

Preview

From promise to practice: Unlocking the multidimensional value of marine ecotourism

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Marine ecotourism offers promise for sustainable blue economies but remains overlooked. In a recent *Cell Reports Sustainability* article,¹ authors explore its transformative potential, focusing on global economic impacts of scuba diving tourism. Here, we reflect on broader sector impacts, key barriers, and actions to unlock marine ecotourism's full socio-ecological promise.

Introduction

Marine ecotourism (MET) is among the fastest-growing sectors of sustainable tourism. It is commonly understood as responsible travel to natural environments that supports environmental conservation, promotes local well-being, and includes educational and interpretive components. Well-established MET activities—such as whale watching, scuba diving, and big-game fishing—often involve close interactions with iconic marine species and habitats. These activities generate substantial revenue for local communities and, when sustainably managed, can enhance human well-being, promote marine conservation, foster inclusive development, and strengthen ocean literacy. However, despite its socio-ecological promise, MET remains relatively overlooked compared to more dominant forms of marine-based tourism, such as cruise or resort tourism, which are more prominently featured in national and international policy arenas. Despite MET's distinct identity and alignment with sustainability principles, it is often subsumed under broader tourism categories. This is due, in part, to fragmented implementation and a lack of systematic data collection at national and global scales. As a result, MET's potential to contribute to the UN 2030 Agenda for Sustainable Development and to sustainable blue economy strategies—particularly at the local level—remains underrecognized and underutilized.

In their study,¹ Dr. Anna Schuhbauer and colleagues present the first global estimate of the economic impact of scuba diving. Using pre-COVID-19 data from an online survey of dive operators world-

wide, the authors estimate that 9–14 million tourists engage in scuba diving annually, supporting up to 124,000 jobs and generating between US \$8.5 and \$20.4 billion in total expenditures. These figures include both direct expenditure on diving activities and indirect expenditure on travel, lodging, and other local services. Regions with the highest revenues include North America, Brazil, Central Europe, Southeast Asia, and Japan. Notably, 80% of employees in the sector are nationals of the country where the business operates, highlighting its role in supporting local economies. The study also explores the sector's reliance on healthy marine ecosystems. Dive operators identified reefs, biodiversity, and marine megafauna as key attractions in tropical regions, while temperate regions emphasized kelp forests and marine mammals. Many reported environmental declines over the past decade, particularly in tropical areas, although positive local changes were also noted. Finally, while 67% of operators reported financial losses during the COVID-19 pandemic, 33% experienced increased revenues, indicating a degree of resilience within the industry.

The multidimensional value of MET

Beyond its economic contributions—especially in relation to marine megafauna—recent studies point to broader social and ecological benefits of MET. For example, the estimated total economic value of marine turtles exceeds \$23 million per year, with non-consumptive uses far surpassing consumptive ones. Under full protection, their value

could rise to \$716 million over 30 years.² In northern Peru, whale watching based on humpback whales grew into a \$3 million/year industry within a decade, reflecting the rapid expansion potential of locally embedded MET activities.³

Tourist profiles also suggest deeper community benefits: visitors engaging in MET tend to stay longer, spend more, and report higher satisfaction compared to conventional tourists.⁴ Scuba diving offers another illustration. Globally, an estimated⁵ 33 million marine dives occur annually—70% within marine protected areas (MPAs)—yet only 15% of these sites are fully protected. Designating remaining dive sites as fully protected MPAs could enhance biodiversity while generating up to \$2 billion annually in additional direct tourism revenue.⁵ Given that 62% of diving occurs in developing countries, this potential is especially relevant to regions most in need of integrated economic growth and sustainable development.

In addition, dive operators increasingly integrate conservation initiatives—such as coral restoration and citizen science—into their business models, fostering ecological recovery, stewardship, and community engagement.⁶ Similarly, the Azores' whale watching industry exemplifies how local ecological knowledge—from former whalers now working as land-based lookouts—is now part of tourism experiences, reinforcing cultural identity and cross-generational knowledge transfer.⁴ In Cabo Pulmo, Mexico, the designation of a no-take MPA in 1995—combined with strong community enforcement—led to a remarkable 460% increase in reef biomass over a



decade. Following this ecological success, the community transitioned toward ecotourism-based livelihoods, which have since delivered long-term socio-economic benefits and helped sustain marine conservation efforts.⁷ This highlights the vital role of MET in diversifying livelihoods toward more sustainable, conservation-aligned practices.

Across contexts, MET has shown value not only in conservation and education but also in supporting community empowerment, stewardship, and local knowledge systems. These contributions underscore why MET deserves greater integration in sustainability, blue economy, and marine policy agendas.

Barriers to realizing broader benefits

Despite growing recognition of its multidimensional value, the full potential of MET remains constrained by several structural and operational barriers. A key limitation lies in the fragmented and often informal nature of MET operations. Many initiatives are small scale, community based, and lack the formal recognition, coordination, and monitoring capacity required for sustainable scaling. This fragmentation, combined with the absence of standardized certification schemes, allows for inconsistent or misleading use of the ecotourism label by operations not fully aligned with sustainability principles—undermining trust and credibility in the sector.

Ecosystem vulnerability is another pressing concern. Despite its non-extractive framing, MET can contribute to ecological degradation through repeated wildlife disturbance, reef damage from anchoring or diver contact, and overcrowding in sensitive habitats. A growing body of evidence documents the effects of marine ecotourism on the behavior, physiology, and long-term fitness of both target and non-target species, as well as on broader habitat integrity.^{8–10} Without strong environmental safeguards and adaptive management, the very ecological assets MET depends on may be compromised. In addition, benefit distribution within MET systems is often inequitable. Revenues frequently concentrate among larger operators or external investors, while local communities remain marginalized. In some cases, increased tourism inflates housing costs, strains infrastructure,

exacerbates seasonal labor insecurity, and contributes to social displacement in coastal areas—reducing resident well-being, especially where inclusive governance and local planning are lacking.

Finally, the absence of a clear institutional identity for MET within global, national, and local policy and data systems limits its visibility and integration in blue economy frameworks. Bridging these gaps will require targeted investment, regulatory support, and participatory governance to ensure that MET delivers not only conservation and economic gains but also equity and resilience.

Unlocking the socio-ecological promise of MET

To realize the full socio-ecological potential of MET, practical and scalable interventions are urgently needed. A core priority is the development of robust monitoring systems that track not only tourist flows and revenue generation but also ecological health, job creation, and community well-being. Such systems are essential to demonstrate impact, inform adaptive management, and build social and environmental accountability.

Defining site-specific carrying capacities is equally critical. Without them, tourism growth risks undermining the very ecosystems and coastal communities it depends on. Establishing thresholds for visitor numbers, vessel traffic, and species interactions helps prevent overcrowding, protect biodiversity, and maintain local well-being. The creation of regionally adapted certification programs can further ensure that MET operations align with sustainability principles and contribute to conservation and social equity.

In parallel, equitable financing mechanisms—such as eco-fees, benefit-sharing arrangements, and reinvestment of tourism revenue into marine conservation or coastal community initiatives—can secure long-term funding and improve local support. Unlocking MET's potential also requires cross-sectoral investment in clean transport, digital infrastructure, and synergies between tourism and other sectors of the blue economy. Capacity building must go beyond tourism skills to include digital literacy and the integration of local ecological knowledge, ensuring community voices shape both visitor ex-

periences and governance. Enhanced stakeholder engagement and shared management provide additional pathways to resilience. Empowering local actors in decision-making builds trust, strengthens stewardship, and ensures that tourism benefits align with community values. Finally, multi-stakeholder partnerships—linking academia, NGOs, industry, and schools—can generate dynamic marine education content that fosters marine literacy and responsible behavior among both visitors and residents.

Undoubtedly, MET holds transformative potential for sustainable ocean development—but only if its growth is guided by effective governance, ecological safeguards, and social inclusion. The challenges are real, but the opportunities are greater. From promise to practice, unlocking the multidimensional value of MET demands bold action—one that centers community engagement, strengthens environmental protections, and reimagines tourism as a catalyst for ocean justice and planetary health.

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DECLARATION OF INTERESTS

The author declares no competing interests.

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