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Lessons learned from screening potential other effective area-based conservation measures

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Article impact statement: An all-or-nothing approach makes it difficult for sites to meet the criteria to be OECMs, even when they are important areas for biodiversity.

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Abstract

Other effective area-based conservation measures (OECMs) are sites that deliver effective biodiversity outcomes irrespective of their management objectives. These areas are widely expected to play an important role in efforts to protect 30% of Earth by 2030. Despite general guidance to support screening sites against the formal criteria to be OECMs, progress recognizing sites has been limited. To advance the ability to identify OECMs, we developed a questionnaire that translates the components of the broad formal guidance into statements that experts can use to screen potential OECMs. Twenty-eight local experts used the questionnaire to evaluate a large global sample of 81 sites. Most sites evaluated were largely in good condition and had the potential to achieve conservation outcomes, but none met the criteria to be considered OECMs. The most common challenges are related to threat management, adequate resourcing, and the ability to demonstrate that governance and management are achieving effective and sustained conservation outcomes. Based on the formal International Union for Conservation of Nature guidance, sites that only partially meet the relevant criteria remain candidate OECMs. Our questionnaire provides a

nuanced way to assess OECMs that can help identify what support sites need to meet the necessary criteria. With effective long-term conservation outcomes unable to be demonstrated for so many important conservation areas, our findings raise important questions about how to ensure area-based conservation promotes positive and sustained outcomes for biodiversity.

KEYWORDS
Aichi Target 11, conservation outcomes, Convention on Biological Diversity, Global Biodiversity Framework, protected and conserved areas, 30 × 30, OECMs

INTRODUCTION

Target 3 of the Kunming-Montreal Global Biodiversity Framework (GBF) commits countries to protect at least 30% of Earth by 2030 (CBD, 2022), almost doubling the 2020 commitments for the area of land and trebling the area of ocean under protection. Achieving target 3 will involve rapidly expanding the area protected in addition to improving the quality of existing protected areas (PAs) and recognizing other effective area-based conservation measures (OECMs).

In 2018 the Convention on Biological Diversity (CBD) defined OECMs as "a geographically defined area other than a protected area, which is governed and managed in ways that achieve positive and sustained long-term outcomes for the in situ conservation of biodiversity, with associated ecosystem functions and services, and where applicable, cultural, spiritual, socioeconomic, and other locally relevant values" (CBD, 2018). The uncertainty associated with identifying OECMs has partly been attributed to the long delay in agreeing on a definition (Dudley et al., 2018) but has likely been exacerbated by confusion created by different iterations of the guidance provided to interpret the CBD decision (CBD, 2018: criteria A–D, with 26 subcriteria; IUCN-WCPA, 2019: criteria A–D; IUCN-WCPA, 2023: criteria 1–8).

Interpreting the broad criteria and associated guidance across diverse contexts is complex, creating additional challenges for identifying OECMs (Alves-Pinto et al., 2021). It has been argued that some formally recognized OECMs do not meet the necessary criteria (e.g., marine refuges in Canada; Lemieux et al., 2019). It is not clear how most currently recognized OECMs have been evaluated (Claudet et al., 2022; Cook, 2024a), with only 31 of the 6,482 sites registered with the World Database on OECMs (as of February 2025) providing evidence they have been evaluated against the formal criteria (Appendix S1). Therefore, it is unsurprising that doubt remains about what is required to demonstrate that areas meet the necessary criteria (Alves-Pinto et al., 2021; Cook, 2024b; Dudley et al., 2018) and when an area should be an OECM versus a PA (Cook et al., 2024; Jonas et al., 2018; Mitchell et al., 2018). Despite the publication by the International Union for the Conservation of Nature (IUCN) of a site assessment tool (IUCN-WCPA, 2023) and additional guidance (Jonas et al., 2024), the uncertainty about how to translate this general guidance into specific assessments of areas that should count toward target 3 remains a barrier to progress (Gurney et al., 2021).

The expectation that OECMs should achieve positive and sustained conservation of biodiversity provides an opportunity to emphasize the effectiveness of area-based conservation embedded in target 3 (Dudley et al., 2018; Jonas et al., 2018), rather than just the total area protected (Maron et al., 2018; Pressey et al., 2021). The OECM designation offer the potential to recognize a wider range of conservation areas, including those where biodiversity conservation is not the primary objective but a secondary or ancillary benefit of other management objectives (IUCN-WCPA, 2019). There are many actors whose management practices support positive conservation outcomes (Donald et al., 2019; Gurney et al., 2021), including Indigenous Peoples and local communities (Alves-Pinto et al., 2021; Jonas et al., 2017) and private landholders (Mitchell et al., 2018). A renewed focus on effectiveness and sustained biodiversity outcomes can promote efforts to recognize the broad range of additional conservation areas that should count toward the 30 × 30 commitment.

To realize the promised benefits of OECMs and avoid the potential pitfalls, it is essential that the emphasis remains firmly on effective conservation outcomes (Dudley et al., 2022). Despite the recommended site-by-site approach to screening OECMs (IUCN-WCPA, 2019, 2023), there is little evidence to guide this process. Few case studies have attempted to use the IUCN guidance to assess possible OECMs (Cook, 2024a) and <0.5% of recognized OECMs provide evidence they meet the CBD criteria (Appendix S1). Conservation areas occur in diverse contexts that do not necessarily have simple answers to questions about whether governance and management will support long-term outcomes for biodiversity. Therefore, more than a decade after OECMs were first incorporated in international conservation policy, critical gaps remain in supporting countries to identify suitable areas (Claudet et al., 2022). Identifying high-performing sites requires detailed guidance, which ideally could also support sites to identify steps they can take to achieve more effective conservation outcomes. Although the criteria in the IUCN World Commission on Protected Areas (WCPA) site assessment tool address the broad aspects of a site, they do not pinpoint why a site might not be achieving those criteria. We sought to address this omission.

We developed a questionnaire that can be used to provide a detailed assessment of sites in relation to the broad criteria for recognizing OECMs. The questionnaire addresses the constituent components of each criterion in the international guidelines. We used this questionnaire to assess a large, inter-

national sample of sites with the potential to be OECMs, providing the most comprehensive global assessment to date. Our goal was to identify whether sites met the criteria to be OECMs, and if not, which aspects of the criteria sites did not satisfy. We sought to provide critical insights into how sites perform when the emphasis is on areas achieving "positive and sustained long-term outcomes for the in situ conservation of biodiversity" and what support sites are likely to need to achieve or maintain this standard.

METHODS

Questionnaire development

To evaluate sites, we developed questions that drew on CBD Decision 14/8 that defined OECMs (CBD, 2018) and the extended guidance developed by the IUCN (IUCN-WCPA, 2019, 2023). Elements of the assessment criteria have changed with each iteration of the guidance, as detailed in Annex 2 of the current IUCN guidance (Jonas et al., 2024). We developed our questionnaire based on the CBD decision, where, for example, equitable governance was incorporated in the criterion addressing legitimate governance authorities (criterion B.2) but has since become a stand-alone criterion in the IUCN site assessment tool (criterion 8). Nevertheless, we used the IUCN site assessment tool (IUCN-WCPA, 2023) to demonstrate how our questionnaire can be used to guide the interpretation and application of the 8 broad criteria it contains.

Step 1 in the IUCN site assessment tool involves identifying a "potential OECM": criterion 1, the site is not a recognized PA, and criterion 2, the site is "*likely* to support important biodiversity." We used these criteria to identify sites for data collection (see "Site Selection" section). The remaining criteria, 3 through 8 of the tool, are used for step 3—the full assessment, where a site must meet all criteria to be an OECM, but those that only partially meet any criteria are considered a "candidate OECM" (IUCN-WCPA, 2023). Step 2 of the tool requires gaining free, prior, and informed consent of the governing authority for the full assessment, which is also required for a site to be recognized as an OECM (Jonas et al., 2024). Because our study is theoretical, and we did not seek to formally recognize or report areas as OECMs, we did not conduct step 2 and did not identify individual sites.

We developed 20 statements that span the 6 criteria in the full assessment stage (Figure 1 & Appendix S2). For ease, hereafter we refer to the 20 statements as *the questions* and the criteria for a full assessment as *the criteria*. Each question translates a component of the IUCN criteria, and its supporting guidance, into categorical responses that can be used to interpret the circumstances under which a site may or may not meet the criteria. The categorical response options reflect conditions under which sites could be designated as *yes*, *partially*, or *no* in response to the question, as required by the site assessment tool (IUCN-WCPA, 2023).

The questions were used to create a questionnaire (Appendix S3) and included descriptive information about the site, including the size, relevant biome and dominant ecosystems present, and the type of site (e.g., community forest, territorial lands).

The questionnaire could be completed using any of the means for verification outlined by the IUCN site assessment tool, including local expert knowledge, monitoring data, scientific studies, local laws and regulations, and relevant traditional ecological knowledge (IUCN-WCPA, 2023).

Site selection

Sites were selected that satisfied the definition of a *potential OECM*, that is, not a PA (criterion 1) and with a reasonable likelihood that they would support important biodiversity (criterion 2) (IUCN-WCPA, 2023). All sites were drawn from places that the Wildlife Conservation Society (WCS) identified as priorities for nature conservation because they contain disproportionately high levels of important biodiversity, maintain relatively intact ecosystems, protect important areas for iconic or charismatic megafauna, provide refugia for unique wildlife, and make important contributions to climate change resilience (Robinson et al., 2024). In addition, WCS often provides support to sites at the interface of wildlife and land tenure boundaries, which are diverse areas across different geographies and stakeholders.

In accordance with the site assessment tool guidelines (IUCN-WCPA, 2023), individual sites in the sample were selected by local experts (i.e., field-based conservation scientists and practitioners) with detailed knowledge of the ecological, social, and economic contexts of the sites. When selecting potential OECMs, experts could choose sites that function to conserve biodiversity in their own right or that support conservation efforts in nearby PAs (i.e., enlarging, buffering, or connecting existing PAs). Priority was given to selecting sites for which experts had the most detailed knowledge about the management, governance, and important biodiversity and that satisfied the requirements to be potential OECMs (criteria 1 and 2).

Data collection

We used the questionnaire to evaluate 81 potential OECMs across 20 countries (Figure 2) from August 2021 to August 2022. The sites were evaluated by 28 local experts, and a separate questionnaire was completed for each site. Experts provided responses for multiple sites if they were actively involved in supporting governance and management of the areas. Experts provided responses for an average of 2.9 sites. Experts who assessed multiple sites did so when they were involved in the management of sites all working toward a broader goal, for example, supporting conservation around a local PA or across different sites protecting populations of the same threatened or migratory species. A small number of experts conducted assessments for sites across more than 1 country because those sites were located close to border regions and were again being

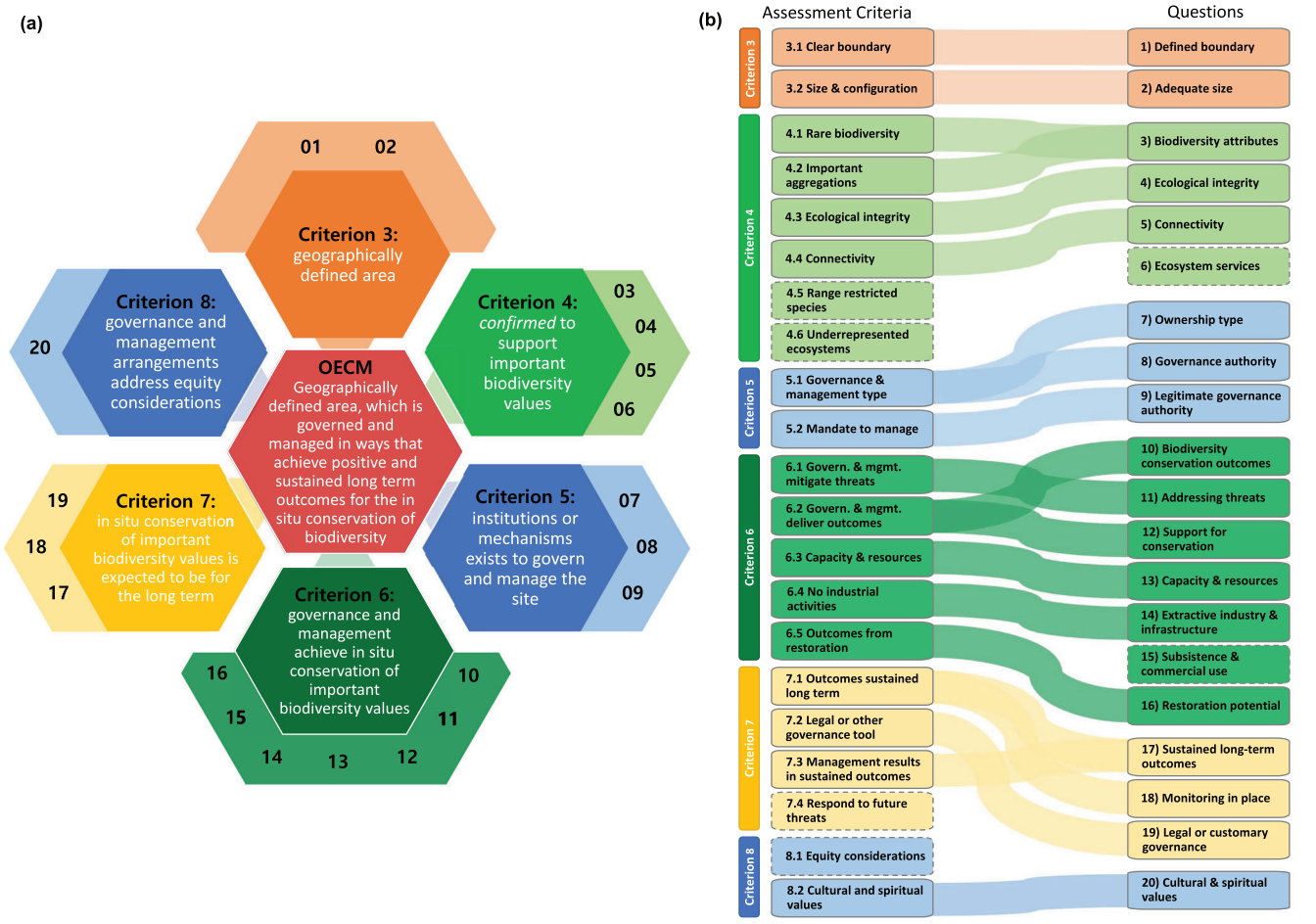

FIGURE 1 The relationship between the Convention on Biological Diversity definition of *other effective area-based conservation measures* (OECMs), the assessment criteria from the International Union for Conservation of Nature site assessment tool (IUCN-WCPA, 2023), and the questionnaire developed to assess each component of the OECM assessment criteria: (a) OECM assessment criteria and questions associated with each criterion and (b) details on how the guidance for the OECM assessment criteria relate to the specific questions (indicators) on the questionnaire.

managed as part of broader conservation goals. In other cases, different experts conducted assessments in the same country, generally because the experts' knowledge was specific to marine or terrestrial sites. In all cases, the expert was working in conjunction with site managers to support planning and conservation efforts and had detailed knowledge of the site.

The questionnaire had detailed instructions experts could use to complete it independently. They could also get help in completing the questionnaire from a member of the research team. In these cases, the questionnaire functioned more like an interview, during which experts were asked to select the responses that best reflected the site.

Experts were local scientists, technical specialists, or field staff working in the relevant countries. These individuals had many years of scientific and policy expertise and worked closely with site managers to set and pursue conservation goals. Experts were contacted and asked if they were willing to participate. Before agreeing, they were asked to consider if they had sufficiently detailed knowledge and access to supporting information about potential sites to complete the questionnaire.

In addition to acting as local experts, experts could draw on available evidence to support their responses, including spatial data, recent national, regional, and local site-based conservation assessments, Indigenous knowledge, and consultation with other experts. This project received approval from the Monash University Human Research Ethics Committee (MUREC Project 37080).

Data analyses

Following the IUCN site assessment tool (IUCN-WCPA, 2023), we calculated how many sites met all the criteria to be OECMs, which required selecting the highest of the categorical responses for all questions (i.e., equivalent to a *yes* response in the assessment tool). The exception to this was criterion 4 (Figure 1 & Appendix S2), for which sites need only contain one category of important biodiversity values. Where experts indicated the site aligned with the intermediate category for some questions (i.e., equivalent to a response of *partially* in the assessment tool),

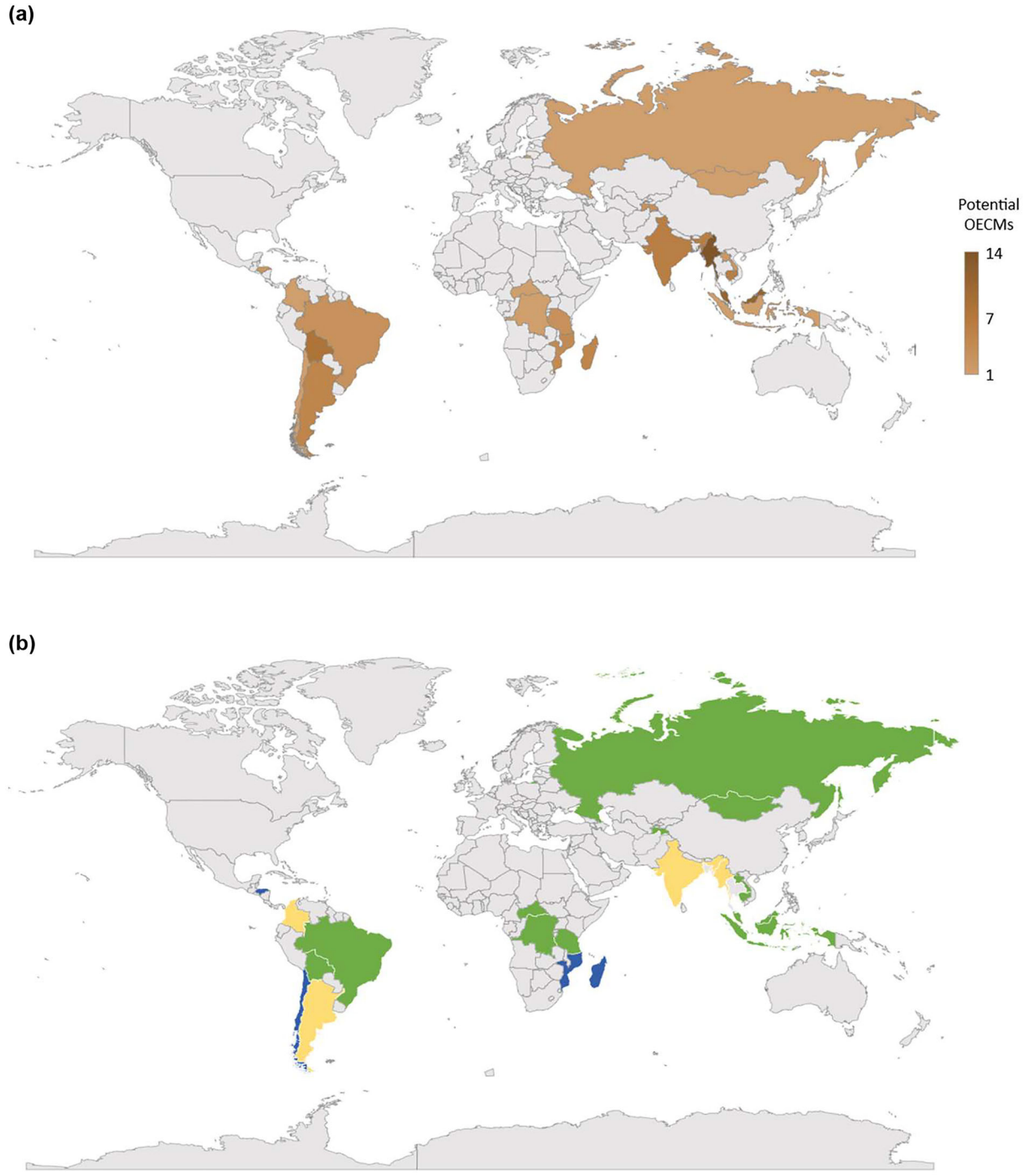

FIGURE 2 The geographic distribution of potential other effective area-based conservation measure (OECM) sites ($n = 81$) evaluated by experts: (a) the number of sites per country and (b) whether countries are represented by sites from the marine (blue), terrestrial (green), or both realms (yellow).

the site was considered a candidate OECM. If experts selected the lowest response for any of the questions (i.e., equivalent to a response of *no* in the assessment tool), the site was considered not currently an OECM. We used the same process to assess responses to 3 essential elements: having important biodiversity at the site, currently achieving biodiversity outcomes, and being likely to sustain conservation outcomes in the long term. This subset was used to identify how many sites could meet the criteria to be OECMs if any of the shortfalls in management and governance could be resolved.

To examine whether marine and terrestrial sites performed differently across the questions, we used Mann–Whitney *U* nonparametric tests (Quinn & Keough, 2002). The categorical responses for each question were converted to an ordinal response variable, scaled between 1 (lowest performance) and 3 (highest performance) (Appendix S3). All statistical analyses

were conducted in SPSS 27. We considered p values of <0.05 statistically significant.

RESULTS

Types of sites assessed

The 81 potential OECMs from 20 countries (Figure 2) included important marine (n = 27) and terrestrial areas (n = 54). This was a much higher proportion of marine areas than those currently recognised as OECMs in the World Database on Other Effective Area-Based Conservation Measures (WD-OECM) (3% marine) (Appendix S4).

The majority of sites had biodiversity conservation as a secondary management objective (e.g., wildlife areas, forestry concessions, community-managed forests, and fisheries areas), relative to those with biodiversity as the primary objective (e.g., nature reserves or biosphere reserves), and only 3 sites had biodiversity conservation as an ancillary outcome (e.g., military lands) (Figure 3a). Compared with the sites in the WD-OECM, our sample underrepresented sites where biodiversity was the primary objective (WD-OECM 55%, our data 27%) (Appendix S4).

The sites represented diverse ownership types (question 7, assessment criterion 5.1) (Figure 3) and governance arrangements (question 8, criterion 5.1), broadly reflecting patterns of ownership and governance of OECMs in the WD-OECM (Appendix S4). The majority of sites were owned by state actors (57%) and managed by governments (32%) or Indigenous and local communities (37%) (Figure 3b,c). Approximately one quarter of sites had communal ownership and shared governance arrangements (26%). Private ownership and management were rare (5%) (Figure 3b,c). As such, our sample included a higher proportion of sites managed by Indigenous and local communities and lower proportion of sites managed by governments relative to those in the WD-OECM (Appendix S4).

A geographically defined area (criterion 3)

Experts reported that 70% (n = 57) of sites had defined boundaries (question 1, criterion 3.1). As such, 30% of the sample did not meet the first criterion. When assessing the size and configuration of sites (question 2, criterion 3.2), 20% were considered of a viable size on their own to support their important biodiversity values, but most were considered viable only in combination with nearby conservation areas (Appendix S5).

Important biodiversity values and associated ecosystem services (criterion 4)

As described in "Site Selection," sites were only selected if they were believed to have important biodiversity values. Experts confirmed that all sites contained one or more of the important biodiversity values outlined for criterion 4 (questions 3–5). Specifically, 91% of sites were reported to support rare or threatened species and to support their habitats or important species aggregations or life stages or both (question 3, criteria 4.1 and 4.2) (Figure 4a).

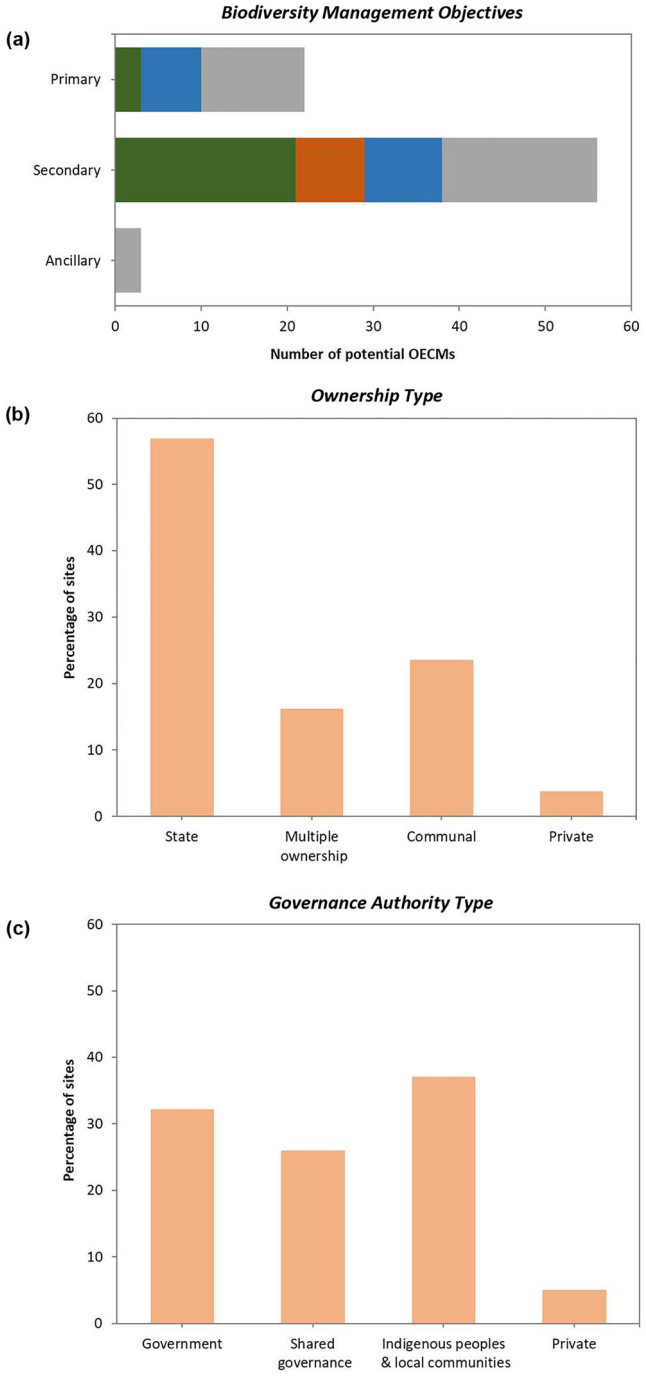

FIGURE 3 (a) Types of potential other effective area-based conservation measure (OECM) sites grouped by management objectives (green, forest management areas; brown, wildlife or game management areas; blue, fisheries management or marine conservation areas; gray, other), (b) who owns the relevant lands or waters (question 7, criterion 5.1), and (c) the governance authority with the responsibility for making decisions about the management of an area (question 8, criterion 5.2) (n = 81). See Figure 1 for the link between the questions and OECM criteria.

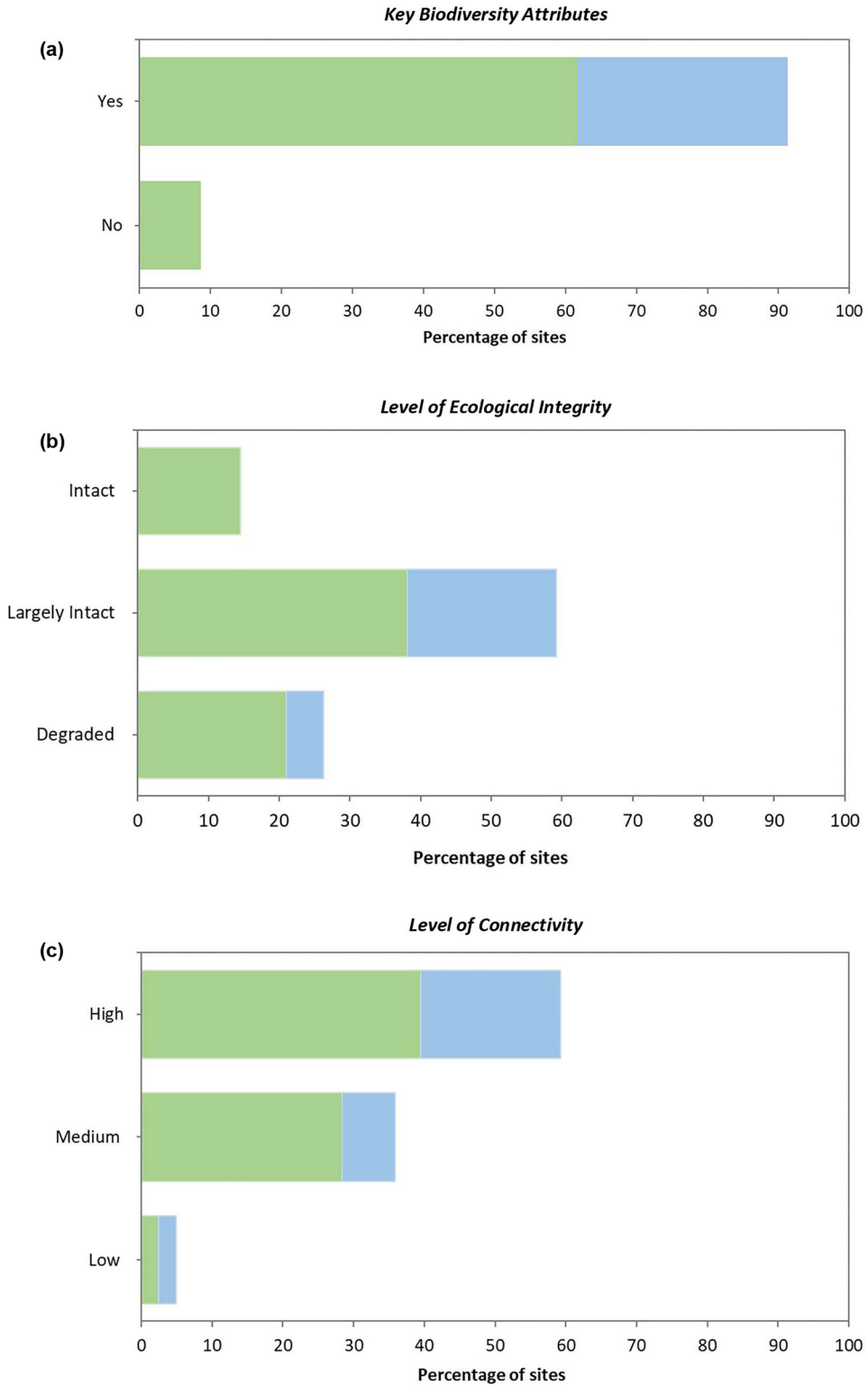

FIGURE 4 Percentage of sites assessed as potential other effective area-based conservation measures (OECM) with (a) key biodiversity attributes (question 3, criteria 4.1 and 4.2); (b) at 3 levels of ecological integrity (question 4, criterion 4.3); and (c) 3 levels of connectivity (question 5, criterion 4.4) (green, terrestrial sites [$n = 57$]; blue, marine sites [$n = 24$]). See Figure 1 for the link between the questions and OECM criteria. Sites need only demonstrate one of the important biodiversity values listed to meet criterion 4.

Most sites had high levels of ecological integrity (question 4, criterion 4.3), although one quarter (26%) were described as degraded (Figure 4b). Marine sites were statistically more likely to be considered intact than terrestrial sites ($U = 529.50$, $z = -2.05$, $p = 0.041$).

The majority of sites (59%) had high levels of connectivity (question 5, criterion 4.4) and were considered sufficiently well-connected to other PAs to sustain viable population of species (Figure 4c) (Appendix S5).

Ecosystem services are not a criterion in the site assessment tool and so were not used to determine if sites met criterion 4. Nevertheless, 80% of sites were considered important for regulatory and production ecosystem services (question 6) (Appendices S6-S7).

Institutions or mechanisms exist to govern and manage the site (criterion 5)

The groups responsible for a site must have a mandate to govern and manage the site (criterion 5.2). We found that 66% of all sites had a governing authority with the necessary legal standing or recognition to ensure the conservation of biodiversity (question 9) (Appendix S8). This was more of a challenge for marine sites, where only 35% had recognized governing authorities, significantly lower than the 77% of terrestrial sites ($U = 329.00$; $z = -3.41$; $p < 0.001$).

Governance and management of the site achieve or are expected to achieve the in situ conservation of important biodiversity values (criterion 6)

Criterion 6.1 addresses the ability of sites to deliver effective in situ conservation of biodiversity. Respondents considered that 73% of sites would likely deliver conservation outcomes at some point in the future (question 10). However, only 7% were reported to have already achieved effective in situ conservation of the biodiversity for which the site was important (Figure 5a).

Criterion 6.2 addresses the ability to prevent and mitigate threats to biodiversity as a site. Several questions addressed whether the governance and management of a site prevent and mitigate threats to the site's important biodiversity values (questions 11–16). Only 9% of sites were reported to have identified and effectively addressed threats to biodiversity, although threats were being at least partially addressed in 85% of areas (question 11) (Figure 5b). Although most sites had groups that recognized and supported its conservation status, 21% had at least one governing authority that did not support the conservation of biodiversity at the site (question 12) (Appendix S9).

Criterion 6.3 addresses capacity and resources. Less than 13% of sites were considered to have sufficient resources (i.e., staff and operational budgets) to sustain long-term conservation outcomes (question 13) (Figure 5c).

Criterion 6.4 addresses extractive uses at a site. We assessed the compatibility of extractive uses associated with industry or infrastructure (question 14, criterion 6.4) separately from subsistence uses (question 15). In both cases, most sites were considered to have extractive uses that were somewhat compatible with biodiversity conservation, but 26% of sites had incompatible industry or infrastructure (Figure 5d), and 22% had subsistence uses that were reported to be incompatible with biodiversity conservation (Figure 5e).

Criterion 6.5 addresses the restoration of biodiversity at sites. The potential to restore biodiversity at sites or maintain biodiversity values that had already been restored (question 16) was considered high (51%) or moderate (43%) in almost all sites (Figure 5f).

In situ conservation of important biodiversity values is expected to be sustained long term (criterion 7)

Approximately half of sites were considered likely to sustain biodiversity outcomes long term; a further 10% were expected to do so (question 17, criterion 7.1). Forty percent of sites were considered unlikely to be able to sustain biodiversity outcomes (Figure 6a).

To understand how current and long-term outcomes were being assessed, we asked about the availability of monitoring data (question 18). Forty-five percent of sites had no monitoring in place to track conservation outcomes for the important biodiversity that occurred there (Figure 6b). Some monitoring was taking place at the other sites, but less than one-third had sufficient monitoring to judge long-term outcomes.

Approximately 69% of sites lacked the enabling conditions for long-term conservation of biodiversity because they had insecure governance and conservation management arrangements (question 19, criterion 7.2). This was either because there was no instrument in place to support the area or the instrument in place could be easily overturned (Figure 6c).

Governance and management arrangements address equity considerations (criterion 8)

Equity considerations at sites were not specifically addressed in our questionnaire, although we asked whether sites had important cultural and spiritual values (question 20). This was the case for 77% of sites; the status of cultural and spiritual values was unknown for 19% of sites (Appendix S10).

Overall capacity to achieve effective and sustained in situ conservation of biodiversity

All of the sites in our sample met the definition of *potential OECMs* based on step 1 of the IUCN site assessment tool because they were not PAs and had important biodiversity.

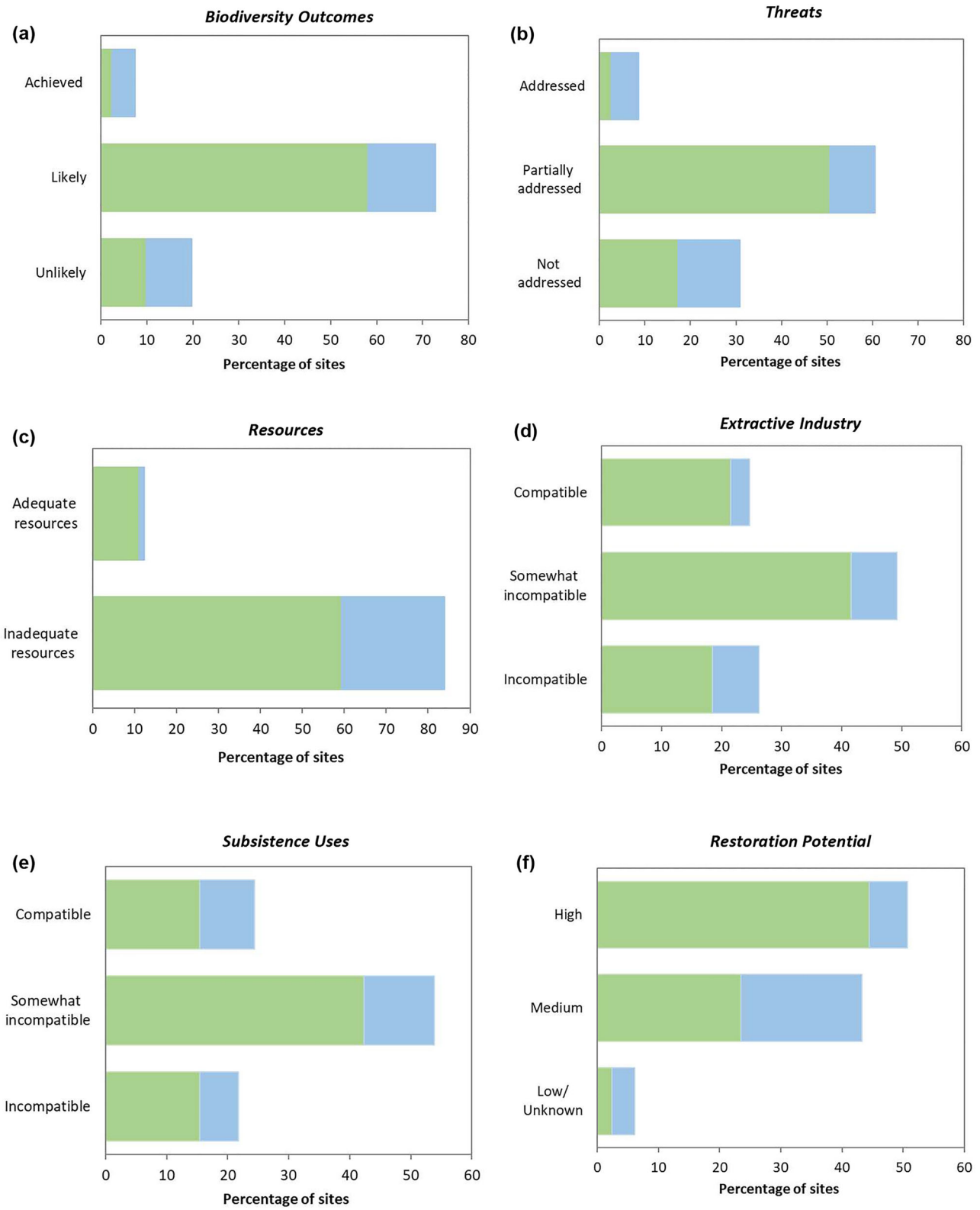

FIGURE 5 The percentage of sites assessed as potential other effective area-based conservation measure (OECM) with varying levels of (a) achievement of biodiversity conservation outcomes (question 10, criterion 6.2), (b) addressing threats (question 11, criterion 6.1), (c) resources (question 13, criterion 6.3), (d) extractive industry (question 14, criterion 6.4), (e) subsistence use (question 15, criterion 6.4), and (f) restoration potential (question 16, criterion 6.5) (green, terrestrial sites [$n = 57$]; blue, marine sites [$n = 24$]). See Figure 1 for the link between the questions and OECM criteria.

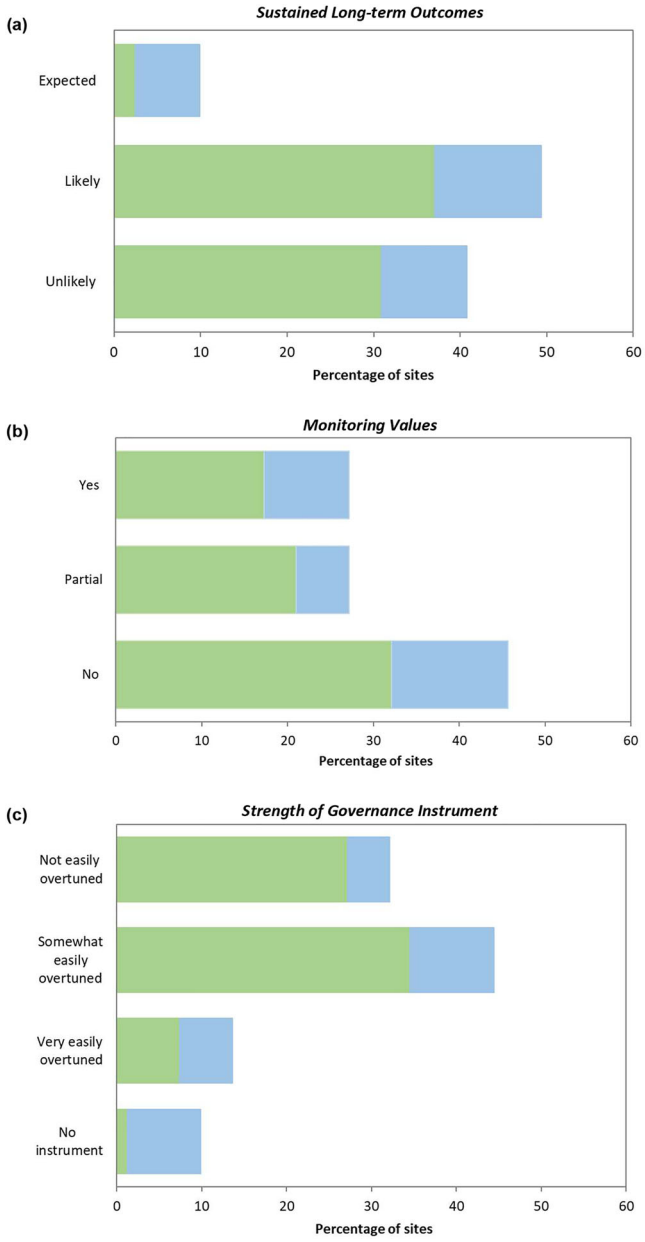

FIGURE 6 The percentage of sites assessed as potential other effective area-based conservation measure (OECM) according to (a) sustained long-term outcomes (question 17, criteria 7.1 and 7.3); (b) monitoring levels in place (question 18, criterion 7.1); and (c) governance strength (question 19, criterion 7.2) (green, terrestrial sites [$n = 57$]; blue, marine sites [$n = 24$]). See Figure 1 for the link between the questions and OECM criteria.

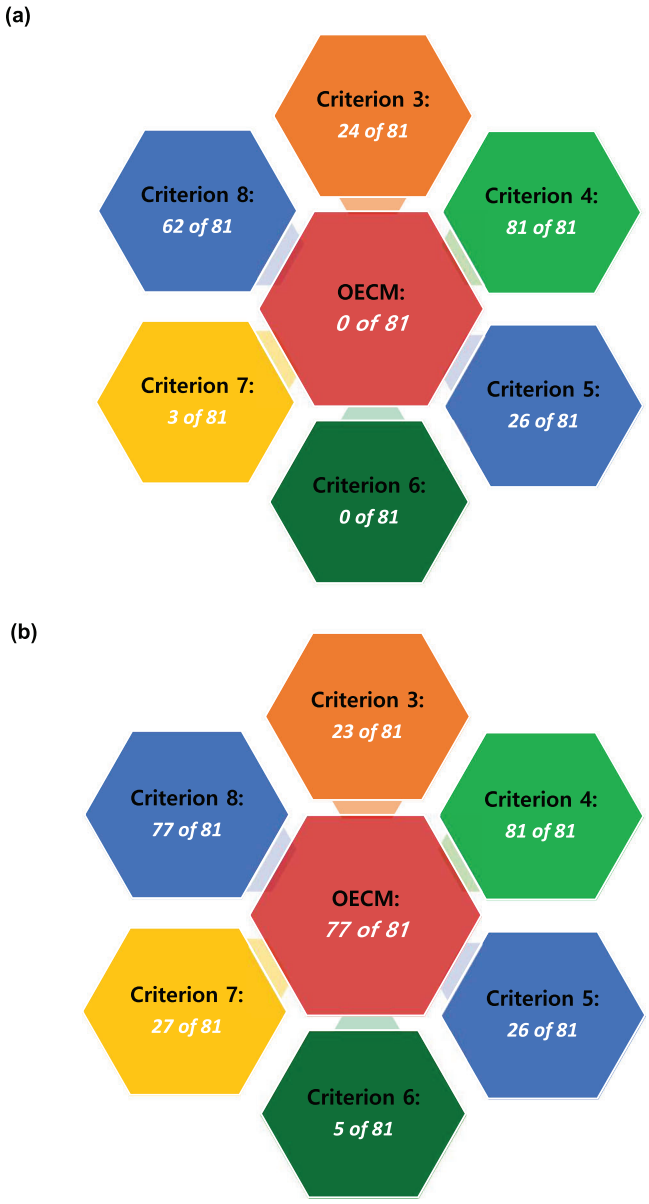

FIGURE 7 The number of sites assessed as potential other effective area-based conservation measures (OECM) that (a) fully met the criteria in the International Union for Conservation of Nature (IUCN) Site Assessment Tool and therefore could be considered confirmed OECMs and (b) partially met the criteria in the IUCN Site Assessment Tool and therefore could be considered candidate OECMs. See Figure 1 for the link text of the definition of an OECM and the text of the criteria.

None of the sites in our dataset met all of the criteria in the full assessment (step 3 of the IUCN site assessment tool) (Figure 7a) because they failed at least one criterion. Critically, no sites met criterion 6, largely because they were assessed as not fully addressing threats to biodiversity and because they lacked adequate resources to do so (Figure 5). Only four sites in our sample were considered candidate OECMs because they scored at least in the intermediate range (partially) for all questions (Figure 7b). However, we did not formally assess sites to be considered as OECMs, which would have required explicit free, prior, and informed consent of the governing authorities (CBD, 2018; Jonas et al., 2024).

When we reduced the assessment to sites with important biodiversity (questions 3–5) that were achieving effective in situ conservation of biodiversity (question 10) and were expected to sustain those outcomes (question 17), three sites fully met these requirements and 46 sites (57%) at least partially fulfilled these requirements (Figures 5a and 6a).

DISCUSSION

We set out to evaluate sites against the criteria that would need to be met to be recognized as OECMs, translating the guidance in the IUCN site assessment tool into specific statements that can provide a nuanced assessment of sites. Our data represented a large and diverse set of sites from around the world, comprising the full range of governance types (Dudley, 2008) across marine and terrestrial environments. These sites are important for biodiversity conservation and are places where the WCS has been working to protect their values. As the most significant effort to screen potential OECMs against the formal criteria, these data provided important insights into the challenges associated with operationalizing OECMs in practice. This type of assessment is particularly important given the process used to evaluate the OECMs currently recognized in WD-OECM is not transparent (Claudet et al., 2022; Cook et al., 2024) and only 0.5% of recognized sites provide evidence that they meet the necessary criteria (Appendix S1).

Demonstrating areas meet the required OECM criteria

Concerns have been expressed that the definition of OECMs sets a challenging standard for sites (Alves-Pinto et al., 2021), requiring a level of current and ongoing effectiveness not evaluated for most PAs (Coad et al., 2019) and sometimes demonstrably not met by existing PAs (e.g., paper parks; Leverington et al., 2010). None of the conservation areas in our sample met the full suite of criteria to achieve what the IUCN site assessment tool defines as "confirmed OECM" status, and only three sites were judged to be achieving sustained outcomes for the in situ conservation of biodiversity (Figure 7a). Yet, more than one-half the areas were considered to be partially achieving in situ conservation outcomes (Figure 5), pointing to the potential they could be OECMs were it not for the all-or-nothing approach implied by the site assessment tool.

The distinction in the IUCN site assessment tool between confirmed OECMs (sites that fully meet all the criteria) versus candidate OECMs (those that partially meet the criteria) highlights the need to be able to draw a clear line between fully and partially addressing the relevant criteria (IUCN-WCPA, 2023). Our results showed that it was common for sites to score in the intermediate range (partially) for several of the questions; they were on track but not yet achieving the required standard as currently defined. Therefore, while those sites would be judged to have failed to meet the criteria to be an OECM by the IUCN site assessment tool, our more granular assessment enabled us to determine which aspects of the broader criteria were limiting the capacity of sites.

We found great value in having questions that assess the different aspects of governance and management, independently of biodiversity outcomes. In contrast, criterion 6 requires sites to have governance and management of the site that prevents and mitigates threats and conserves the site's important biodiversity values (IUCN-WCPA, 2023) (Appendix S2). Our results highlight the particular challenge of meeting criterion 6. It may be unrealistic to expect governance and management to address all threats to biodiversity, and for sites to have all necessary resources, when this is not the case for most PAs (Leverington et al., 2010). Instead, the goal could be to ensure threats are not compromising biodiversity outcomes and that management and governance processes demonstrate improvement in aspects that have been identified as deficient. Monitoring and reviewing processes and outcomes periodically would provide confidence that a site is one of the places where biodiversity is currently being conserved irrespective of the management objectives.

Challenges for effective governance and management

In addition to threat management and resource constraints being widespread challenges for sites in our dataset, another challenge for many sites was the presence of activities that were at least somewhat incompatible with biodiversity conservation (Figure 5d,e). Given that most of the sites we evaluated were reported to have biodiversity conservation as a secondary management objective (Figure 3a), this may reflect a challenge in balancing management objectives to ensure biodiversity outcomes are not compromised by other activities. There has been a long-running debate about the biodiversity outcomes associated with strictly PAs versus those that permit resource extraction (Grorud-Colvert et al., 2021; Leberger et al., 2020; Pike et al., 2024), and the issue of resource extraction has been contentious in the OECM literature (Hoesen et al., 2023; Lemieux et al., 2019). It should be a goal of all area-based conservation to ensure that activities do not compromise important biodiversity values over time (Rees et al., 2018). Wherever there are concerns that activities may be compromising outcomes, ongoing monitoring will be critical.

Demonstrating that sites currently meet the criteria for in situ conservation of biodiversity requires evidence (Geldmann et al., 2021; IUCN-WCPA, 2023). Where sites already have resource constraints, providing the necessary evidence for effective biodiversity outcomes could be a potential barrier to seeking recognition as OECMs (Alves-Pinto et al., 2021; Cook, 2024a). It will be important to ensure sites have the resources to demonstrate they are achieving in situ conservation of biodiversity (Geldmann et al., 2021; IUCN-WCPA, 2023). We relied largely on expert judgment to evaluate sites because a significant proportion of sites in our sample did not have adequate monitoring programs to verify their conservation outcomes with data (Figure 6b). The importance of monitoring OECMs is emphasized in the CBD Decision 14/8 (CBD, 2018), but our data showed that many sites lacked data and would need to rely heavily on the other forms of evidence endorsed by the site assessment tool, such as the knowledge of local experts (IUCN-WCPA, 2023). The ultimate goal should be the use of monitoring data to demonstrate a site is currently achieving positive conservation outcomes and to ensure OECMs deliver their promised long-term benefits (Dudley et al., 2018). This will require investment in developing long-term monitoring

programs, which will involve resources and technical expertise (Geldmann et al., 2021).

There has been considerable optimism that OECMs could be a mechanism to gain access to additional resources and build the capacity to achieve effective management (Alves-Pinto et al., 2021; Gurney et al., 2021). Tax incentives, corporate partnerships, and payments for ecosystem services are being considered as measures to raise funds to support OECMs in some countries but remain at the pilot stage (Sharma & Pasha, 2024). Without a dedicated source of funding for OECMs, there is a risk that expanding the area under conservation will simply increase existing capacity shortfalls (Coad et al., 2019; Gill et al., 2017) and potentially result in resources being diverted away from existing PAs (Watson et al., 2016). This situation would run counter to the overall goal of improving conservation outcomes embedded in target 3 of the GBF (CBD, 2022; Claudet et al., 2022). Understanding the specific challenges facing a site could strengthen efforts to seek the resources required to efficiently address those issues. Identifying innovative solutions to providing resources for monitoring and management is critical to ensuring the success of area-based conservation more generally (Dudley & Stolton, 2022).

Importantly, our results demonstrated that many sites have insecure governance arrangements (Figure 6), which may compromise the capacity of those sites to sustain conservation outcomes. The legal frameworks that generally accompany PAs, while not infallible, are not easily overturned and offer a mechanism through which changes to protection can be identified (e.g., PA downgrading, downsizing, and degazettement [Golden Kroner et al., 2019]). Most countries do not currently have legislation to recognize OECMs, making it difficult to track changes in the protection for OECMs over time (e.g., conserved area downgrading, downsizing, and delisting [Cook et al., 2024]). There is no agreement about what is required to formalize OECMs or what would be considered long term (e.g., Marnewick et al., 2021). The lack of formal structures not only makes demonstrating that sites meet the requirements to be OECMs challenging, but also creates challenges for tracking the status of OECMs going forward and how they interact with PAs (Cook et al., 2024).

Limitations and future directions

Although the sites included in our dataset reflect a diverse cross-section of conservation areas around the world, we included sites only if they met the definition of potential OECMs set out in the site assessment tool—important places for biodiversity outside PAs. Given that the sites were being supported by a conservation organization, our findings could be an optimistic assessment of the capacity of less well-supported areas to meet the necessary criteria. There is likely to be a much wider spectrum of areas with different strengths and challenges than captured by our sample. Many more studies that evaluate potential sites to identify the types of areas and enabling conditions that make good OECMs are required (Cook, 2024a).

Although the knowledge of local experts is supported as a means of verification for OECMs by the IUCN (IUCN-WCPA, 2023), we did not collect independent, quantitative data or require local data to be shared to verify the assessments made by local experts. The questionnaire we developed is the most comprehensive attempt to transform the broad criteria and guidance for OECMs into a detailed assessment of sites. An important next step is to determine what forms of evidence are required to independently verify these assessments and credibly demonstrate in situ conservation outcomes. Ideally, such assessments would involve quantitative metrics or clear thresholds for when a site has met a criterion (Hilton & Cook, 2022), similar to the performance thresholds set out in the standard for the Green List of Protected and Conserved Areas, then reviewed by an independent panel of assessors (Hockings et al., 2019).

Ideally, future studies could move beyond categorical responses to the questions we developed. A structured approach that asks assessors to detail how they interpreted subjective terms, such as *effective*, *sustained*, and *viable*, and that explicitly links the answers to the important values at the site would be a significant step forward. Our questionnaire will also need to be updated, based on the subsequent publication of the most recent guidance (IUCN-WCPA, 2023; Jonas et al., 2024), with questions added (e.g., assessing equitable governance) and some updated (e.g., restoration must now demonstrate significant conservation outcomes for a site to be an OECM). A process of continual improvement should be the goal of any assessment tool, and additional case studies will help achieve this. We also stress that the questionnaire cannot be used to support an assessment of a site as an OECM without the free, priori, and informed consent of the governing authority. This is a mandatory step, without which a site cannot be formally considered or recognized as an OECM (Jonas et al., 2024).

Our study provides the most comprehensive evaluation of potential OECMs to date, but our findings bring into focus the many questions that remain unanswered. There is a clear need to resolve what is required for sites to demonstrate they meet the definition of an OECM (CBD, 2018). An expectation that sites fully meet all the components of all of the criteria is likely to be unrealistic. Instead, detailed evaluations similar to the questionnaire we developed could be used to identify sites where important biodiversity is being conserved and to identify aspects of management or governance that need to be improved to ensure future outcomes are sustained in the long term. There needs to be greater clarity about the essential elements and the evaluation processes required to ensure OECMs are given the right support, including additional resources and technical advice to meet the intention of long-term conservation outcomes for biodiversity. It is essential to engage with these questions now, while countries are still in the process of formulating strategies to recognize OECMs (e.g., Sharma et al., 2023). Our questionnaire provides an important tool to help advance this process. As the world moves toward 2030, we urge a renewed emphasis on ensuring all area-based conservation is effective at protecting biodiversity. This will involve a deeper consideration of the role OECMs can play in conserving impor-

tant biodiversity as part of integrated conservation landscapes and seascapes.

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SUPPORTING INFORMATION

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