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Preparing the next generation of protected area managers in Madagascar: addressing competency gaps to advance the 30x30 target

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ABSTRACT

To curb biodiversity loss and enhance human well-being, recent decades have witnessed an expansion of protected areas, with a global goal of protecting 30% of the earth's surface by the year 2030 (often referred to as the 30x30 target). To achieve meaningful outcomes, protected areas must be staffed sufficiently with competent personnel. Madagascar's system of protected areas (SAPM by its French acronym) has expanded in area by >400% between 2003 and 2015. This study identifies priorities for growing management competencies to meet this increased staffing demand. Through competence assessment surveys and workshops involving 139 participants from 49 protected areas, we identified critical training needs: senior protected area managers require enhanced managerial skills, and technicians need improved community interaction skills. Less than 20% of senior staff have a degree in management, with a vast majority (70%) having trained in environmental disciplines. Soft skills in ethics, open-mindedness, and growth mindset are important to develop at all levels. Our results offer a pathway forward to align protected area manager training with onsite demands, establishing an enabling environment for enhanced learning in the protected area management sector. Revisiting the SAPM human resources development policy is imperative for effectiveness and expansion of Madagascar's protected areas given the ambitious 30x30 target.

RÉSUMÉ

Pour freiner la perte de la biodiversité et améliorer le bien-être humain, les dernières décennies ont vu une expansion des aires protégées, avec un objectif mondial de protéger 30 % de la surface terrestre d'ici à 2030 (souvent appelé l'objectif 30x30). Pour obtenir des résultats significatifs, les aires protégées doivent être suffisamment dotées de personnel compétent. Le système des aires protégées de Madagascar (SAPM) a vu sa superficie augmenter de plus de 400 % entre 2003 et 2015. Cette étude identifie les priorités pour renforcer les compétences en gestion afin de répondre à cette demande accrue de personnel. À travers des enquêtes d'évaluation des compétences et des ateliers impliquant 139 participants provenant de 49 aires protégées, nous avons identifié des besoins critiques en formation. Il s'agit des gestionnaires des aires protégées, à un niveau important dans les responsabilités, qui ont besoin de renforcement de leurs compétences managériales et des techniciens qui ont besoin d'améliorer leurs compétences en interaction avec les communautés. Moins de 20 % des cadres supérieurs possèdent un diplôme en gestion, la grande majorité (70 %) ayant été formée dans des disciplines portant sur l'environnement. Le développement des compétences transversales, telles que l'éthique, l'ouverture d'esprit et la mentalité de croissance pour un esprit de développement, est essentiel à tous les niveaux. Nos résultats offrent une voie à suivre pour aligner la formation des gestionnaires d'aires protégées avec les besoins sur le terrain, en créant un environnement propice à un apprentissage renforcé dans le secteur de la gestion des aires protégées. Il est impératif de réviser la politique de développement des ressources humaines du SAPM pour garantir l'efficacité et l'expansion des aires protégées de Madagascar, compte tenu de l'ambitieux objectif 30x30.

INTRODUCTION

Protected areas play an important role in achieving sustainable development goals (Dudley et al. 2017, Fischborn and Sandwith 2021), providing ecosystem services and multiple benefits to society (Stolton and Dudley 2015) and helping to mitigate climate change (Dudley 2010, Londono et al. 2016, Roberts et al. 2020). The parties to the Convention on Biological Diversity (CBD) have set targets to encourage all countries to increase the coverage of protected terrestrial and aquatic habitats worldwide (CBD 2010,

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2022). Although the Aichi target 11 has only been partially achieved (UNEP-WCMC et al. 2021), it inspired many countries to increase the number and size of protected areas. The Kunming-Montreal Global Biodiversity Framework Target 3 aims to protect at least 30% of lands and 30% of oceans by 2030, known as the 30x30 target, via designated protected areas and other effective area-based conservation measures (OECMs) (CBD 2022).

The ambitious 30x30 target requires that protected areas and OECMs be effective in achieving defined and specific goals, demonstrating sound planning, equitable governance, healthy relationships with local communities, adequate resources, strong processes, and ultimately outcome-based management to achieve conservation goals (Hockings et al. 2006, Visconti et al. 2019, Dudley et al. 2022). Adequate staffing—both in terms of the number of staff and their competence—is essential for achieving the 30x30 goals (Appleton et al. 2022, Rakotobe et al. 2023, Rakotobe and Stevens 2024).

Yet around the world, the increase in protected areas has often exceeded effective management capacity (Sandwith et al. 2014). Indeed, protected areas require active management to limit threats and ensure long-term ecosystem viability. Many fear that new protected areas lack sufficient resources for effective management (Di Minin and Toivonen 2015, Geldmann et al. 2018), particularly in the availability of qualified staff to carry out mission-focused objectives (Gill et al. 2017). Globally, protected areas achieve only a third of the recommended staffing levels needed for effective management (Appleton et al. 2022).

Protected areas have existed since the 19th century, yet assessment of human resource efficacy and competencies in protected area management is a surprisingly recent research topic. Competence is defined as "the proven ability to perform a task or job" (Appleton 2016:2). Although sometimes used interchangeably, a "competence" differs from a "skill" in encompassing not only the technical abilities (skills) of performing a task, but also the attitudes and deeper knowledge related to the role, including the ability to generalize knowledge, communicate with stakeholders that have different knowledge and perspectives, apply decision making in different contexts, and understand more deeply the 'why' for a given job. The Global Register for Competences for Protected Areas Practitioners clearly demonstrates the differences with biology or forestry professions (Appleton et al. 2016), as they combine personnel management skills with technical aspects that go far beyond monitoring fauna and flora. This role demands a range of cross-functional critical thinking skills, including effective communication and coordinated efforts, especially when engaging with local communities. Like other professionals, protected area managers must apply their knowledge, expertise, and interpersonal skills in a way that is tailored to the specific context (Müller et al. 2015, Appleton 2016).

Following a painstaking process that began with the Durban Vision in 2003, Madagascar made significant achievements in 2015 by tripling the number of protected areas and quadrupling the surface area under protection (Gardner et al. 2018). Several strategies accompanied this significant leap in land and ocean management, in particular diversification of management authorities from one parastatal national parks agency to 20+ non-governmental organizations, integration of development objectives and greater involvement of local communities in many of the new protected areas (Gardner et al. 2018). This new System of Protected Areas of Madagascar (SAPM by its French acronym) faced additional challenges amid extreme poverty around many of the protected areas, hampering participation of local communities in decision-making and management. Multiple threats to biodiversity loss and deforestation, limited law enforcement and law enforcement capacity, strategic needs for alternative livelihoods, and personnel/training required for biodiversity monitoring together result in severe challenges to overall management effectiveness (Eklund and Cabeza 2017, Gardner et al. 2018, Morelli et al. 2020). At present, Madagascar's protected areas are critically understaffed at one third of the global recommendation, with only one staff member per 37km2 (Rakotobe and Stevens 2024). A national training center was proposed at the outset of the newly created SAPM to build human resource capacity for managing new protected areas (Borrini-Feyerabend and Dudley 2005). However, this center was never established, leaving the SAPM's expansion with unmet needs in human resources development, which are crucial for building capacity within the institutions managing protected areas (Gardner et al. 2018).

In the absence of a formalized national training program, numerous initiatives have emerged from the Ministry of the Environment and Sustainable Development (MEDD) to address gaps and enhance training for staff in newly established management institutions. For example, the Network of Conservation Educators and Professionals (NCEP) project has developed a Competency Standard for Protected Area Managers, outlining professional competencies and establishing competency-based certification schemes (Rakotobe 2015). Although these initiatives are important, they do not provide a sustainable alternative to a formalized national capacity development strategy for the SAPM.

National efforts to achieve the 30x30 target will require the strengthening and expansion of SAPM, raising important questions about the sustainability and effectiveness of both current and future human resources. Documenting competencies of protected area staff provides a solid foundation for shaping operations, improving capacity-building mechanisms, and considering outsourcing for specific capacity needs.

This article presents a study conducted as part of a project initiated by the Wildlife Conservation Society (WCS) in Madagascar aimed at clarifying the capacity-building needs of protected area managers. We share the results of our skills assessments following the expansion of SAPM and discuss the implications for preparing the next generation of protected area managers in an evolving landscape.

METHODOLOGY

In consultation with the MEDD and several protected area management institutions, we organized six workshops, grouping managers from nearby regions, and conducting surveys between June and September 2017 as detailed below. Protected area management institutions and site directors were invited to send two representatives per site to take part in the workshops.

DATA COLLECTION. Assessment of individual competencies was carried out through a survey questionnaire distributed to individuals working for protected areas. The questionnaire, in printed version, was completed individually and manually during workshops. After each workshop, the questionnaire was emailed to participants, to share with additional colleagues on a voluntary basis.

The questionnaire is comprised of two sections: 1) The respondent profile gathered information on gender, age group, education level, academic background and protected area

management experience; 2) The competency self-assessment, a series of pre-printed questions that the participant used to self-assess competency level within competency categories utilized in their professional role. Our survey instrument was based on the Malagasy competency standard for protected areas management, and modified to align with the international standard (Appleton 2016). We added the "administrator" professional level, previously absent, to include managers of groups/networks of protected areas, e.g., senior officials from regional directorates of the MEDD. We also reduced our competency categories from 19 to 11, following the international competence register (Table 1). Our self-assessment follows a three-step methodology proposed by Appleton et al. (2015). First, participants were required to specify their professional level from 1 to 4 as agent (level 1), technician (level 2), manager (level 3) or administrator (level 4). Then, in a second step, they were asked to select the top three most used competency categories in their current role. The limitation to the top three was for prioritization purposes and to limit the assessment time to one hour. The last step was a self-assessment of competencies from a 1 to 4 scale with questionnaires that correspond to individual professional level and most-used competency categories.

Inter-regional consultation workshops gathered participant perceptions of individual and managing institution capacities in the protected area sector. Participants listed perceived competency gaps, and responses were grouped by similarity without prioritization for analysis.

DATA ANALYSIS. Respondent profile responses were grouped by categories and summarized statistically. Capacity needs were calculated using the Capacity Need Index (CNI), following methodology proposed by Appleton (2015, 2016). The formula of CNI is: CNI= proportion of responses that assess the skills category as relevant for the job (1 to 4) * proportion of responses that assess competencies as 1 (low) or 2 (medium).

CNI captures skills where gaps are most pronounced, as a proportion of all relevant skills using a scale between 0 and 1. The higher the CNI (closer to 1) the greater the capacity need expressed. To prioritize common competency gaps, we narrowed the responses to skills mentioned by at least 25% of participants at each professional level, focusing on the ten skills with the highest CNI. Qualitative responses obtained during discussions were grouped by similarity.

RESULTS

SCOPE. A total of 139 people took part in the study covering 49 protected areas managed by 39 institutions, including 10 public institutions (of which eight are MEDD regional directorates), 22 non-governmental organizations, five community associations (locally called VOIs), and the parastatal agency Madagascar National Parks. In all, six workshops brought together 77 managers according to their proximity and accessibility, and 62 people responded to surveys distributed electronically. The average individual completion of the printed form was one hour. The structure of our sample enabled focused analysis on intermediate professional levels: technicians (level 2) and senior managers (level 3) as these levels represented 80% of study respondents (n=111). The highest and lowest professional levels were excluded from analysis as these categories would require a larger sample. In this study, we received 22 respondents for level 1 (Agent), and just six for level 4 (Administrator). Due to the low number of respondents, we lacked confidence that our sample was sufficiently representative of those components of the workforce.

Table 1. Competence categories in protected area management in Madagascar.

Code	Competence Category
	Managerial Competences
SPM	Strategy, Planning and Management of protected area
AFM	Administrative and Financial Management
HRM	Human Resources Management
PRC	Public Relations and Communication
	Technical Competences
CMR	Biodiversity Conservation, Ecological Monitoring, Research
SCD	Structuring Local Community and Development support
EED	Environmental Education
ECO	Ecotourism
LAE	Law Enforcement
GIT	GIS, Information Technology

Location and gender distribution were similar for respondents in levels 2 and 3. More than 60% of respondents were based onsite, i.e., at the protected area itself. Approximately 28% of respondents were based in main towns within regions near protected areas. Less than 10% of respondents were based in the capital, Antananarivo. These include respondents living in sites not far from the capital, and staff at the national directorate for protected areas.

The age distribution was homogeneous for level 2 (Technician) with around a third in each age bracket: under 35, 35–45 and 45–60. Perhaps not surprisingly, level 3 (Senior Manager) was dominated by people aged 45–60 (47%). Most respondents reported having an academic background in biodiversity conservation: natural sciences, environment, agronomy and forestry training at 70% for senior managers and 59.6% for technicians. In our sample, 88% of senior managers reported holding a Master's degree, compared with 51% among technicians. Diversity of academic background was higher at the technician level. Professional experience in protected area management was relatively low at the technician level (48% reporting five years or less experience). More than 35% of senior managers and 30% of technicians reported having more than 10 years of experience in protected area management (Figure 1).

COMPETENCE AREAS. Technicians reported primarily using the following skills most frequently in their work: (1) SCD: Structuring local communities and development support; (2) CMR: Biodiversity conservation, ecological monitoring and research; and (3) EED: Environmental education.

Senior managers reported primarily using the following skills in their work: (1) SPM: Strategy, planning and management; (2) PRC: Public relations and communication; and (3) CMR: Biodiversity conservation, ecological monitoring and research.

COMPETENCE NEEDS. For technicians (Level 2), the average CNI of the ten priority skills was 0.57. The top ten priority competencies were distributed among three categories: EED (4), CMR (4) and SCD (2). For managers, the average CNI of the top ten priority competency gaps to address was 0.78, indicating a higher perceived need for training compared to that expressed by technicians (0.57). Of the ten priority skills, eight were managerial (Table 2) with five in the SPM category. The highest CNI score was for SPM 3.11 "Direct identification and implementation of measures to deal with climate change", indicating this as a strong priority for focused training.

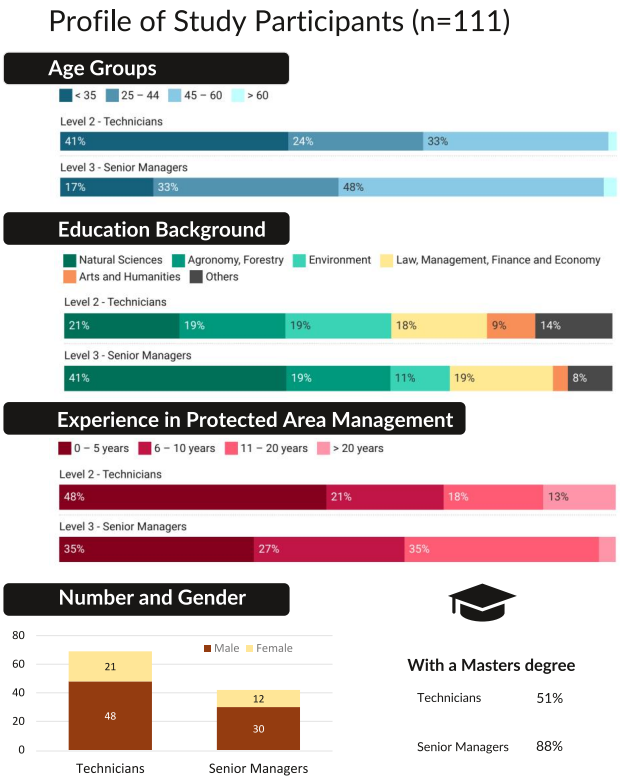

Figure 1. Profile of study participants.

Table 2. List of priority skill needs for protected area senior managers (level 3) based on Competency Need Index (CNI) calculation.

Code	Skill	CNI
EED 2.6	Organize the monitoring and evaluation of behavior change of local actors	0.73
EED 2.3	Supervise the production of training, awareness and interpretation tools	0.62
CMR 2.3	Propose conservation measures for animal and plant species and habitats	0.61
CMR 2.6	Plan, execute and report ecological restoration activities	0.61
CMR 2.4	Plan, execute and report threat management or mitigation activities	0.58
EED 2.2	Oversee the establishment of orientation and interpretation infrastructure in and around the protected area	0.54
CMR 2.2	Assess status, degree of pressures and threats to protected area conservation targets	0.52
SCD 2.10	Plan, direct and report on actions to protect cultural and historical sites, structures and objects.	0.51
EED 2.4	Organize and conduct training and information-awareness activities	0.50
SCD 2.8	Monitor support for development activities	0.49

COLLECTIVE PERCEPTIONS OF COMPETENCY GAPS. Discussions during workshops provided a collective perception of competency gaps for individuals and institutions. Gaps at the individual level were grouped into four categories: knowledge gaps, skill gaps, problems of character or attitude, and inadequate systems at the institutional level affecting individual workers (Table 3). A large proportion of answers were concerned with problems in individual character, particularly on resistance to others' ideas (closed-mindedness, lack of listening, difficulty communicating with those who are not in the protected area's world, etc.) and lack of rigor in accomplishing the work.

Regarding institutional capacities, workshop participants listed several gaps that affect the capability of the protected management institutions to deliver their mission. Institutional capacity gaps can be grouped into four categories: internal governance and leadership, operating mode, resources, and external relations or factors (Table 4). The last category received the most responses, illustrating common difficulties in work environments.

Table 3. List of staff competency gaps in protected area management in Madagascar viewed by participants of the six regional workshops (RW 1 to 6).

Code	Skill	CNI
SPM 3.11	Identify and implement measures to mitigate climate change effects.	0.92
CMR 3.11	Determine the value of ecological / environmental services of the protected area according to needs	0.86
SPM 3.7	Lead the establishment of a fundraising strategy	0.80
AFM 3.3	Lead the development and application of strategy and measures for the efficient use of resources for the protected area operations	0.80
SPM 3.9	Develop the protected area business plan	0.76
PRC 3.1	Lead the development and monitoring of the protected area communication strategy	0.72
SPM 3.8	Develop national and international partnerships and collaborative relationships	0.72
SPM 3.10	Lead the development of risk and disaster assessments and contingency plans.	0.72
AFM 3.6	Develop rules and procedures for the management of electrical / electronic furniture and equipment and vehicles	0.70
CMR 3.10	Contribute to national assessments of conservation status and harvest quotas	0.67

Table 4. List of institutional competency gaps in protected area management in Madagascar viewed by participants of the six regional workshops (RW 1 to 6).

Knowledge Gaps	Inadequate training, with no specialty in PA management (RW1) (RW5) Poor knowledge of Code of Protected Areas COAP (RW 6) and legal texts (RW 1) Those who have diplomas do not have experience, and vice versa (RW 5)
Skill Gaps	Management and coordination capacities (RW 2) Managerial skills (RW 4) Anticipation capacities (RW 6) Data management (RW 6) Monitoring and evaluation (RW 5) Output-focused instead of impact-oriented (RW 4) Valorization of PA resources (RW 1) General PA management capacities (RW 1) Law enforcement (RW 6) Technology delay (RW 1) Lack of best practices, very little standardization (RW 4) Lobby techniques to elected officials and authorities (RW 1)
Problems of Characters or Attitudes	Closed-mindedness (RW 2) Lack of listening (RW 3) Difficulty communicating with those who are not in the PA world (RW 1) Individualistic character (RW 1) Personal interest is sometimes higher than the mission (RW 3) (RW 6) Lack of role model of integrity for youth (RW 1) Arrogance in approaches with local populations and local authorities (RW 1) Lack of rigor, tendency to let go "Moramora" (RW 4) (RW 5) (RW 1) Lack of judgment in sensitive situations (RW 4) Lack of conviction for conservation (RW 2) Do not dare speak out the truth (RW 6) Fear of facing PA opponents (RW 6) Difficulty managing sensitivities (RW 3) Lack of transparency and visibility (RW 4)
Gaps in means and organizations	Room to maneuver limited by over dependence on the central level (RW 1) Insufficient communication between PA managers (RW 2) Lack of transparency in information and management of resources (RW 3) Decrease in means available for work (RW 5)

These results indicate that protected area staff training should also include the less tangible aspects of staff attitudes and expectations.

DISCUSSION

This study is the first to detail self-identified professional development competency gaps among protected area managers at different career stages in Madagascar's expanded system of protected areas. Findings reveal managerial skill gaps among protected area executives and areas for growth among technicians, particularly in relation to interactions with local communities. Our study sample focused on technicians and senior managers, disseminating online invitations to regional workshops and questionnaires. We recognize that internet access can limit participation particularly for less-resourced protected areas, and we worked to develop a large sample of respondents from different protected area management organizations. Self-assessment studies have a bias risk since respondents may perceive or report skills differently. Yanjun (2013) found that in skills self-assessments, low performers tend to overestimate abilities and high performers tend to underestimate abilities, also termed the Dunning-Kruger effect.

We aimed to reduce the impact of such biases by using a competency standard with clearly defined competencies aligned with each professional level, helping to winnow out specific competency gaps that could be addressed. Workshop discussions represent the opinions of a smaller sample (79 individuals) and although informative, should be generalized with caution.

PREPARATION FOR EMPLOYMENT FOR MADAGASCAR'S PROTECTED AREA MANAGERS. Our results document the most frequently used skills and most greatly felt competency gaps among current Malagasy protected area managers. We found that senior managers largely feel the need for managerial skills reinforcement, with five of the ten most identified skills gaps in Strategy, Planning and Management. Indeed, less than 20% of protected area staff reported having received formal training in management-related fields. In contrast, 70% reported having received formal training in the conservation/natural history sector (natural sciences, forestry/agronomy, environment). Previous studies have conducted needs assessments based on responses expressed by individual protected area practitioners (e.g., Hausser 2013). Our study is unique in that it centers the needs assessment around the structure of a competency register. This approach demonstrates how needs differ at each professional level, offering strategic targets for professional development and capacity building throughout the protected area workforce. Although biodiversity conservation efforts often incorporate topics related to protected area management, the conservation sector lacks a systematic approach for key skills development needed for daily tasks. Effective protected area management revolves around critical managerial skills: planning, organizing, leading and evaluating functions (Worboys and Trzyna 2015) and the 30x30 target in particular requires outcomes-based management (Dudley et al. 2022). Our study documented significant capacity gaps for protected area managers in these dimensions.

For protected area technicians, we found that four of the 10 highest CNIs concerned environmental education (EED), and two focused on structuring local communities and development support (SCD). This indicates a need for capacity building in the areas of communication and community development to enhance staff capacity to engage in critical roles as social facilitators along protected area boundaries. Similar gaps were mentioned by workshop participants. Several studies have emphasized the importance of strengthening communication skills among park and protected area staff (Jacobson and McDuff 1998, Blickley et al. 2013) and elevating social sciences topics in the training of conservation practitioners (Bennett et al. 2017). In particular, Gardner et al. (2013) highlight the importance of conservation research communication with local Malagasy communities, especially for people from conservation backgrounds.

These results document gaps in academic and human resources training for conservation practice. Such a mismatch has been documented in the past (Jacobson and McDuff 1998, Muir and Schwartz 2009), particularly how many issues that protected area managers face have not traditionally been addressed in university curricula (Kopylova et al. 2011). Indeed, university training often places heavier emphasis on research skills with less attention directed to developing competencies required in the professional and interpersonal realms (Muir and Schwartz 2009). Even in training specifically directed at protected area management, Hausser (2013) documented significant content gaps. Virtual and self-taught training courses have recently filled some of these gaps, providing content that is much more up to date with the needs of the profession and allowing practitioners to train while on the job. For instance, in 2016 only, the French-speaking Massive Open Online Courses (MOOC) on protected area management has attracted more than 7,000 learners of which 65% are from Africa (Madagascar being among the top five African countries in terms of number of enrollees) and more than half are professionals (Mauvais 2017). However, as typical to MOOC, completion rate is relatively low, with less than 10% as many enrollees do not seek a diploma but rather knowledge.

RE-EXAMINING CAPACITIES FOR SAPM SUSTAINABILITY. In a more holistic way, it is important to examine whether people who work daily with local actors are adequately trained in co-management of protected areas. Indeed, the success of SAPM expansion relies primarily on participation and engagement of local communities in the management of protected areas (Virah-Sawmy et al. 2014). This begins with establishing bonds of trust and collaboration with local actors. Strengthening community structures and co-developing environmental education activities are an essential part of growing meaningful connections to advance long-term conservation and sustainable livelihoods. When a protected area team has successfully established processes of self-determination and motivation among local communities, conservation outcomes can be sustainable (Nilsson et al. 2016).

Discussions during our workshops revealed key gaps, particularly in terms of individual characters and interpersonal skills training and conflict resolution, that hamper work with local actors and overall effectiveness of conservation efforts. These results are a reality that must be faced to move forward. Attitudes of protected area managers can be a barrier to long-term success. Ayivor et al. (2020) describe how local communities have experienced arrogance and unkindness from national park authorities in Ghana, increasing tensions between parties. Participants in one regional workshop also mentioned a similar attitude of arrogance in approaches with local populations and local authorities. Belecky et al. (2021) recognize that rangers can be both sources and victims of corruption, important aspects to address in training initiatives. Establishment of and training on an agreed code of conduct, such as the Ranger Code of Conduct (International Ranger Federation 2021) can promote and reinforce professionalism and ethical attitudes among protected area staff.

Intangibles including social and cultural capacities are recognized as essential by the World Commission on Protected Areas (IUCN-WCPA 2015). Beyond performing technical tasks, Müller et al. (2015) identified four essential skills for protected area professionals: (i) commitment (often unrecognized as a capacity), (ii) service delivery and logistical tasks, (iii) ability to build relationships and attract resources and support, and (iv) ability to adapt and renew, balance diversity and coherence. Different competency standards in management of protected areas also highlight emotional intelligence and soft skills as part of a toolkit of essential competencies (Appleton 2016).

Our research has documented that several institutional weaknesses, such as poor operating systems and insufficient funding (see also Eklund et al. 2022) are system-wide influences that impede success for protected area staff. Several studies encourage institutions to review human resources strategies to identify opportunities to maintain, improve and sustain engagement and

performance and personnel growth (IUCN-WCPA 2015, O'Connell et al. 2019, Porzecanski et al. 2022) indicating that providing staff training is not enough. Rather than merely considering capacity needs assessments results as training topics, they can feed into the institutional capacity development strategy and any initiative to improve the overall PA system (Müller et al. 2015, Dudley et al. 2022).

Madagascar has established the SAPM commission, a consultative and collaborative body designed to foster cooperation between MEDD, stakeholders involved in protected areas and other ministerial departments. The commission offers an inter-institutional platform of in-depth discussions on protected area issues. In response to these discussions and member requests, several guidelines have been produced (e.g., harmonized protected area management plan format) with impacts at the system level. The commission has excellent potential to develop a systematic approach to capacity building for Madagascar's protected areas workforce and respond to current staffing gaps with a national and inclusive workforce strategy (Rakotobe et al. 2023, Rakotobe and Stevens 2024).

CONCLUSIONS

The 30x30 target promotes the idea that increasing the amount of land/ocean that is under environmental protection through protected areas and OECMs will improve biodiversity conservation outcomes and ultimately enhance human health and wellbeing. This assumes that these protected areas are managed effectively, and that depends largely on adequate staffing, enhanced training for protected area managers, and systems that work together to achieve ambitious and well-defined outcomes (Appleton et al. 2022, Rakotobe and Stevens 2024).

For Madagascar to succeed in protected area management, a renewed workforce development strategy must be developed (Rakotobe et al. 2023). The 30x30 target stipulates that protected areas are no longer the sole prerogative of conservation institutions and elite university graduates, but rather a collective responsibility requiring new organizations that engage a broader society including local communities and the private sector. Academic institutions and professional training centers must ensure that curricula harmonize with real-world challenges, recognizing the essential role of interdisciplinary training across social and natural sciences. The SAPM must expand human resource engagement strategies to local communities as part of their external workforce. Our findings help prioritize training needs by documenting skills gaps and behavior issues that protected area managers have identified; these can be integrated within national training centers as the CNFTF in Angavokely or the CNFEREF in Kirindy for forestry technicians and also in university programs that produce senior managers and technicians (e.g., School of Forestry and Agronomy, natural sciences and geography departments). Conservation NGOs could also consider these topics for timely workshops or online trainings for their staff. Revisiting the concept of a national Center of Excellence for Protected Area Management, proposed nearly two decades ago (Borrini-Feyerabend and Dudley 2005), to foster sector-relevant skills and community building in a decentralized approach can elevate the centrality of biodiversity conservation training in a megadiverse country like Madagascar. This reflection should also be extended to the capacity development of all types of stakeholders involved in OECMs management. A renewed national conservation workforce strategy is imperative to consolidate efforts and build a stronger environmental future.

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