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Marine protected areas as a tool for environmental justice

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Overfishing, destructive industrial practices, and climate change are the biggest drivers of biodiversity loss in the ocean. Marine Protected Areas (MPAs), including through nature conservation initiatives like "30x30" and "America the Beautiful," can be an effective solution to protect marine life and habitats, while making them more resilient to the pressures of extractive and destructive practices, as well as climate change impacts. There is general scientific consensus on the components that make MPAs ecologically effective, however, social context is often presented as burdensome—where protected spaces exclude communities from accessing nature. While this is a valid concern in top-down approaches to implementing protections around the world, under economic-driven systems of ocean management in countries like the United States, this narrative overlooks the potential opportunity of MPAs as a means to equity and environmental justice. In the U.S., the Magnuson-Stevens Fishery Conservation and Management Act (MSA) established a system that prioritizes the economic value of fisheries and centers power among Fishery Management Councils which are dominated by industry actors. Given this type of governance landscape, this perspective article presents MPAs as a step towards environmental justice in ocean management, whereby an MPA under the appropriate enabling conditions can be a tool to mitigate damage, distribute power, support other cultural value systems, and to advance our understanding of the ocean, climate change and diverse community impacts moving forward.

KEYWORDS

MPAs, policy reform, equity, ocean conservation, power dynamics, 30x30, fishery management

1 Introduction

A suite of ocean-related laws in the United States offer mechanisms to protect marine species, such as the Marine Mammal Protection Act (1972), the Endangered Species Act (1973), and the Magnuson-Stevens Fishery Conservation and Management Act of 1976 (MSA). The MSA is an important regulatory framework which supports the livelihoods of those that deliver wild caught seafood as a service to society. It is a tool designed to maintain commercially relevant natural resources and it is also, arguably, the most comprehensive governance framework for managing U.S. ocean waters. The law established a system of decision-making

power which is maintained through consistent federal agency resources and attention. Its extent covers the entire U.S. Exclusive Economic Zone and, though focused on specific marine fisheries, the biological consideration of habitats needed for long-term sustainability of those fisheries give decision-makers a broader purview than it may seem the law provides at surface level (NOAA Fisheries, 2007, 2024a). The result is that fishery management bodies are consulted and thus hold power in many fora for ocean decision-making (NOAA Fisheries, 2024b; NOAA, 2023).

Our planet and its climate are becoming less stable and increasingly less predictable (Wood et al., 2003; IPCC, 2019) and, post-2020, the intersection of these impacts with social injustices and systemic inequities are more prevalent in public discourse and harder to ignore in policy and decision-making (Schlosberg and Collins, 2014; Rowland-Shea et al., 2020). Climate change, the limitations of our governance to adapt management of marine resources to these changes, and the added pressures of new and emerging ocean industries warrant a deeper analysis of how environmental justice can be achieved in the United States with respect to the ocean.

Environmental justice is defined by the U.S. Federal Government as "the just treatment and meaningful involvement of all people regardless of income, race, color, national origin, Tribal affiliation, or disability, in agency decision-making and other Federal activities that affect human health and the environment." This goal will be achieved when everyone has "equitable access to a healthy, sustainable, and resilient environment in which to live, play, work, learn, grow, worship, and engage in cultural and subsistence practices." (Federal Register, 2023). Environmental in-justice exists from the unequal distribution of environmental burdens and benefits (Bennett et al., 2023). Thus, achieving environmental justice requires reparation, mitigation and prioritization of the needs and perspectives of, as well as impacts upon, those who have been marginalized.

For the ocean in particular, the recent White House Ocean Justice Strategy offers broad recommendations on achieving a more inclusive approach to decision-making and diversifying the communities involved in ocean use and management. Though tangible and actionable, integrating these approaches within existing systems will take time and consistent political will. The Strategy notes, "The diversity of advisory bodies, interagency coordination bodies, and decision-making groups is an important factor to achieving ocean justice." (The White House, 2023) The Fishery Management Council system lacks such diversity (Okey, 2003; NOAA Fisheries, 2023a), and given the exigent need to address biodiversity loss and climate change, a complementary and timely approach to conserving the marine environment is needed. Marine Protected Areas (MPAs) which are meaningful—i.e. well-designed, actively managed and monitored, and with high levels of protection—emerge as an important tool for environmental justice in our ocean. By meaningfully[1] protecting important habitats and the species and services these areas support, we have a mechanism to repair and mitigate the damage of commercial pursuits, support value systems that honor the intrinsic merit of what the ocean provides, and create an opportunity to better understand our ocean environment and how diverse communities value these areas and the benefits they offer.

2 Consequences and risks of U.S. fishery management

2.1 Economic priority

The MSA is predicated upon the concept of "maximum sustainable yield." As the term implies, the aim is to maximize profit from a fishery but only to the extent that enough of the population remains to reproduce and sustain the industry in future years (NOAA Fisheries, 2007, 2024c). The law's social and environmental guardrails extend its purview to the enabling conditions of a fishery, but also offer the caveat, "to the extent practicable," (NOAA Fisheries, 2023b) which is often used to further favor short-term economic interests at the expense of the longer-term health of habitat and other marine life. At the end of the day, "maximum sustainable yield" accounts for a limited suite of information on a species and its environmental conditions (NOAA, 2024), and it is an estimate. As environmental conditions and species interactions shift and become less predictable due to climate change, estimates of MSY will become more uncertain and further increase the potential risk to the health of a fishery (Roberts et al., 2017).

While shore-based and most subsistence take associated with the fishing activities of marginalized communities is done within state-level management schemes—separate but in coordination with, and often culturally similar to, federal-level management under MSA—this boundary is merely political (Hughes, 2015). Ecological boundaries are not static, and thus federal-level fishery management decisions can have implications on the near-shore catch for some species and hence, to the sustenance of low-income coastal communities. Commercial fishing activity impacts the quality, size and fishing effort needed by shore-based fishers. These local communities are often not considered or included in management decisions yet may be faced with catch limits and/or limited resource availability requiring greater effort for lesser and lower-quality catch (Cooper, 2024; Furman et al., 2023; Guiry et al., 2021).

2.2 Power asymmetry

Eight regional management bodies called Fishery Management Councils (Councils) are critical to the MSA's execution. While Council composition is intended to include diverse interests (U.S. Regional Fishery Management Councils, 2024), the system has come to exemplify the concept of regulatory capture,

1 In the context of this article, "meaningfully protected" or "meaningful MPAs" refer to the enabling conditions where MPAs are designed, implemented and managed in a way that is deemed effective according to literature and leading scientific information, such as the MPA Guide (Grorud-Colvert et al., 2021) and Edgar et al., 2014.

with Councils dominated by individuals from fishing industry sectors (Eagle et al., 2003).

A demonstration of this power asymmetry is evident in the establishment and management of National Marine Sanctuaries (Sanctuaries). As the ocean's equivalent of National Parks, Sanctuaries are community-borne efforts that should notionally support recreational use and offer a means to support intrinsic and other value systems in connecting with nature. Globally, fishing is the biggest driver of biodiversity loss in the ocean (IPBES, 2019) and only four of seventeen Sanctuaries—which are intended to protect areas of the marine environment due to a variety of qualities, including their ecological significance—have authority to regulate fishing within their boundaries[2] (NOAA, 2024; FKNMS, 1997; MNMS, 2024; ONMS, 2012; Federal Register, 2006). Bottom trawling, which is the most destructive form of commercial fishing, is allowed in most Sanctuaries (Jones, 2023; Mirza et al., 2021; Personal communication with NOAA ONMS staff, July 2024). Condition reports in the majority of Sanctuaries further point to fishing as a factor contributing to decline, yet updated management plans continually fail to address this significant threat (Gittings et al., 2013; Mirza et al., 2021). Guidance documents for new Sanctuary nominations recommend forgoing the authority of Sanctuary managers to regulate fishing in the management plan because Councils are given explicit privilege, by law, of consultation throughout the nomination and designation process, which is not necessarily granted to other communities and interests (NOAA, 2014; Greenly, 2023; NOAA, 2023). Thus, a Sanctuary nomination—intended to protect ecologically and/or culturally significant areas—is easily undermined by commercial interests through legally required Council consultation processes. As a result, most Sanctuaries are not meaningful MPAs, as they are minimally protected according to the MPA Guide (Sullivan-Stack et al., 2022).

Efforts to address population decline, habitat destruction and other significant environmental issues due to the limitations of the MSA are also often hindered by the power structure of the Fishery Management Councils. For example, the MSA does not mention climate change in its text, and while Councils continue to affirm that the nimble nature of their decision-making process can help them adapt to these unprecedented changes in the ocean, including to fish stocks, fishery management plans rarely account for stock shifts due to changing conditions (Otts et al., 2022). There is evidence that climate change will reduce productivity of some species in the coming years, and the impacts hold uncertainty (Free et al., 2019); these climate impacts and associated uncertainty will be compounded for the vast majority of marine species which have little or no data. Ninety-nine percent of documented ocean species in U.S. waters are not covered by this system (Fautin et al., 2010). This means species which may hold significance to other communities are unmanaged, likely at risk, and without a clear mechanism to understand, protect or restore their populations.

2.3 Limited knowledge

Even for those species that are managed under the fishery management system, information is limited. Fishery managers must still set thresholds and determine harvest levels with the information available. The process may be based on science and data however, decision-making is ultimately value-driven. This could result in a precautionary approach but more often leans toward economic incentive. For example, a stock that is found to be overfished (which relates to both extractive activities and degraded environmental conditions) requires a specific plan to rebuild the population, often with continued extraction of fishery stocks allowed to limit disruption to the livelihoods dependent on these fisheries. While this may be a helpful mechanism to recover commercially relevant species in the near-term, it also highlights the priority given to for-profit fishing interests over broader environmental and marine resource quality. Data is needed to trigger this effort to restore, but even for the 506 fish stocks managed under this system, nearly half do not even have a known overfished status and timely information is difficult to collect (NOAA Fisheries, 2024c). This allows for continued extractive activity despite long-term impacts, ultimately benefiting industry at the expense of ecosystem health.

Recent attempts to bring principles of equity and environmental justice into U.S. fishery management highlight gaps in representation in NOAA Fisheries and the Councils, as well as limitations in collecting and interpreting the demographic and social information needed to assess equity. Social science capacity and prioritization within the agency are also limiting factors in implementing and operationalizing NOAA Fisheries' EEJ Strategy (NOAA Fisheries, 2023a; NASEM, 2024). A National Academies Report on equity in fishery management notes, "Lack of capacity is not only a practical constraint, but also an epistemological one, reinforcing a culture within [NOAA Fisheries] that values particular kinds of science, data, and evidence." (NASEM, 2024). This cultural shift, plus the will and ability to identify gaps and gather necessary information on who is broadly impacted by fishery management decisions, though critical, will be a lengthy and resource intensive process.

2.4 Summary of consequences and risks

Thus, the most impactful and broadest mechanism for managing the U.S. ocean favors industry, and gives industry power in decision-making while failing to consider important values and ecosystem benefits to communities unrepresented in decision-making. This leads to further burden on vulnerable coastal

2 These four Sanctuaries are: Florida Keys, Monitor, Flower Garden Banks and Gray's Reef. Through section 304(a)(5) of the National Marine Sanctuaries Act (NOAA, 2023), the Channel Islands National Marine Sanctuary has Marine Reserves and Conservation Areas within its boundaries. These areas have limitations on fishing established through federal fishery management and state-level management processes (Federal Register, 2007). In 2020, the Monitor National Marine Sanctuary's prohibition on all fishing was clarified to only restrict trawling activities (Federal Register, 2020).

communities. Low-income subsistence fishers, often from communities of color, rely on near-shore fisheries for food security. These shore-based communities are not considered in fishery decision-making (Furman et al., 2023). Consequently, access to quality near-shore fisheries has declined over several generations, both in species type and condition (Miller et al., 2014; Poe et al., 2015). Fisheries that are now readily accessible from shore are often subject to health advisories (OEHHA, 2024; EPA, 2024) and are unsupported by management because there is little to no data on stock abundance (Furman et al., 2023), and a lack of recognition along with various other inequities. The examples and components of fishery management outlined above serve to establish conditions which should be mitigated as we seek environmental justice through future decision-making.

3 Opportunities and benefits of protected areas

If we accept that the system we have in place for U.S. ocean management benefits for-profit fishing interests at the burden of all others who find value in marine resources, Marine Protected Areas can emerge as a mechanism to reverse this injustice. On a global scale too, where high seas fishing activity is largely done by corporations (Carmine et al., 2020), open ocean protected areas have the potential to considerably reduce inequality in the distribution of fishery benefits among maritime countries (Sumaila et al., 2015). By limiting extractive activities, an MPA can shift the flow of benefits derived from the ocean away from industry by prioritizing the needs of diverse communities and value systems, and providing an opportunity to correct inequities in our current system of ocean management. This will, of course, require MPA design, implementation and management to be done meaningfully and with consideration of the various elements of social equity.

Building upon Bennett et al., 2021 examination of advancing social equity in marine conservation, the design and implementation of new MPAs and the management of existing protected areas can contribute to advancing all elements of equity outlined and, potentially, other elements beyond the scope of Bennett et al. (2021) analysis such as spatial and intergenerational equity. Core to this approach is an acceptance of diverse value systems and elevating these to, or beyond, the level enjoyed by the market-driven, economic-values approach that typically leads decision-making. At no point in our modern history has the overall state of our ocean become healthier (IPCC, 2019). The burden of this reality has and will impact already vulnerable communities most (Bennett et al., 2023). Meaningful MPAs can provide a place-based approach to reconnect communities with nature and the associated benefits of a healthier marine area, restore Tribal self-determination and Indigenous rights, and create a system where marginalized groups may find agency, safety and transparency in engaging with both the environment and its management.

Often described as an "insurance policy," MPAs can help mitigate the risks to ecosystem function associated with climate uncertainty (Jacquemont et al., 2022). By meaningfully protecting important habitat, MPAs can serve as a precautionary backstop to the uncertainties of fishery management associated with MSY and data limitations. These area-based protection efforts should be thoughtfully and deliberately sited to support communities and value systems marginalized across some or all of the elements of social equity. For example, shore-based fishing communities may directly benefit from partially protected areas on the margins of fully protected marine reserves, as there is evidence that socioeconomic advantages can be derived from limited and well-regulated uses in this type of protected area scheme (Zupan et al., 2018). Similarly, MPAs can be designed with downstream benefits to coastal access points in mind. In California, for example, piers and jetties do not require the purchase of a fishing license and are areas of concentrated subsistence fishing (Quimby et al., 2020) which could be enhanced by appropriately sited MPAs. Other non-consumptive ways of interacting with the ocean can and should be enhanced, as well, as there is a growing body of scientific literature relating ecosystem health and biodiversity to mental health and well-being (Bratman et al., 2019; Sandifer et al., 2015).

Hawaii's Community-Based Subsistence Fishing Areas (CBSFA) and California's Indigenous Marine Stewardship Areas (IMSAs) are two examples of existing MPA types that have, or have potential to, advance environmental justice. Hawaii's Hā'ena CBSFA is an example of a community-led stewardship effort to restore traditional systems of resource management. Local families with intergenerational ecological knowledge pre-dating colonization were key to this MPA's designation, offering an opportunity to continue traditional cultural practices and engage the community in enforcement and monitoring of the area, which has shown an increase in biodiversity since establishment (Collier, 2020). The IMSA is a relatively new MPA designation type in the state of California which can be established by Tribal governments. The Yurok-Tolowa Dee-ni' IMSA has been announced with co-management details still forthcoming (Tolowa Dee-ni' Nation, 2024). Assuming Tribal self-determination will be honored by the state, this offers another opportunity towards restoring both biodiversity and community stewardship of a marine area.

Any MPA designation requires political will and public support, so too does ensuring these areas are durably protected. Siting and boundaries will likely face resistance from the fishing industry, and moments for adaptive management could invite risk to MPA durability as much as opportunities to improve efficacy and service to communities. Political will may be the key enabling factor for an MPA to advance environmental justice, by placing priority on enhanced benefits for those marginalized over economic interests. Science shows that MPAs are an effective tool to invest in the future health of marine ecosystems and are themselves key to further scientific understanding of our marine ecosystems through the unknowns of changing conditions (Claudet et al., 2008; Lester et al., 2009; Marcos et al., 2021; O'Hara et al., 2021; Roberts et al., 2017). Our cultural acceptance and theories of practice as it relates to equity and environmental

justice principles are new and evolving. Marine Protected Areas, too, should be seen as an opportunity to understand the human connection to the ocean. Adaptive management is key to the efficacy of an MPA (Morris and Green, 2014; Tony, 2020). In addition to the management decisions that enhance ecological outcomes, adaptive management should also be an opportunity to learn and adapt for enhanced social outcomes, as well. As marginalized groups find safety and agency in decision-making processes, and our understanding of diverse perspectives becomes more robust, we can also build upon existing bodies of knowledge for more meaningful approaches to measuring and achieving equity in engaging with the ocean and its management.

4 Conclusion

Though there is opportunity for reform, the idealistic suggestion to fully upend existing systems of ocean management is not feasible. Given the current moment of opportunity, as different jurisdictions are examining how to reach 30x30 targets, new and strengthened MPAs—which should be ecologically effective and consider the dimensions of social equity—emerge as a pragmatic tool for progress in both addressing the biodiversity crisis and achieving environmental justice in U.S. ocean management, and perhaps other jurisdictions with similar management structures and inequities. State management schemes, Sanctuary designation and updated management plans, and/or establishment of Marine Monuments through the Antiquities Act are existing mechanisms that can and should be used with full authority in the U.S. It will be up to those respective decision-making bodies to look beyond the Council system. And the Council system itself could even choose to meaningfully, and durably, use area-based management opportunities under their purview. All of these potential efforts will require decision-makers to seek out and elevate the needs of those marginalized in ocean management, and meaningfully protect the ocean for everyone's benefit.

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.

Author contributions

AA: Conceptualization, Funding acquisition, Writing – original draft, Writing – review & editing.

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Conflict of interest

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

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