited engagement of national authorities, the lack of employment opportunities, and the cultural significance of consumptive uses of sea turtles (Ferreira, 2015; Vieira, Jiménez, Besugo, et al., 2016).

3.2 | Engagement and positive shifts

Fortunately, attitudes in the local biodiversity conservation sector have changed, and individuals who once relied on sea turtle capture and trade were genuinely integrated into conservation practices (CTM, 2011; Vieira, Airaud, Jiménez, Airaud, et al., 2017; Vieira, Airaud, Jiménez, Monteiro, et al., 2017; FPT, 2023). This shift aligns with the progressive development of law enforcement, along outreach and marketing campaigns to reduce demand (Veríssimo et al., 2020; Vieira et al., 2024; Vieira, Jiménez, Besugo, et al., 2016; Vieira, Jiménez, Hancock, et al., 2016). For example, during the implementation of the prohibition at Príncipe (2009–2010), efforts were made to engage spearfishers, the major group exploiting sea turtles, by paying for turtles brought ashore for sampling whenever a collaborating scientists was present (Sada, 2010). Although continuous compensation could reduce spearfishers' incentive to sacrifice turtles, infrequent field missions, prioritizing research over the social dimension, led to program termination (Ferreira, 2024). Any action to reduce human impacts on wildlife must be guided by respect for local culture and deep understanding of socio-environmental dynamics, which requires social integration and time to master (Catalano et al., 2019; Frazier, 1999). This improvement and expansion in conservation approaches and policies likely contributed to the increase in sea turtle nesting, observed over the last decade on both islands (Ferreira et al., 2019; Thomas-Walters et al., 2020). Conversely, it also resulted in significant social impacts, including economic displacement, diminished social support, and food insecurity (Vieira et al., 2024). While enhancing statistical robustness with recent data is essential for assessing population status, well as for evaluating interventions, research shows that sea turtles can sustain limited direct take if properly managed, respecting local cultures (Chaloupka & Balazs, 2007; Hays et al., 2024).

4 | COMMUNITY-BASED CONSERVATION—PRÍNCIPE ISLAND

At Príncipe, the absence of an active sea turtle conservation project prompted the appearance of a grassroots movement, the Sea Turtle Commission. Initiated by local sea turtle technicians, mostly spearfishers engaged with the previous program, with the advice of the first author living on the island for research (Box S1). Formally established in late 2010 within the Natural Park of Príncipe, a governmental organization, it operated until 2014. It focused on working with the local population to devise nonconsumptive sea turtle conservation solutions, tailored to the local social-cultural context, while fostering behavior change through interactions among social actors and building local capacity. The main inspiration came from the successful TAMAR project, in Brazil, where staff live in the communities they serve, ensuring a clear understanding of fishers' perceptions, needs, and limitations while making them feel valued and appreciated (Marcovaldi et al., 2005). This approach is a foundation for collaborative work, taking advantage of relationships and trust between actors and building on them.

4.1 | Empowerment and resilience

The Commission, with members in each fishing settlement, struggled to maintain its structure as significant

financial support was never secured. While leveraging local skills and insights is crucial for efficient use of resources and intervention success (Buxton et al., 2021; Catalano et al., 2019), funding is often directed to projects led by organizations from the global north, potentially overshadowing local priorities and hindering community-based conservation efforts as they pursue their own agendas (de Vos & Schwartz, 2022; Rayadin & Buřivalová, 2022). In the present case, the urge of external organizations to control sea turtle conservation in the island fomented conflicts and division, impeding cost-effective local coordination and management. Nevertheless, under the second author's leadership, the Commission creatively adapted to those challenges, prioritizing empowering activities with high potential to induce pro-environmental behaviors or reduce sea turtle mortalities, demonstrating that actions can speak louder than words or money. This included meetings with fishing communities to gather feedback and achieve a consensus on sea turtle conservation, fostering shared responsibility; constructing a traditional shelter and establishing monitoring on a major nesting beach within the National Park, previously unprotected; and regular coastal surveillances to discourage poaching, enhance outreach to fishers, and collect data for research (Box S2). Incorporating local perspectives, outreach actions were executed in the main settlements, showcasing global success cases and highlighting the economic benefits of protecting sea turtles. These efforts culminated with a humorous children's play performed at various locations, delivering the message that harming turtles brings bad luck (Figure S1).

4.2 | Alternatives and engagement

Moreover, the Commission fostered pioneer employment opportunities, such as organizing fishers to offer boat tours, promoting and directing clients to them, and establishing opportunities for wildlife watching and local product manufacturing. It also cooperated actively with researchers on data collection and logistics, advancing the knowledge on sea turtle ecology (Ferreira et al., 2015, 2018, 2021; Tavares et al., 2022, 2023). These economic activities have substantial growth potential, particularly given the recent increase in tourist facilities and interest on the island's biodiversity (Ceríaco et al., 2022; Costa, 2023). In summary, this grassroots movement made a modest contribution to the development of sea turtle research and conservation, while also contributing to the Sustainable Development Goals (Brito, 2021; UN, 2015). To expedite and consolidate the shift toward nonconsumptive uses of sea turtles, fishing communities proposed the following measures: establish a fishing store to address the local scarcity and expense of fishing gear, implementing a mandatory code of conduct for access; support the creation of a sea surveillance team, assessing interactions with sea turtles and enforcing compensations or penalties; and support fishing settlements near main nesting sites in hosting researchers or volunteers, fostering the development of essential services and acting as a deterrent against poaching (Box S3). See Roe (2015) for a variety of community engagement approaches, and Vieira et al. (2024) for social impacts of sea turtle conservation on São Tomé Island.

4.3 | Local stewardship impact

Maintaining persistence was a challenging task, as the Commission was perceived as an obstacle and used by conservation newcomers wielding financial influence. Although it failed to continue, and acknowledging the need for quantitative assessments to evaluate the effectiveness of interventions (Thomas-Walters et al., 2020, 2023), here we illustrated how small inputs in local stewardship can produce significant outputs, including stakeholders' engagement, capacity building, and reducing sea turtle mortalities. Without the Commission, the island would have been deprived of a powerful deterrent to poaching, risking a return to exploitative practices by engaged spearfishers and the loss of valuable local knowledge on conservation practices. Instead, it not only sustained previous activities but also expanded monitoring and protection, collaborating with other organizations until a new entity secured the conservation efforts, establishing the *Protetuga* project in 2015 (FPT, 2023).

5 | CONCLUSIONS

While legislation is a necessary tool, it cannot achieve progress without effective enforcement, awareness-raising, and the active support of the affected populations (Cooney et al., 2017; Frazier, 1999). To attain these goals, it is essential for all society to visualize direct economic benefits from the nonconsumptive use of sea turtles (Mancini et al., 2011; Vieira et al., 2024). These objectives can be swiftly achievable when conducted from within, at significantly lower costs than top-down interventions and while enhancing communication and consensus among stakeholders, what fosters self-determination and a sense of ownership of their resources (Cooney et al., 2017; Wilkie et al., 2016). Recent plans to establish large marine protected areas in São Tomé and Príncipe (UN, 2022) should effectively integrate fishing

communities as part of the planning, design, execution, and decision-making processes (Buppert & McKeehan, 2013; UN, 2007), enabling them to be full participants and benefit from the project equitably, without any form of marginalization or favoritism. Improving the quality of life of the less privileged is fundamental to address the illegal wildlife take, and should be actively pursued through the creation and support of diversified economic activities (Cooney et al., 2017; Roe, 2015). We believe these efforts can be enhanced by incorporating subjects in school curricula that promote proactivity, equity, and respect for all social classes and the natural world (Appiah, 2006; Freire, 2000). This is crucial to counter the pervasive culture of usufruct, marked by subservience and lack of ownership or accountability, rooted in colonial tradition and perpetuated by neo-colonial behaviors (Feio, 2008; Seibert, 2006), such as the assumption that outsiders know better.

This perspective highlights how small investments in empowering local movements can inform science, policy, and practice, promote social justice, and incorporate indispensable local viewpoints into project design and implementation, ensuring that wildlife conservation strategies are aligned with the community's values and engage its members in sustainable practices. The future is promising, and it is time for organizations with ample report writing and rhetorical skills, which may monopolize or hoard funding, to share their expertise and empower local practitioners and stewards. While these people may not have those capacities and resources, they possess practical knowledge and experience critical to do it right and achieve cost-effective and lasting outcomes. By leveraging local expertise and building their capacity to take ownership of the projects, biodiversity and people's lives can be enhanced while minimizing the waste of resources.

AUTHOR CONTRIBUTIONS

R. L. F. wrote the manuscript with inputs from I. A. P.

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No conflicts of interests.

DATA AVAILABILITY STATEMENT

All information is included in the article or its supplementary materials.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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