Increasing diversity to save biodiversity: Rising to the challenge and supporting Indonesian women in conservation

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Abstract
Indonesia is one of the most biodiverse countries in the world yet suffers from the highest global deforestation rate. Having more diverse voices in conservation science contributing innovative ideas and solutions could benefit the country’s biodiversity. However, some aspects of conservation work in Indonesia remain male-dominated, particularly fieldwork. Understanding motivations and challenges for women pursuing a conservation career is critical to diversifying the workforce. We present some of the motivations and challenges of women conservation scientists attending a field skills and networking workshop in Sumatra, Indonesia, in September 2019. We conducted semistructured surveys in a preliminary study with female conservation scientists at the beginning of their careers and those with established careers of at least 3 years. Early-career women predominantly cited a love of nature as their main motivator and cultural-based gender norms as their primary challenge. Established career women discussed slowly improving gender norms and the importance of mentors throughout their careers. Without active engagement in career training and support over the long-term for underrepresented groups in conservation, we could lose out on novel perspectives that could help solve the world’s most daunting ecological problems.

KEYWORDS
conservation education, Indonesia, STEM, women in conservation, women in science

1 | INTRODUCTION

Globally, we face unprecedented loss of biodiversity due to human influence (Dirzo & Raven, 2003). Although one of the most biodiverse countries in the world, Indonesia now has the world’s highest deforestation rate, with unique species at risk of extinction (Margono, Potapov, Turubanova, Stolle, & Hansen, 2014; Myers, Mittermeier, Mittermeier, da Fonseca, & Kent, 2000). Sumatra is projected to undergo significant forest loss over the next 30 years despite the presence of highly endangered species such as Sumatran tiger (Panthera tigris sumatrae) (Poor, Shao, & Kelly, 2019). Inclusion of representative voices and ideas from all of Indonesia’s people could
reduce forest and biodiversity loss in a stressed landscape by providing a diversity of perspectives in both identifying and solving conservation problems (Agarwal, 2009; Allen et al., 2019; Arjunan, Holmes, Puyravaud, & Davidar, 2006; Bajner, 2019; Lau, 2020; Sandbrook, Fisher, Holmes, Luque-Lora, & Keane, 2019; Sodhi, Davidar, & Rao, 2010). However, some aspects of Indonesian conservation remain male-dominated, particularly fieldwork activities, which are often considered a necessary component of a natural sciences education (Klemow, Berkowitz, Cid, & Middendorf, 2019; Thornton et al., 2020). While fieldwork is related to more productive careers for men in conservation globally, this is not the case for women, and globally fewer women conduct tropical ecology fieldwork than men (McGuire, Primack, & Losos, 2012). In this article, we explore the experiences of Indonesian women working or planning careers in conservation, with the goal of identifying ways to support their participation in finding solutions to Indonesia’s biodiversity crisis. We focus on conservation science (“conservation”) as including wildlife biology, forestry, conservation biology, ecology, and other science, technology, engineering, and math (STEM) disciplines that ascribe to a primary goal of protecting biodiversity. This preliminary study focuses on biological and natural sciences, due to the authors’ and participating experts’ expertise, but recognizes the importance of social sciences in conservation as well.

The conservation field generally recognizes that gender equity is fundamental to effective, inclusive, just, and sustainable efforts to stem biodiversity losses (Agarwal, 2009; Alvarez & Lovera, 2016; Lau, 2020; Sodhi et al., 2010). While opportunities for women pursuing conservation careers have increased, recent research documents ongoing challenges that still hinder women’s efforts and efficacy in this field (e.g., Jones & Solomon, 2019; McGuire et al., 2012; Sánchez-Montoya et al., 2016; Sardelis & Drew, 2016; Thornton et al., 2020). Jones and Solomon (2019) identify four major challenges to women’s participation in a workforce context: formal exclusion, informal exclusion, assumed inadequacy, and assumed wrongness. Formal exclusion occurs during promotion and hiring processes when women may be overlooked or promoted less quickly in favor of less competent male colleagues. Informal exclusion occurs when women are not included in decision-making spaces, not recognized for their ideas, or are asked to do administrative tasks outside their job description. More insidious are assumptions of inadequacy or wrongness that keep women out of leadership positions because of gendered stereotypes regarding women’s capabilities and personal characteristics (Jones & Solomon, 2019). To overcome these challenges, researchers and interviewees suggested supportive relationships with peer networks, mentors, role models, and others to provide feedback, guidance, and to champion their work, as well as structural support from organizations, such as formal mentoring, ongoing training opportunities, targeted funding and employment opportunities, childcare options at conferences and field stations, and active engagement to improve workplace safety and community (Byrne, Broadhurst, Leishman, & Belov, 2018; Jones & Solomon, 2019; McGuire et al., 2012; Sánchez-Montoya et al., 2016; Thornton et al., 2020). While specifics will vary by workplace and local cultural values and norms, these broad trends affect conservation scientists globally and will need to be addressed if gender equity in conservation is a goal.

Specific metrics about women working in Indonesian conservation and their challenges are lacking, but anecdotal evidence and personal observations by the authors suggest the conservation field is dominated by men, especially in roles requiring outdoor activity (“fieldwork”). Education attrition rates may be one factor influencing this observation, despite the incentive of women in STEM disciplines, including conservation, earning more than their non-STEM female counterparts, regardless of socioeconomic background (Melguizo & Wolniak, 2012). In Indonesia, there are nearly twice as many women studying natural sciences than men, yet women receive fewer than half of doctoral degrees nationwide (WEF, 2020). These high attrition rates of women during graduate or postgraduate education result in significant underrepresentation in the STEM workforce and, ultimately, conservation science, especially in senior-level roles, a phenomenon seen globally (Ceci & Williams, 2011; Charles & Bradley, 2009).

One effect of fewer Indonesian women receiving doctorates and in senior-level positions is fewer visible female role models in science-driven fields for early-career women in Indonesia. Role models and mentoring support have long been recognized as a challenge for greater gender equity in science (Langenheim, 1996; Thornton et al., 2020). While male mentorship can offer women support, gender-based blind spots regarding the work-life balance of personal responsibilities and family expectations (e.g., that women care for the household and children), as well as cultural norms about interactions between unrelated people of different genders (e.g., it is not appropriate for unwed individuals of the opposite sex to be alone together in some cases), could restrict the value of this mentorship in situations where it would be beneficial for a woman to gain fieldwork experience in remote areas. Thus, providing women mentoring and networking opportunities with other women is a critical element for the recruitment of women in
conservation (Bhatia & Amati, 2010; Clancy, Nelson, Rutherford, & Hinde, 2014). Short-course workshops with exposure to multiple potential faculty/teaching and peer mentors have been shown to be effective in raising awareness, confidence, and interest of women in other STEM fields, and may be beneficial in the Indonesian conservation context as well (Hernandez et al., 2017).

An increase in women in STEM, including conservation science, provides multiple benefits to societies at multiple scales (Alvarez & Lovera, 2016; Beebe, Julian, McKitterick, Khan, & Doms, 2011; Cook, Grillos, & Andersson, 2019; Sodhi et al., 2010; UNESCO, 2007; Westermann, Ashby, & Pretty, 2005). Globally, research shows that women are more averse to policy inequalities and more likely to share resources (Engel, 2011). Studies show resource condition improvement in areas where women are involved in natural resource management locally (Agarwal, 2009; Cook et al., 2019) and at national levels where more environmental protection regulations are passed when women are involved in decision-making (Norgaard & York, 2005). For example, when a group of Sumatran village decision makers were given a 50/50 gender inclusivity mandate, tree retention was linked to groups with gender parity, although the specific cause was not documented (Cook et al., 2019). These conservation gains are likely situationally dependent, as women-only groups in another village increased incomes but also increased deforestation (Villamor, Desrianti, Akiefnawati, Amaruzaman, & van Noordick, 2014).

Efforts to increase women’s involvement in conservation require baseline information about their motivations and challenges specific to the country of interest. This information can help identify specific institutional and societal policies or actions that can increase recruitment and retention of women in conservation; thus leading to a more diverse field and a wider diversity of conservation solutions (Ceci & Williams, 2011; Jones & Solomon, 2019; McGuire et al., 2012; Sodhi et al., 2010). While such information exists, especially in the Global North (e.g., Byrne et al., 2018; Jones & Solomon, 2019; Langenheim, 1996; Sánchez-Montoya et al., 2016), a literature search investigating women in Indonesian STEM, and women in Indonesian conservation specifically, found limited results focused primarily on women in community conservation (Cook et al., 2019; Villamor et al., 2014). We were unable to locate information about recruitment, retention, and advancement of female conservation professionals in Indonesia. This information is critical to address the conservation career gender gap in a country of global biodiversity importance, especially as it relates to fieldwork, often a necessary step to conservation career advancement (Klemow et al., 2019). To begin to address these issues, we conducted a survey to identify common experiences, influences, and opportunities among a small cohort of early-career women and established, experienced career women in conjunction with a 2-day field skills and networking workshop in central Sumatra, as a preliminary study to a future wider survey.

2 | METHODS

2.1 | Study location

Indonesia is the largest Muslim-majority nation in the world, with a population of 260 million (49.6% female; 50.4% male; WEF, 2020). Indonesians speak >300 languages and have diverse religious and spiritual belief systems and practices. Our workshop, described below, was held in Riau Province, central Sumatra, due to its global conservation importance. Riau has extremely high levels of deforestation, largely due to land clearing for oil palm plantations (Poor et al., 2019). It is mostly rural, spanning 87,000 km², with a total population of nearly 6.7 million people.

2.2 | Workshop

Building capacity to conduct biodiversity conservation in Indonesia as Indonesians see fit, requires developing the necessary skills and knowledge of Indonesian people (Cockerill & Hagerman, 2020). Care is needed to ensure that training is desired and culturally appropriate to avoid perpetuating tensions stemming from Western gender and leadership norms that have led to ineffective conservation (Straka, Bal, Corrigan, di Fonzo, & Butt, 2018). Extensive consultation with Indonesian staff at World Wildlife Fund-Indonesia (WWF-ID) in Sumatra, faculty of forestry at Universitas Gadjah Mada (UGM), and Indonesian women involved in conservation prior to this research indicated strong interest and need for a skills and mentorship workshop specifically geared toward women who want to conduct conservation fieldwork. These conversations also helped identify Indonesian women with established conservation careers who could lead such workshops as instructors. Although used in other STEM contexts (Hernandez et al., 2017), we were unaware of any previously published literature on the use of short-course workshops in the Indonesian context for advancing women in conservation. As such, we provide preliminary, new insights in the published literature about mentoring and skills workshops in this context.

From September 13–15, 2019, WWF-ID, UGM, and the University of Maryland, held a workshop for women conservation scientists at Camp Subayang field station just
outside of Bukit Rimbang Bukit Baling Wildlife Reserve, a protected area (Figure 1). Workshop goals, supported by STEM research on gender equity and inclusion (Bhatia & Amati, 2010; Hernandez et al., 2017), included providing participants networking opportunities and offering a setting in which experienced women could develop collegial relationships with and mentor less-experienced women, as well as practice technical skills such as camera trap and GPS (global positioning system) unit usage. The established career women had been working in conservation for at least 3 years at the time of the workshop, a minimum limit chosen on the assumption that the knowledge and experience gained during this period was equivalent to an advanced degree. Once confirmed, the established career women set the workshop agenda by identifying topics they thought would be informative for their early-career colleagues (Supporting Information 1). WWF-ID staff, UGM faculty and volunteers distributed the workshop advertisement through social media and their diverse networks to provide application instructions to interested early-career women. Fourteen applicants applied to attend the workshop, but three could not attend due to limited travel funding for flights and hazardous air conditions in Riau during the workshop weekend, which caused voluntary evacuations across the province. Ground transportation travel grants were provided to participants traveling to Pekanbaru, and organizers, instructors, and participants then travelled to the workshop location together.
Eleven early-career women attended the workshop and three established career Indonesian women participated as instructors. Participants worked and lived in Riau and elsewhere in Indonesia. Most of the early-career women were undergraduates or had obtained a bachelor’s degree in the past year, and one had begun a doctoral program. Two American female scientists who have worked extensively on Indonesian wildlife conservation also attended the workshop to share their expertise and assist instructors, but did not contribute to survey results. During the workshop, all attendees participated in field skills sessions and in informal, small group discussions about careers and life as female conservation professionals.

2.3 | Participant surveys and analysis

Small, purposive samples can provide rich insights on targeted topics in exploratory qualitative studies (Bernard, 2017; Riley & Schmidt, 2016; Rust et al., 2017). This preliminary research with self-selected workshop participants sought to explore the experiences and views of established and early-career Indonesian women working in conservation, as well as field-training recommendations. Survey questions were provided in English and Indonesian, and hosted with the online Qualtrics platform to facilitate participant completion at a time and location of their choosing. The pre-workshop survey link was sent 2 days prior to the workshop to 14 early and three established career women, and the post-workshop survey link was sent within a week of workshop completion to the 11 early-career women who attended the workshop. We were primarily interested in how to improve the workshops for young women in the future, and thus did not send established career women these surveys.

Pre-workshop surveys consisted of questions about prior career training, current employment, perceived career challenges, skills, and sources of assistance (Supporting Information 2). The post-workshop survey questions focused on workshop experiences and recommendations, perceived value of workshop topics, and field skills training. While questions directed participants to think about these specific topics, they were written in an open-ended manner to encourage responses that reflected the women’s diverse experiences and perspectives. We also collected basic demographic information to allow for comparison across the groups. Survey participation was voluntary, with the option to skip questions and stop at any time. We also offered “on-the-record” and “off-the-record” survey options, where “on-the-record” participants consented to the public use of their employment position or organization name and “off-the-record” participants did not. This choice was added to the consent form to give the women the option to respond frankly about their experiences. All surveys were conducted with the approval of the University of Maryland Institutional Review Board (#1483724-1).

Survey responses in Indonesian were translated into English by members of the research team for ease of analysis by all team members. We used coded text analysis to understand why Indonesian women pursue conservation careers, workplace and home challenges, how these challenges may or may not be changing, and ways to support Indonesian women conservation scientists (Bernard, 2017; Newing, 2010; Zhang & Wildemuth, 2009). During analysis, predetermined codes like career motivations, experienced and perceived challenges, skills for success, and career support were applied to survey responses from both early and established career women by two coders. Additional thematic codes emerged during the analysis that identified career motivation factors, sources of career challenges, and field skill needs. Coders communicated regularly as they worked to ensure that definitions for predetermined and emergent thematic codes were the same. The semistructured nature of the surveys encouraged participants to respond directly to the questions, making themes easier to identify in responses.

3 | RESULTS

This research focused on a small group of participants, as a preliminary study, and should be considered illustrative rather than a complete representation of Indonesian women in conservation. Additionally, we recognize that numerical analyses are inappropriate given our small, purposive sample (Bernard, 2017; Rust et al., 2017); however, we provide participant counts throughout the results to highlight the shared experiences and challenges they discuss.

3.1 | Survey participant characteristics

Four Indonesian female experts in the “established career” group completed the online, pre-workshop survey, “on the record.” The four surveyed experts were from Kalimantan, Sulawesi, and Sumatra and identified ethnically as Buginese, Malay, Madurese, Minangkabau, and Sunda-Betawi. While only three could attend the workshop, the fourth woman completed the survey citing excitement regarding our work and a desire to help us
better understand women in Indonesian conservation. Of the three workshop participants who completed the survey, one of them held, and two sought to pursue advanced degrees in conservation-related subjects, from universities in Europe and the United States. They all earned their undergraduate degrees in Indonesia.

Thirteen early-career women completed the pre-workshop survey (seven “on the record” and six “off the record”), and 11 completed the post workshop survey (seven “on the record” and four “off the record”). These women’s academic and conservation field experience ranged from second-year undergraduates to PhD students and those employed in education, government and/or research organizations. All early-career women were attending or had attended universities in Indonesia, were from Java and Sumatra, and most were Muslim.

### 3.2 Career paths and motivations

Each of the established career women described a slightly different path in the conservation field. One respondent had been employed in the conservation field for more than 13 years and was working on her doctoral degree with the hopes of achieving a top managerial position at a conservation organization. Another, a recent graduate in forestry, had freelanced as a liaison between government and NGOs for the conservation of Indonesian wildlife. Her career goals included running an ecotourism NGO to empower local communities and educating people about Indonesian conservation. One established career participant worked in conservation for 10 years and had been in a senior managerial position in industry for 5 years. This position offered her opportunities to plan, implement, and monitor conservation management plans that protect and conserve forests in collaboration with government, business, and local community interests.

Eight early-career women indicated they were current undergraduate students. Additionally, two described themselves as researchers, one helped with family responsibilities, one was unemployed, and one had just been hired as a university teacher. When asked about their career aspirations and 5-year career goals, these women either mentioned an employment sector where they could apply their conservation knowledge and skills or characteristics of their ideal job. Six respondents wanted to conduct research or teach in an academic setting because they saw this as “a job that will have a big impact on a lot of people” (Early-career Respondent 11 [R11]), and having the capacity to “make a change to the mindset of many people about nature and the environment” (Early-career R2). In these responses, research and teaching were described as two separate career paths without overlap. Some women were more specific and described working for the government, an NGO, or continuing their education. Of six women who described their ideal jobs, five described positions that would benefit others. Early-career participants also mentioned having jobs that could financially support them and job stability as desirable.

The women listed a wide range of motivations, grounded in personal values and beliefs for pursuing a career in environmental, wildlife, or conservation science (Table 1). Among early-career women, a love for nature dominated the list. In many cases, this love for nature intersected with other factors such as education, human responsibility, and environmental degradation. Witnessing environmental degradation in Indonesia and knowing that humans were responsible were the next most common motivations for early-career women (Table 1).

### 3.3 Career challenges: Experiences and perceptions

All established career women identified community, cultural, and religious views on gender roles and the “unconventionalism of a woman in the field and in the forest” (Established R2) as a major challenge when they started their careers. One early-career respondent (R7) mentioned that her mother initially tried to forbid her from working in the conservation field. Other challenges at the beginnings of careers included a lack of available conservation training at Indonesian universities and difficult group dynamics when an established career woman’s new team leadership position was resented by others.

The established career women indicated that the views of gender roles in conservation science were slowly changing in Indonesia for the positive. As one woman stated, “Society now understands that fieldwork is not given value by [a person’s] gender, but the ability of the person in question” (Established R2). Current challenges the women discussed included needing more time on projects to build trust with stakeholders and improve engagement with land claimants to better manage areas with human–wildlife conflict and land degradation. Integrating conservation principles into practice on industrial plantations and finding resources to participate in additional training outside Indonesia were also identified as career challenges by the established career group.

Early-career respondents still see traditional and religious gender norms, particularly the social expectations of women at work or home, as a challenge to their chosen conservation career (Table 1). However, these women
also view their work in conservation as a way to challenge and change these norms. For some early-career women, these perceptions intersected with family beliefs and cultural norms that stigmatize women working outdoors, as well as values attached to marriage and children. One woman stated if she had children the time she would need to dedicate to childcare could severely restrict her ability to advance in a career requiring fieldwork (Early-career R10). Other challenges early-career women were facing included a lack of technical knowledge or skills, difficulties in finding field employment, and financial problems (Table 1). One woman described how physical fitness limited her ability to do extensive conservation fieldwork and her family worried about the possible personal risks she took doing field work (Early-career R1).

### Table 1 Quotes of early-career workshop participant/survey respondents describing their motivations and challenges encountered in their early conservation careers. (R = respondent)

| Category          | Theme                      | Example quote                                                                                                                                 |
|-------------------|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Motivation        | Love of nature             | I love nature. I love animals. (R6)                                                                                                         |
|                   | Environmental degradation  | I realized that the environment can be considered the most important thing that we need for humankind’s persistence. (R1)                     |
|                   | Human responsibility       | What drives me is the fact that at this time humans are already ignoring nature and the environment, taking it without stopping or improving it. (R2) |
|                   | Future generations         | I think working to protect nature is the best thing I can do for the world and its people. (R6)                                              |
|                   | Educating others           | ...there are still many people who must be given an explanation of the basic things in maintaining life, there are still people who do not know the importance of a nature reserve and wildlife sanctuary for animals and plants. Things like this, we must give knowledge to ordinary people. (R3) |
|                   | Seeking knowledge          | There are many things I have learned from watching nature respond to humans and I really like that. (R5)                                   |
|                   | Value of nature            | For me, nature teaches us how be valued if one wants to be valued. (R5)                                                                     |
|                   | Personal activism          | My motivation to have a career in the conservation field is because I have a connection to one species. (R10)                                |
|                   | Religious beliefs          | Because actually humans still have to take care of what has been given by God. (R3)                                                        |
| Challenge         | Gender norms               | Even though equality is clearly evident, we have dreams that we want to make real, we have plans and goals to achieve. But, all that is sometimes blocked in the middle of the road. Now it is 2019, there are many great women who dare to oppose that women must be at home, women have always shown that they can be equal in whatever their work. (R3) |
|                   |                            | In my opinion, the biggest challenge is the lack of gender equality in some areas for the forestry profession. (R5)                           |
|                   |                            | Being known as a woman who wishes to pursue a career in conservation I am expected to be away from home most of the time and the unpopularity of the job makes people think my future is bleak. (R6) |
|                   | Lack of training           | The challenge that I face is my lack of understanding and skills in this field. (R2)                                                          |
|                   |                            | In addition, the lack of such workshops also results in a lack of knowledge and skills to work in the forestry world. (R5)                    |
|                   | Lack of employment         | It is difficult to find information about job advertisements that need women to work in the field because more often, jobs adverts are looking for men. (R9) |
| opportunities     | Finances                   | ...in some time there may be financial problems. (R8)                                                                                     |

#### 3.4 Skills, knowledge, and support for career success

When asked about what skills and knowledge would have been useful at the start of their careers, the established career women mentioned communication skills, particularly local language fluency, technical skills like field data collection, GIS (geographic information systems), statistical analysis, the “capacity to adjust quickly in a new environment,” (Established R4) a good sense of humor, teamwork skills, the ability to take and use constructive criticism well, and better physical fitness. The women emphasized the importance and need for soft skills in addition to creativity and learning new data collection and analysis techniques. Skills and
knowledge they mentioned as helpful for them included project management, fundraising, negotiation, human-wildlife conflict mitigation, and the ability to engage local communities. One woman indicated that a completed master's degree and additional field skills would help advance her career (Established R2).

A variety of organizations and individuals mentored and assisted the established career scientists. These women described how family support, training and mentoring offered by employers, and individual mentors outside of their jobs were important early in their careers. One woman described her early-career mentor as someone who “shaped me to ready myself to become a leader in the field of wildlife conservation by expanding my network and creating conservation projects,” who still pushes her to continue learning (Established R2). The established career women also mentioned that they still find support in their families and mentoring by supervisors as their careers continue to unfold.

3.5 | Workshop attendance motivations

Established and early-career participants offered related, but distinguishable reasons for attending the workshop. One established career woman came to the workshop to encourage early-career attendees to pursue conservation fieldwork and not feel limited by their gender. Another woman expressed her interest in learning more about women's involvement within the Indonesian conservation movement, although she was unable to attend due to a scheduling conflict. Learning more about forest species and reconnecting with research aspects of conservation also motivated participants.

The primary reason early-career women (N = 9) gave for workshop attendance was acquiring new knowledge about conservation and related field research skills from those with experience and expertise. “My hope is to gain basic field skills that I might not acquire as I sit on the [lab] bench at school” (Early-career R7). Six women also mentioned building networks and networking skills, seeking support and motivation to continue their chosen career path, and four mentioned acquiring field experience. In most cases, the women discussed their reasons for attending the workshop as interconnected.

“I hope that I can pass on the things I learn to my friends, so that they know and understand that the field is not a bad thing. It is precisely [experience and learning] about the field that we don’t get in class. Attending an event [like this] changes some things in our lives, whether it’s the scope of friendship or changes in us for the better.” (Early-career R3)

Other reasons for attendance included finding a mentor, having new experiences, learning more about women's roles in conservation, and connecting with their identity as a biology student interested in conservation.

3.6 | Recommendations for future workshops

Post-workshop, eight early-career women indicated the workshop fulfilled their expectations. All participants identified soft research skills and technical research methods as two areas of workshop learning that they found most helpful. References to soft research skills ranged from what “tools in the field” to carry or “food preparation in the field,” to “personal safety when doing conservation or staying in the forest.” The women also appreciated discussions about human–wildlife conflict and advice for finishing research projects. Technical research methods that women found helpful included learning how to use camera traps, GPS use, and data processing. However, two women wanted to learn more about GIS and managing camera trap data, indicating they wanted more training to collect and analyze their field data in the required software. A few commented specifically about how the experience opened their minds to diverse research ideas and career options for women within conservation.

All of the early-career women said they would recommend attending similar workshops to their friends in conservation. Three attendees recommended including GIS skills in future workshops. Six attendees specifically linked developing their conservation knowledge and fieldwork skills at the workshop to stronger motivations to participate in conservation. “Because of this workshop, I learned a lot of basic things that we should do when we go to the field and opened my mind about what we as women can do in wildlife conservation. Not all of my friends have this” (Early-career R11). Five women mentioned a desire to pass on workshop learning to others who could not attend.

4 | DISCUSSION

Attaining equal representation in conservation among men and women in Indonesia is a complex issue; a full discussion of which is beyond the scope of this study. The workshop and surveys presented here were motivated by the experiences of the primary author while conducting
fieldwork in Riau from 2014 to 2016. Local women expressed interest in joining her field team but were usually unable to join when the time came, citing school or family responsibilities. It also seemed that the predominantly male field team was a barrier preventing women from joining her in the field. When there are cultural gender gaps, it is important for women (and other underrepresented groups) to have a safe, welcoming environment in which to learn new skills (Clancy et al., 2014; Herrmann et al., 2017; Nelson, Rutherford, Hinde, & Clancy, 2017). Although our participant number was small, our results indicate a strong desire and need for these types of skills and networking workshops for Indonesian women in conservation.

We recognize the gender binary focus of our current study, but all genders, ethnicities, and religions warrant research attention, inclusion, equity, and support. While we asked the participants in our surveys about religion and ethnicity, most women were Muslim with a wide variety of ethnicities and geographicalities represented, preventing rigorous comparisons across groups. In future surveys, we aim to widen our survey to better understand the nuances of career decisions of all young Indonesians in conservation, as well as the impacts on and perceptions of family members. Surveying a wider group of conservation workers can shed light on the prevalence of ungendered challenges in Indonesian conservation, such as a lack of technical field education. Observations and anecdotal evidence indicate that men are more likely to take recreational trips to natural areas, resulting in more informal field experiences than female counterparts by the time formal career paths are chosen. However, because there is strong evidence that career paths are influenced by networks and mentors (Bhatia & Amati, 2010; Dawson, Bernstein, & Bekki, 2015; Hernandez et al., 2017; Kendricks, Nedunuri, & Arment, 2013), if men in certain geographic, demographic, or socioeconomic groups are not exposed to the conservation field, they may also be underrepresented.

Half of the established career participants mentioned mentors as influential in their careers. Mentoring can be particularly important for the retention of underrepresented groups in STEM fields, including conservation (Hernandez et al., 2017; Preston, 2004). While women are more likely to remain in STEM fields if they have a female mentor or peer group, mentors who are able to encourage and support the specific challenges women may face also increase retention (Bernstein, Jacobson, & Russo, 2010; Buck, Plano Clark, Leslie-Pelecky, Lu, & Cerdalizarraga, 2008; Hernandez et al., 2017). None of the women we surveyed reported having a female mentor. Given the importance of mentorship in early-career development and learning from others with shared experiences in peer groups (Bhatia & Amati, 2010; Buck et al., 2008; Herrmann et al., 2016), we were not surprised by the enthusiasm and excitement expressed by the women in our workshop. Not only did these women meet one another as a peer support and mentorship group for the first time, but communication among the women continued through the time of manuscript preparation. This suggests even brief experiences like this workshop can increase networks, which can be crucial in tackling career challenges. Future follow-up surveys will focus on retention of these women in the conservation field.

While networking can increase motivations and help overcome challenges, the four challenges identified by Jones and Solomon (2019) were evident in the complex and nuanced responses to questions about career choices, challenges, experiences, and sources of support. Fieldwork, potentially a significant part of a conservation career, can require long periods of time away from family, internet, and/or cell phone signal. Many early-career respondents mentioned concerns about balancing future family needs with careers—concerns echoed by women across geographic regions, and a form of informal exclusion when women are forced to make choices between families and careers due to insufficient facilities or accommodations (Ceci & Williams, 2011; Jones & Solomon, 2019; Lynn, Howells, & Stein, 2018; Thornton et al., 2020). Interestingly, while established career women mentioned family concerns as a challenge when they began their careers, none of these women mentioned childcare as a current challenge. The women suggested changing societal perceptions as a reason they didn't face childcare challenges, but these established women may have also reached levels in their careers where childcare is affordable or they are not required to do frequent fieldwork.

In other geographic regions, increasing communication access to women in rural areas has increased their participation in the labor market (Asongun & Odhiambo, 2020; Viollaz & Winkler, 2020). Providing child/family care or stipends for hired care, access to satellite phones or internet at field camps, as well as treating field camps as places of employment with enforced codes of conduct could ease some concerns about personal and family health and safety, and increase women's participation, as exemplified in other regions (Clancy et al., 2014; McGuire et al., 2012; Viollaz & Winkler, 2020). Although none of the women we surveyed specifically mentioned field safety as a primary barrier to a conservation career, field stations can be bastions of sexual harassment and physical safety lapses (Badan Pusat Statistik, 2017; Clancy et al., 2014; KOMNAS, 2016; Nelson et al., 2017; Nilan, Demartoto, Broom, & Germov, 2014). As fieldwork is often seen as a right-of-passage and is often necessary for early-career scientists to gain experience, normalizing
these features at field stations could increase retention of scientists (Klemow et al., 2019; Lynn et al., 2018; McGuire et al., 2012; Thornton et al., 2020).

Formal exclusion was exemplified in our study when one survey participant reported that fieldwork job advertisements often specifically request male applicants. This type of exclusion can be addressed through broader societal changes or political intervention. As Indonesia becomes more globalized, traditional gender beliefs may change regarding appropriate career paths for women (Ruspini, 2019). The changing views of gender roles seen among young women nationally (Nilan, Parker, Bennett, & Robinson, 2011) was reflected in the women we surveyed, as well; with women rejecting negative views of women working in a field-based career. Global evidence suggests increasing societal awareness of women’s interest in science through governmental, educational, or organizational programs, in addition to increasing mentorship opportunities and introducing flexible schedules to support family care, may aid in the recruitment and retention of women in STEM fields (Hernandez et al., 2017; Leggon, McNeely, & Yoon, 2015; McGuire et al., 2012; Roberts, 2014). As women advance in conservation careers, supporting all-female field teams, providing other accommodations to respect religious or societal beliefs, promoting family leave, and allowing flexible funding and promotion timelines can help women advance in academia, non-profits, and government agencies (Ceci & Williams, 2011; Lynn et al., 2018; McGuire et al., 2012).

In addition to addressing the multiple gendered challenges women face, a lack of technical field skills was one of the main challenges the women mentioned, and may be lacking for young Indonesian scientists, regardless of gender. The intersectional pairing of gendered and ungendered challenges faced by Indonesian women could result in insurmountable hurdles to entering a conservation career, and indicates a need for more support in career training and development in conservation in general.

Our work expands the knowledge of women working in STEM and conservation in Indonesia, a country critically important for biodiversity conservation globally (Myers et al., 2000). Throughout this research, we were struck by the lack of literature on the training and retention of women working in the conservation field, particularly for the Global South. While we found literature regarding women in community conservation, we were interested in women as direct, committed actors employed in conservation. We aim to expand these preliminary research efforts to more fully understand the barriers to women working in Indonesian conservation and the impacts a workshop such as ours can have; and this work needs expansion into other biodiverse regions in the Global South as well. Increasing the number of women in conservation is a long-term goal that benefits the economy and the environment (Sodhi et al., 2010; Tallis & Lubchenco, 2014). By encouraging, mentoring, and teaching underrepresented groups, a more inclusive conservation field can lead to more diverse and successful solutions to some of the world’s most daunting ecological problems.

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CONFLICT OF INTEREST
The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS
Erin E. Poor, Rafselia Novalina, and Jennifer M. Mullinax Developed the research concept. Erin E. Poor and L. Jen Shaffer: Analyzed the data. Erin E. Poor, Rafselia Novalina, Muhammad Ali Imron, L. Jen Shaffer, and Jennifer M. Mullinax planned the research and wrote the manuscript, led by Erin E. Poor. Erin E. Poor and Jennifer M. Mullinax: Secured funding for this research.

DATA AVAILABILITY STATEMENT
Anonymous survey data are available upon request from the corresponding author.

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