



Perspective

Small grants advance global ocean conservation and management equity

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ABSTRACT

Threats to ocean health are not distributed equally among nations: low- and middle-income countries (LMICs) are disproportionately impacted by conservation threats, which are frequently driven by high-income countries (HICs). These inequities and resultant challenges have been driven by a long history of colonialism and resource exploitation by HICs. There has been a growing recognition that these colonial practices and inequities have been perpetuated in the ocean science and conservation fields. This recognition has led to increased discourse about the need for social equity in ocean science and conservation. We explore the potential of small grants programs to address conservation challenges in a manner that promotes management equity (one component of social equity) by reviewing the characteristics and outcomes of projects funded in the first 21 years (1999–2020) of the Marine Conservation Action Fund (MCAF), a small grants program focused on global ocean conservation. Our review of MCAF provides evidence that small grants advance global ocean conservation and management equity. We highlight characteristics of grants programs that enable lasting conservation impacts: openness to risk and responsiveness to emerging conservation needs. To promote management equity in conservation science and practice, we recommend ensuring funding is accessible to project leaders and local organizations in LMICs, providing flexibility in proposal and reporting structures, supporting the design and implementation of projects that are driven by local priorities, providing support to projects that engage stakeholders in developing solutions, and seeking input from the leaders the program serves.

1. Introduction

The health of the ocean is increasingly threatened by cumulative impacts from anthropogenic stressors, including climate change, unsustainable fishing practices, shipping, and pollution (Halpern et al., 2019). Several global agendas, such as the United Nations Sustainable Development Goals (Goal 14 Life Below Water) and the United Nations Decade of Ocean Science for Sustainable Development (2021–2030), emphasize the importance and urgency of addressing threats to ocean health (<https://sdgs.un.org/goals>; UNESCO Intergovernmental Oceanographic Commission, 2021). Although these agendas are global, threats to ocean health are not distributed equally among nations. Low- and

middle-income countries (LMICs) are home to the majority of the world's coastlines (Fig. 1) and include key marine biodiversity hotspots (de Vos, 2020; de Vos et al., 2023; Ocampo-Ariza et al., 2023; Zhao et al., 2020). These countries depend on the ocean for ecosystem services including, but not limited to, food security and livelihoods. However, coastal LMICs are heavily impacted by threats to ocean health, which are frequently driven by high-income countries (HICs; Fig. 1) (Mammides et al., 2016; Obura et al., 2017; Sharpe and Davison, 2022).

This imbalance between the drivers of impacts and their outcomes is exemplified by the depletion of coastal LMIC fisheries by foreign fleets from wealthier countries (McCaughey et al., 2018; Okafor-Yarwood et al., 2022). HICs are also the greatest contributors to climate change, which

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has caused the loss of biodiversity in important coral reef and mangrove ecosystems that are prevalent in many coastal LMICs, provide critical habitat for marine life, and buffer coastlines from storms (Archer et al., 2022; Bartlett et al., 2009; Chow, 2018; Jadot, 2020; Martin and Watson, 2016). We acknowledge that LMICs are not a homogenous group of countries (see supplement for our definition of LMICs and HICs) and use this term to highlight the inequities and challenges created by financial disparities between countries. These inequities and resultant challenges have been driven by a long history of colonialism and resource exploitation by HICs (Asase et al., 2021; Khan et al., 2022).

There has been a growing recognition that these colonial practices and inequities have been perpetuated in the ocean science and conservation fields (de Vos et al., 2023; Asase et al., 2021; de Vos, 2020, 2022; de Vos and Schwartz, 2022; Spalding et al., 2023; Stefanoudis et al., 2021). This recognition has led to increased discourse about the need for social equity in ocean science and conservation (de Vos et al., 2023; Bennett et al., 2021; Ocampo-Ariza et al., 2023; Spalding et al., 2023). This discourse acknowledges that advancing social equity is integral to ethical and effective conservation. Social equity is broadly concerned with fairness and justice in the treatment of people and in the development and execution of public policy (Bennett et al., 2021). One of the critical components of social equity is management equity, defined by Bennett et al. (2021) as the degree to which local people have participatory and leadership roles in managing their own resources.

One of the key barriers to management equity is parachute or colonial science, a phenomenon where scientists from HICs conduct research in LMICs without any sustainable investment in local capacity or effective communication with or inclusion of stakeholders from the LMICs (e.g., experts, government agencies, local nonprofit organizations, etc.) (de Vos, 2020; de Vos and Schwartz, 2022; Ocampo-Ariza et al., 2023; Spalding et al., 2023). This practice can result in research that does not prioritize local and national needs, and creates dependencies on external expertise in the longer term (de Vos et al., 2023; Asase et al., 2021; Bennett et al., 2021; de Vos, 2020; de Vos and Schwartz, 2022; Ocampo-Ariza et al., 2023; Spalding et al., 2023; Stefanoudis et al., 2021). In contrast to external practitioners, local leaders and organizations in LMICs understand the local context of threats to ocean health and are best positioned to develop lasting solutions and engage stakeholders and communities (de Vos et al., 2023; Asase et al., 2021; Bennett et al., 2021; de Vos, 2020, 2022; de Vos and Schwartz, 2022; Spalding et al., 2023; Stefanoudis et al., 2021).

Funding inequities that benefit practitioners and organizations in HICs contribute to parachute science (de Vos, 2022; Asase et al., 2021). Most of the top 20 funding recipients of the \$1 billion of philanthropic giving dedicated to the ocean in the United States were large research and conservation organizations headquartered in HICs (Seas, 2022). In addition, an analysis of giving by United States foundations showed that only 12 % went directly to organizations based in the country where the work took place (Needles et al., 2018). Furthermore, burdensome grant application and reporting requirements can create additional barriers to funding for local organizations with a small number of staff (Buchanan and Wozniak-Brown, 2023). Consequently, access to funding remains one of the biggest challenges for conservation practitioners in LMICs (Parker et al., 2012). Addressing this funding challenge is critical to successfully mitigating conservation threats in a manner that overcomes the problems of parachute science and advances management equity in LMICs.

In this perspective, we explore the potential of small grants programs to advance ocean conservation and foster management equity by supporting opportunities for LMIC leaders and their communities to study, manage, and conserve their own resources. Compared to many traditional and large funding sources that have prescribed goals and agendas for their funded projects, many small grants programs leave responsibility for project design and implementation with project leaders (PLs) who are best positioned to develop appropriate solutions to address threats to ocean health in their country (Kraan and Wensing, 2019). This approach also enables PLs to co-design their initiatives with stakeholders and communities, ensuring that their work addresses local needs, accounts for local conditions, and incorporates local knowledge (de Vos et al., 2023; Spalding et al., 2023).

Small grants programs can also provide an accessible, responsive, and flexible approach to address funding needs. They may be more accessible to LMIC leaders and organizations than traditional and larger funding sources because they typically have reduced application and reporting requirements that recognize the challenges faced by small organizations (Donaldson, 2008; Kraan and Wensing, 2019). Small grants programs may also be positioned to respond to funding applications quickly, which enables them to respond to conservation needs as they arise and fill unexpected funding gaps (Donaldson, 2008; Wiedenfeld et al., 2021). The flexibility of small grants programs allows for greater risk-taking, which can support innovation by both early career and seasoned conservation leaders (Baez et al., 2020). They may also

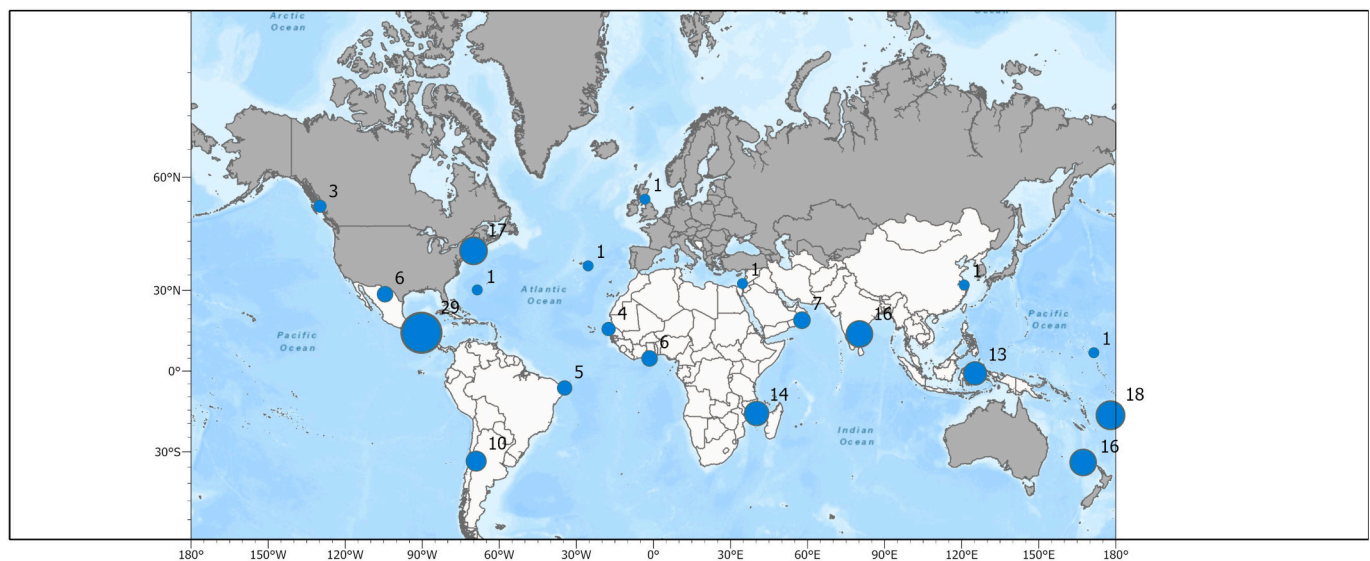


Fig. 1. Map of Marine Conservation Action Fund projects. High Income Countries (HICs) are shown in light gray. Low and Middle Income Countries (LMICs) are shown in white. Definitions of HICs and LICs are provided in the supplement. Circle size corresponds to the number of projects funded in each region. The location of each circle was selected to provide the best representation of projects in the region. Service Layer Credits: ESRI, HERE, FAO, NOAA.

offer non-financial benefits, such as increased visibility and new connections for PLs and organizations, which can result in subsequent larger career and funding opportunities that ultimately increase professional growth and conservation impacts (Dunning, 2013).

We explore the potential for small grants programs to advance ocean conservation and promote management equity by evaluating projects funded by the Marine Conservation Action Fund (MCAF), a small grants program focused on global ocean conservation (Fig. 1). We focus on MCAF as a case study because of its long history of supporting ocean conservation, which provides more than two decades of data on funded projects and their outcomes. This work draws on the authors' direct experience with MCAF, including leading MCAF (ES), working as MCAF staff (BE, ED, BB), being an MCAF fellow (AdV, KF, NIK), and serving on the advisory committee (MT, KF, NIK). We review projects funded in the first 21 years of the MCAF program (1999–2020) and how they changed between the first and second decades. We use the lessons learned from the evaluation of MCAF projects and feedback from program participants to make recommendations to help grants programs maximize their conservation outcomes and promote management equity in conservation.

2. Methods

2.1. The Marine Conservation Action Fund

The Marine Conservation Action Fund (MCAF), founded in 1999, is a small grants program that provides rapid turnaround funding for urgent projects, seed funding for early-stage projects, and funding for ongoing work. The program has streamlined application and reporting requirements. For example, applications require an initial letter of interest and then a three-to-five-page proposal that includes a simple budget. For reporting, PLs of MCAF-supported projects are asked to share a brief project update over email with MCAF staff six months after the launch of the project and to submit a final report and blog within six months of the end of a project. The program accepts proposals on a rolling basis and relies on expert reviewers and an advisory committee to evaluate proposals and inform funding decisions. The program funds projects focused on a broad range of marine species and habitats, projects that use a variety of approaches, and projects from PLs at all career stages. Funding decisions are based on the project's and PL's potential to advance ocean conservation.

In its first decade, MCAF accepted proposals from any country with an ocean coastline. In 2010, MCAF shifted to primarily funding projects in LMICs as a result of MCAF staff's growing recognition of the financial inequities faced by small organizations in LMICs. Additional developments included providing non-financial resources to funded PLs, such as professional and technical support, networking opportunities, and mentoring. A fellowship program, launched in 2015, provides support and promotes community building in perpetuity among a selected group of established conservation leaders. The MCAF program is financially supported by foundations and individual donors, as well as in-kind support from the New England Aquarium. A key role of MCAF staff is to build relationships with these funders. The MCAF program raised an average of approximately \$100,000 per year between 2017 and 2019. Following the timeframe evaluated for this paper, MCAF has continued to evolve and now requires that PLs must be from the LMIC where the work is taking place.

2.2. Project characteristics

The MCAF program provides an opportunity to explore the potential for small grants programs to advance ocean conservation and promote management equity because submitted proposals, funded projects, and project outcomes have been documented for more than 20 years (i.e., communications with project leaders, reports, publications, websites, blogs, media, and social media posts). We summarized the following

characteristics of the funding dispersed by the MCAF program from June 1, 1999 to July 31, 2020: the total funding dispersed, the average award size, and the average number of projects funded each year. We also summarized the following project-specific characteristics, which were obtained from proposals submitted by PLs: the country in which work was conducted, the type of funding requested, the threat to ocean health addressed by the project, the species group or habitat that was the focus of the project, and how PLs learned about MCAF. The type of funding requested was summarized in four categories (see Supplement for definitions): new projects, ongoing projects, gap funding, or emergency funding. Some projects addressed multiple threats and focused on more than one species or habitat. These projects were assigned to multiple categories. If no threat was mentioned, we assigned the project to a "not-specified" category.

To assess changes over time in project characteristics we compared data from MCAF's first decade (June 1, 1999–December 31, 2009) to data from its second decade (January 1, 2010–July 31, 2020). For the purposes of this paper, each "decade" is 10 years and seven months. Dividing the projects into these two decades results in an equal number of projects per decade and reflects a change in MCAF to increasingly fund projects from LMICs. Finally, we analyzed the change in the percentage of PLs who were funded more than once over the two decades.

2.3. Conservation outcomes

We assessed the potential of small grants to impact conservation by assessing the short- and long-term outcomes of the MCAF projects. Outcomes were identified from keywords and text provided in project reports, correspondence with PLs, social media, media, online reports submitted to other funders or government entities that acknowledged MCAF, and publications that acknowledged MCAF. Short-term project outcomes were defined as outcomes that resulted directly from the project and occurred during the grant period. We categorized short-term outcomes as follows (see Supplement for definitions): data collection, direct protection (e.g., turtle eggs, individual animals), and spatial management (e.g., strengthening the management of a marine protected area). Projects were allowed to have multiple outcomes. We calculated the average outcome per project for the first and second decades of the program.

Long-term outcomes represented broader impacts than short-term outcomes and were defined as outcomes that the project contributed to, but that occurred after the grant period ended. A single long-term outcome was identified for each project. We used the keywords and text in the sources used to identify short-term outcomes to define four categories of long-term outcomes (see Supplement for definitions): catalyst (e.g., the project launched years of additional work), sustained impact (e.g., the funding maintained the continuity of an ongoing project), marine protected areas (MPAs; e.g., a new MPA was established or an existing MPA was expanded), and policy (e.g., new conservation measures were enacted). Our categories are specific to MCAF funded projects and other categories may be relevant to other funding sources.

2.4. Management equity

We used three metrics to evaluate the impact of MCAF on advancing management equity. The first metric evaluated the number of projects and PLs from LMICs versus HICs. We selected this metric to represent the degree to which local practitioners in LMICs have the opportunity to lead conservation initiatives, which is a component of management equity (Bennett et al., 2021). In particular, we determined the percentage of projects taking place in LMICs between the first and second decades of the program. We also determined the percentage of projects led by a PL from a LMIC in each decade. We determined whether a PL self-identified as being a citizen of an LMIC from biographical information provided in proposals, from biographical information posted on the internet, and through personal correspondence with PLs.

The second metric evaluated stakeholder engagement in each project. We selected this metric because it shows local engagement, which is a component of management equity (Bennett et al., 2021). We evaluated the percentage of projects in both LMICs and HICs that specified stakeholder engagement. For projects conducted in all countries, we also evaluated the type of engagement and the stakeholders involved. Data were compiled from keywords and text in the same sources used to identify short-term outcomes. Some projects specified multiple types of engagement or stakeholders. These projects were assigned to multiple categories. We defined six categories of stakeholder engagement (see Supplement for definitions) that were specific to MCAF projects: collaboration, information dissemination, training, knowledge exchange, consultation, and interviews. We also used the MCAF projects to identify the types of stakeholders involved in the engagement. We used three categories for individual stakeholders (see Supplement for definitions): community members, conservation practitioners (e.g., academic scientists, conservationists, and technicians with expertise in the project subject matter), and students. We also used two categories of industry stakeholders: fishers and tour operators. Finally, we also

included government and local organizations as stakeholders.

The third metric evaluated the number of publications in peer-reviewed journals resulting from MCAF projects and the percentages of publications and citations for PLs from LMICs compared to HICs. We selected this metric because publications can contribute to increasing management equity by promoting opportunities for career advancement, funding, and leadership roles in conservation science and practice (Johri et al., 2021). We compiled data on publications through correspondence with PLs, social media, and media. We also searched Google Scholar for papers that acknowledged the Marine Conservation Action Fund, the Conservation Action Fund (MCAF's name when launched), or the New England Aquarium. We cross-referenced these papers with the name of the PL and the project description.

3. Results

3.1. Project characteristics

During the first 21 years of the MCAF program (i.e., June 1, 1999 to

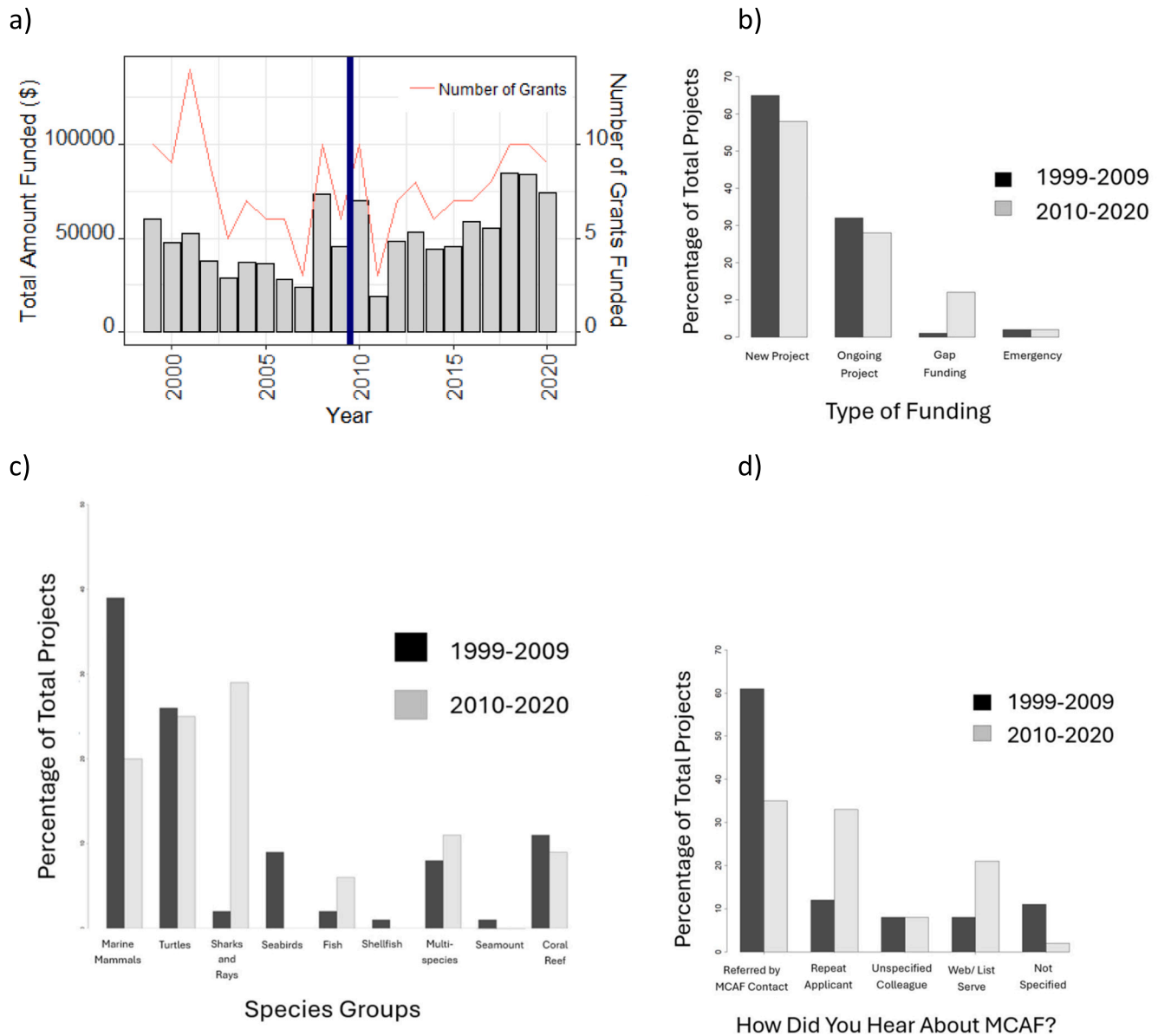


Fig. 2. Characteristics of projects funded between June 1, 1999 and July 31, 2020 by the Marine Conservation Action Fund: a) amount of funding distributed and the number of funded projects each year (the vertical dark blue line divides the first and second decades of program); b) type of project funded; c) percentage of species and habitats that were the focus of funded projects (projects that focused on more than one species were noted as “multispecies”); and d) how applicants learned about MCAF.

July 31, 2020), a total of \$1,107,087.10 was distributed to 170 projects (Fig. 2a) that took place in 57 countries across the world (Fig. 1). The region with the highest number of projects was Central America (29 projects). The LMIC and HIC with the highest number of projects were Costa Rica (14 projects) and the United States (17 projects), respectively. The average award was \$6588 (range: \$1000 to \$12,000). The average number of projects funded each year was 7.7 (range: 3 to 14; Fig. 2a) and depended on the number of proposals approved by expert reviewers, the amount of funding available, and the amount of funding requested by each project. The type of project funded was similar between decades: a majority of projects were new, approximately a third were ongoing projects, and a smaller percentage of projects represented requests for gap or emergency funding, with the proportion of gap funding increasing from 1 % to 12 % between the two decades (Fig. 2b).

MCAF projects covered a broad range of ocean threats (Table 1) and focused on a diversity of species and habitats (Fig. 2c). The impact of unsustainable fishing practices was the top threat addressed and increased from 35 % to 47 % of all projects between the first and second decades (Table 1). In the second decade, there was a decrease in the percentage of marine mammal and seabird projects that received funding, which was offset by an increase in the percentage of projects focusing on sharks and rays (Fig. 2c).

In the first decade, 61 % of PLs learned about MCAF from individuals who were closely connected to the program, such as members of the MCAF advisory committee or PLs of funded projects (Fig. 2d). From the first to second decade, the percentage of PLs learning about MCAF through the web or a listserv more than doubled (i.e., increased from 8 % to 21 %; Fig. 2d). The percentage of repeat applicants also more than doubled between the two decades (i.e., increased from 12 % to 33 %; Fig. 2d).

Table 1

Threats to ocean health addressed by projects funded by the Marine Conservation Action Fund. Threats are listed from the highest to lowest number of projects that addressed each threat in the first decade of the program. In total, 85 projects were funded in both the first and second decades of the program. Some projects addressed multiple threats, making the column totals higher than the number of projects in each decade. Percentages were calculated using the column totals (e.g., the total number of threats addressed).

Threat	1999–2009		2010–2020	
	Number of projects addressing each threat	Percentage of threats addressed	Number of projects addressing each threat	Percentage of threats addressed
Unsustainable fishing practices	34	35 %	51	47 %
Not Specified	19	20 %	9	8 %
Poaching	9	9 %	17	16 %
Strandings	7	7 %	2	2 %
Habitat Destruction	5	5 %	9	8 %
Tourism	5	5 %	2	2 %
Ship Strikes	4	4 %	5	5 %
Predation	3	3 %	3	3 %
Pollution	2	2 %	2	2 %
Oil/Gas	2	2 %	0	0 %
Exploration				
Natural Disaster	2	2 %	1	1 %
Whaling	2	2 %	0	0 %
Climate Change	1	1 %	5	5 %
Ocean Noise	1	1 %	1	1 %
Covid-19 Pandemic	0	0 %	1	1 %

3.2. Conservation outcomes

In both decades, data collection was the primary short-term outcome (Fig. 3). The percentage of projects that contributed to direct protection and spatial management outcomes increased between the first and second decades. There was also an increase in the number of projects with multiple outcomes, with the average number of short-term outcomes per funded project increasing from 0.94 to 1.19. Projects that were catalysts for years of follow-on work and those that allowed for the sustained impact of established monitoring programs made up the majority of long-term outcomes, with smaller numbers of projects leading to MPA and policy outcomes (Table 2).

3.3. Management equity

The percentage of funded projects taking place in LMICs increased from 56 % in the first decade to 93 % in the second decade (Fig. 4). The percentage of funded projects that were led by PLs from LMICs also increased from 27 % to 60 % (Fig. 4). The percentage of funded projects led by a PL working in their own LMIC increased from 26 % to 58 % between the first and second decade of the program (Fig. 4). In contrast, the percentage of projects led by a PL working in their own HIC decreased from 40 % to 6 % (Fig. 4). The percentage of projects in LMIC's that were led by PLs from HICs decreased from 52 % to 35 % (Fig. 4). Over the entire 21-year period, no project in a HIC was led by a PL from a LMIC.

Stakeholder engagement was specified in a higher percentage of projects conducted in LMICs than HICs across both decades (Table 3). In all countries, the percentage of projects that included stakeholder engagement increased from 62 % to 79 % between the first and second decades (Table 4). Collaboration, information dissemination, and training were the most common forms of stakeholder engagement in both decades (Table 4). Community members and fishers were the most common type of stakeholders engaged in the first decade of the program. In the second decade, commonly engaged stakeholders expanded and included fishers, students, community members, and government agencies.

A total of 48 publications were generated by PLs of MCAF projects (Table 5). The percentage of publications senior authored by PLs from LMICs (PLs were the first, second, or last author) increased from 24 % to

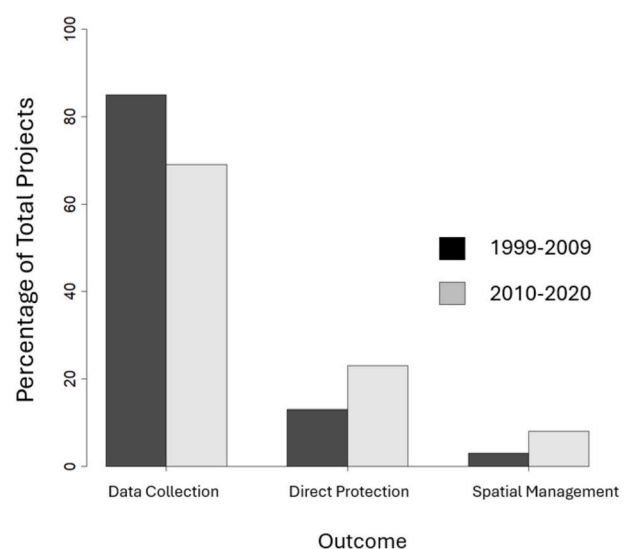


Fig. 3. Short-term outcomes of projects funded by the Marine Conservation Action Fund. Direct protection involved saving individual animals and turtle eggs. Spatial management represented the establishment or strengthening of a marine protected or local marine managed area. Projects could have multiple short-term outcomes.

Table 2

Long-term outcomes of projects funded by the Marine Conservation Action Fund. Each of the 55 projects for which a long-term outcome was identified was assigned a unique outcome.

Category	Definition	Number of projects	Example
Catalyst	Project launched further years of work that built on the original initiative	21	New and ongoing funding helped support the launch of the Haiti Ocean Project's fisher monitoring network in 2017, which has led to important discoveries and continued research on marine life in Haiti.
Sustained impact	Supported the continuity of an established conservation program and/or prevented gaps in long-term data sets	18	Gap funding to the University of Papua in 2013 allowed the continuation of a long-running program that monitors and protects leatherback turtle nests in Indonesia.
Marine Protected Area	Contributed to the establishment, expansion, or strengthening of a marine protected or local marine managed area	10	Ongoing funding to Misión Tiburón contributed to their efforts to achieve the declaration of Costa Rica's first shark sanctuary in 2018.
Policy	Contributed to the enactment of local, national, or international species conservation measures	6	Ongoing funding to Blue Resources Trust in Sri Lanka enabled the collection of long-term fisheries data that contributed to International Union for Conservation of Nature (IUCN) Red List assessments for various Chondrichthyan, which help to inform management actions. The data were also used to support successful proposals to list all Manta and Mobula species on Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 2013 and 2016, respectively, and to support successful proposals to list all Manta and Mobula species under Appendix I and II of the Convention on Migratory Species (CMS) in 2014.

70 % between the first and second decades. The percentage of citations for publications by PLs from LMICs increased from 22 % in the first decade to 47 % in the second decade. Although the percentage of citations for publications by PLs from HICs decreased between the two decades, the percentage in the second decade was similar to the percentage for PLs from LMICs (i.e., 53 % versus 47 %).

4. Discussion

In this perspective, we explore the potential of small grants programs to advance ocean conservation and foster management equity. Our evaluation of projects funded by MCAF provides evidence that small grants programs make valuable contributions to advancing ocean

conservation in a manner that enables greater local leadership, which promotes management equity. In its first 21 years, MCAF distributed approximately \$1,100,000 to 170 projects in 57 countries. The funding distributed over this period is similar in size to a large US grant for a single project. For example, the US National Science Foundation anticipates distributing \$10,000,000 to support 6–10 projects focused on organismal response to climate change in 2023 (<https://new.nsf.gov/funding/opportunities/organismal-response-climate-change-orcc>; accessed on 9/13/2023). Although the funding distributed by MCAF represents a small percentage of the funding distributed by large grant programs, projects supported by MCAF contributed to achieving lasting conservation impacts (e.g., establishing or expanding MPAs and advancing conservation policy). Overall, these projects also contributed to management equity because funding was increasingly given to PLs from LMICs to develop relevant, timely, and locally informed solutions to the conservation challenges in their countries.

4.1. Advancing ocean conservation

Projects supported by MCAF made substantial contributions to ocean conservation across the world. Over the short-term, projects collected baseline data and filled key knowledge gaps on species and threats in a region, protected individual animals, and strengthened spatial management tools, such as locally managed marine areas and MPAs. Over the long-term, projects contributed to lasting conservation impacts, including establishing national and international protections for species (e.g., CITES listings; Table 2) and new marine protected areas (Table 2). Projects also served as a catalyst for future research and conservation efforts and helped ensure the continuity of established programs and long-term monitoring datasets.

Long-term outcomes were supported by multiple contributors, including other funders, local stakeholders, and collaborators. However, MCAF often played a key role in these successes by investing in projects at an early stage (example provided in Box 1), providing gap or emergency funding that allowed a project to continue, or providing rapid turn-around funding to allow a project to address an immediate conservation need (example provided in Box 1).

The flexibility of the MCAF program also enabled its contribution to advancing ocean conservation. Specifically, MCAF was responsive to the conservation needs identified by PLs. For example, a high percentage of PLs requested and received funding for fisheries-related initiatives to address the threats that unsustainable fishing practices pose to marine life, food security, and local livelihoods. Changes in funding priorities also occurred because MCAF staff became aware of evolving conservation concerns. For example, the increase in funded shark and ray projects in the second decade was driven by MCAF staff's growing recognition of the increased threats facing these species.

4.2. Promoting management equity

The MCAF program helped to advance management equity in ocean conservation by supporting opportunities for PLs from LMICs to conduct research and develop solutions to effectively conserve marine resources in their home countries. Financial disparities between countries create inequities and challenges in advancing conservation (de Vos, 2022). These inequities and resultant challenges have been perpetuated through a long history of colonialism and resource exploitation by HICs (Asase et al., 2021; Khan et al., 2022). To contribute to resolving these challenges, MCAF almost exclusively funded projects in LMICs in its second decade. The majority of these funded projects were led by PLs working in their home countries. Consequently, MCAF addressed an important gap in funding opportunities for PLs and organizations in LMICs (Parker et al., 2012; Seas, 2022). To ensure the accessibility of its funding opportunities, MCAF actively increased its web presence, leading to a doubling of applications from this source in the program's second decade.

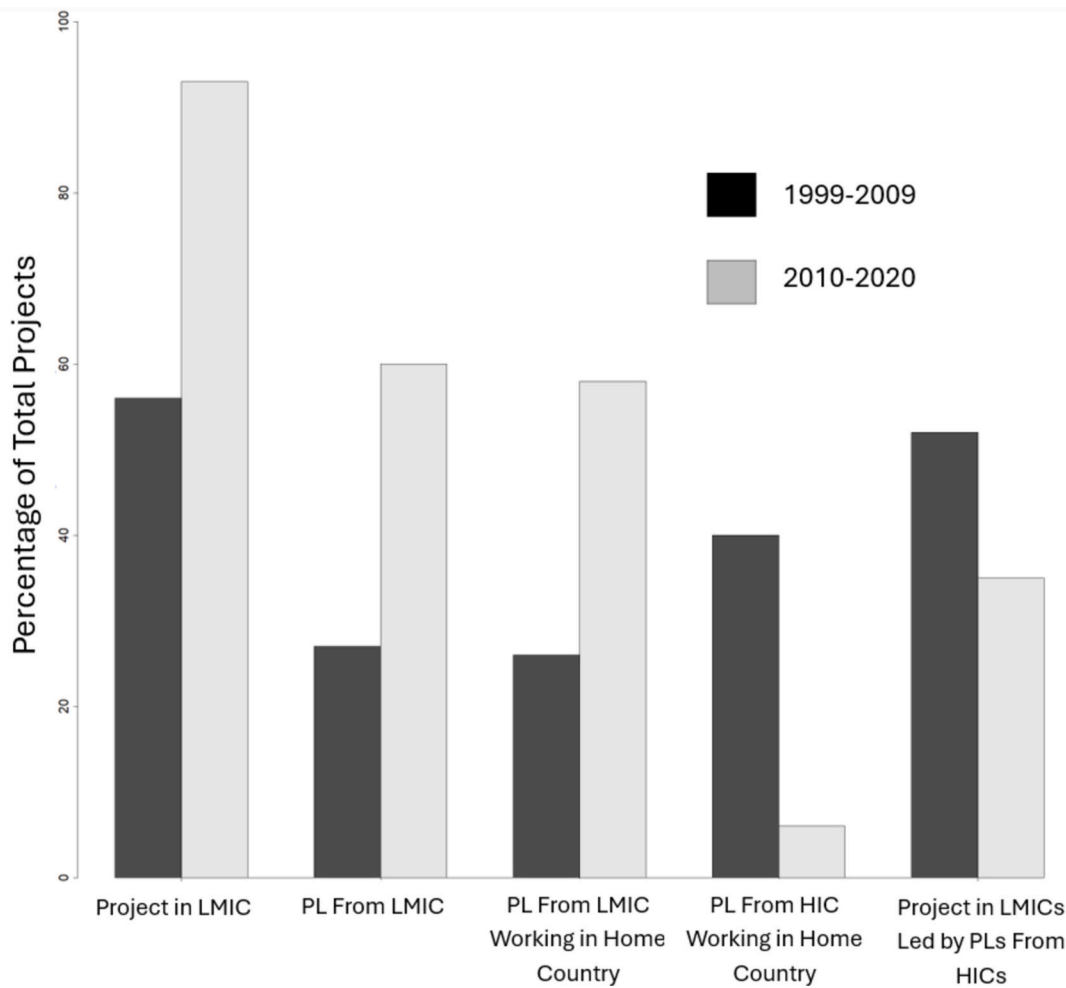


Fig. 4. We determined the percentage of projects taking place in low- and middle-income countries (LMICs) and the percentage of projects led by a project leader (PL) from a LMIC in the first and second decades of the Marine Conservation Action Fund. These PLs may have been working in their own LMIC or another LMIC. Consequently, we also assessed the percentage of projects in which PLs from LMICs and high-income countries (HICs) worked in their own countries in the first and second decade. Finally, we assessed the percentage of projects in LMICs that were led by PLs from HICs.

Table 3

The percentage of projects that specified stakeholder engagement in low- and middle-income countries (LMICs) compared to high-income countries (HICs).

	Number of projects that took place in LMICs that had stakeholder engagement	Number of projects in LMICs	Percentage of projects that took place in LMICs that had stakeholder engagement	Number of projects that took place in HICs that had stakeholder engagement	Number of projects in HICs	Percentage of projects that took place in HICs that had stakeholder engagement
1999–2009	40	48	83 %	13	37	35 %
2010–2020	66	79	84 %	1	6	17 %

The increase in projects led by PLs from LMICs was associated with an increase in the number and percentage of publications by PLs from LMICs in the second decade. Our review was not able to rigorously document publications written in languages other than English. Adding papers published in other languages could increase the number of publications and citations for PLs from LMICs. Catalyzing opportunities for PLs in LMICs to publish their research is important because of the structural biases favoring North American and European contributions to the review and publication process (Johri et al., 2021). Evidence of this bias can be seen in the relatively equal percentage of citations of papers by PLs from LMICs and HICs in the second decade, even though a smaller number of papers was published by PLs from HICs, compared to LMICs. While bias also exists in publications by gender (Maas et al., 2021), we were not able to evaluate these biases because we did not collect these data.

Project leaders also helped to promote management equity in LMICs

by engaging a broad range of stakeholders in conservation initiatives. This engagement included PLs collaborating directly with stakeholders to achieve conservation outcomes, disseminating data and promoting knowledge exchange to inform or energize stakeholders about ocean conservation issues, soliciting local knowledge through interviews, and obtaining input through consultations to guide and inform the PLs' work. In addition, close to a quarter of the projects funded by MCAF in the second decade included training local stakeholders. For example, PLs trained community members to collect species sightings data, helped fishers learn to safely release sea turtles from their nets, taught early career practitioners field research techniques, helped citizens learn stranding response methods, trained community members in sea turtle nesting beach monitoring and protection techniques, and mentored emerging scientists (example provided in Box 1). Capacity sharing and stakeholder engagement can advance management equity and effective conservation by growing the corps of citizens and local leaders who will

Table 4

Type of engagement and stakeholder groups engaged in the first and second decades of the Marine Conservation Action Fund across all countries. In total, 85 projects were funded in each of the first and second decades of the program. Projects could have multiple types of engagement and engage multiple stakeholder groups.

Stakeholder engagement	1999–2009		2010–2020	
	Number of projects	Percentage of total projects	Number of projects	Percentage of total projects
Overall	53	62 %	67	79 %
Engagement types	Number of projects	Percentage of engagement types	Number of projects	Percentage of engagement types
None specified	32	32 %	18	12 %
Collaboration	29	29 %	44	30 %
Information Dissemination	14	14 %	28	19 %
Training	14	14 %	34	23 %
Knowledge Exchange	7	7 %	0	0 %
Consultation	4	4 %	3	2 %
Interviews	1	1 %	18	12 %
Stakeholder groups	Number of projects	Percentage of stakeholder groups	Number of projects	Percentage of stakeholder groups
None specified	32	31 %	16	11 %
Community members	17	16 %	22	15 %
Fishers	15	14 %	39	26 %
Government	12	12 %	21	14 %
Conservation Practitioners	10	10 %	10	7 %
Students	8	8 %	29	20 %
Local organizations	5	5 %	6	4 %
Tour operators	5	5 %	5	3 %

Table 5

Publications (Pub.) by PLs from low- and middle-income countries (LMICs) and high-income countries (HICs) are shown for the first 21 years of the Marine Conservation Action Fund and for the first and second decade. We also show citations (Cit.) of publications by PLs from LMICs and HICs.

	Total Pub.	Number of Pub. with PL from LMIC	Percentage of Pub. with PL from LMIC	Number of Pub. with PL from HIC	Percentage of Pub. with PL from HIC	Total Cit.	Number of Cit. with PL from LMIC	Percentage of Cit. with PL from LMIC	Number Cit. with PL from HIC	Percentage Cit. with PL from HIC
All years	48	24	50 %	24	50 %	1455	401	28 %	1054	72 %
1999–2009	21	5	24 %	16	76 %	1116	241	22 %	875	78 %
2010–2019	27	19	70 %	8	30 %	339	160	47 %	179	53 %

steward, study, and advocate for the ocean and the communities that depend on it (Asase et al., 2021; Spalding et al., 2023).

4.3. Conclusions and recommendations

The MCAF program has evolved to fund conservation projects that promote management equity and contribute to lasting conservation impacts. For example, the vast majority of projects more recently funded by MCAF have PLs from LMICs. The program now requires that PLs must be from the LMIC where the work is taking place. This evolution has been based on feedback and guidance from PLs funded by MCAF, which has driven positive changes to the program's approach and an enhanced awareness regarding social equity in conservation. We use the lessons learned from our evaluation of MCAF projects and the participant-driven evolution of MCAF to make recommendations that can help grant programs maximize their conservation impact and support management equity. Key characteristics of small grants programs that enable lasting conservation impacts are openness to risk (e.g., investing in early-stage projects) and responsiveness to emerging conservation needs. Management equity in marine conservation can be promoted by ensuring funding is accessible to PLs and local organizations in LMICs, providing flexibility in proposal and reporting structures that support smaller organizations, supporting the design and implementation of projects that are driven by local priorities, and providing support to projects that engage stakeholders in developing conservation solutions. We recommend the following strategies to enable grant programs to amplify their impacts:

1) Support established and emerging leaders from LMICs. These leaders can identify and implement short- and long-term conservation

solutions because they understand the cultural and sociopolitical context of the problems in their countries and regions.

- 2) Support leaders that meaningfully engage and collaborate with local stakeholders and communities over the long-term.
- 3) Make long-term investments in PLs and organizations by offering multi-year, unrestricted funding and grants that support mentoring of early career scientists, organizational development (e.g., strategic planning), salary, and core operations (e.g., website development).
- 4) Provide multi-faceted support for PLs, including offering professional development opportunities, elevating the visibility of their projects, contributing to building their professional network, and assisting their efforts to gain support from larger funding sources.
- 5) Regularly seek feedback and guidance from PLs on program strategy and funding decisions.
- 6) Adapt the granting program to better serve the PLs' needs and conservation goals.

The adoption of these recommendations by large and small grant programs will result in a more equitable and participatory approach to funding locally led marine conservation projects. Our review of the MCAF program shows that grant programs can advance ocean conservation in a way that overcomes the problems of parachute science and fosters management equity.

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Box 1 Examples of big impacts from small grant funding.**Rapid turn-around funding to address an immediate conservation need**

At the start of the COVID-19 lockdowns in 2020, I was concerned about the wellbeing of small-scale fishers across Sri Lanka. This concern led me to design a project that would assess how the lockdowns impacted their lives and livelihoods. The time-sensitive nature of this research required immediate access to funding. I was able to obtain the funding needed from a MCAF grant. The grant allowed me to hire 14 research assistants to conduct 415 surveys across 13 study sites in Sri Lanka. The results of this project are currently being prepared for publication, incorporated in the policy and advocacy work conducted by the Sri Lankan non-profit Oceanswell, and used for educational purposes.
Dr. Asha de Vos

Oceanswell, Sri Lanka



Photo: Oceanswell

Funding for early-stage projects

MCAF provided funding in 2012 for our initial baseline field assessments of mobulid fisheries in northern Peru. These assessments showed that these fisheries included pregnant female and juvenile mobulids. We shared the results of these assessments with government officials and conducted several years of advocacy, education, and outreach efforts with fishers, youth, policy-makers, and community members. These efforts contributed to the establishment of full legal protection in 2016 for giant manta rays in Peru.
Kerstin Forsberg,

Planeta Océano, Peru



Photo: Planeta Océano

Funding that contributes to strengthening local capacity

Funding from MCAF in 2019 made it possible to expand our efforts in supporting intergenerational leaders and scientists to advance research on billfish and other marine species in Kenya and the Western Indian Ocean region. A key element of the BILLFISH Western Indian Ocean Project is developing capacity to collect and report fisheries data, which is important in designing actions to conserve billfish and other marine species. The MCAF grant enhanced our opportunity to collaborate with undergraduate, masters, and Ph.D students and local fishing communities to build awareness about the threats facing billfish species and provide hands-on training to ensure long-term data collection critical for ensuring healthy populations of billfish and protection of their habitats.
Dr. Nelly Isigi Kadagi

BILLFISH-WIO Project, Western Indian Ocean



Photo: African Billfish Foundation

CRediT authorship contribution statement

Elizabeth H. Stephenson: Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization. **Bess-Lyn Edwards:** Writing – review & editing, Formal analysis, Data curation, Conceptualization. **Emily Duwan:** Writing – review & editing, Writing – original draft, Visualization, Methodology, Formal analysis, Data curation, Conceptualization. **Benny Berger:** Writing – review & editing, Data curation. **Asha de Vos:** Writing – review & editing, Writing – original draft, Conceptualization. **Kerstin Forsberg:** Writing – review & editing, Writing – original draft, Conceptualization. **Nelly Isigi Kadagi:** Writing – review & editing, Writing – original draft, Conceptualization. **Michael F. Tlusty:** Writing – review & editing, Conceptualization. **Jessica V. Redfern:** Writing – review & editing, Writing – original draft, Methodology, Conceptualization.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Elizabeth H. Stephenson, Emily Duwan, Bess-Lynn Edwards, and Benny Berger report a relationship with the New England Aquarium's Marine Conservation Action Fund that includes: employment. Nelly Isigi Kadagi, Asha de Vos, and Kerstin Forsberg report a relationship with the New England Aquarium's Marine Conservation Action Fund that includes: funding grants. Nelly Isigi Kadagi, Kerstin Forsberg, and Michael F. Tlusty serve on the New England Aquarium's Marine Conservation Action Fund advisory committee.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.biocon.2024.110845>.

Data availability

Data will be made available on request.

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