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Short communication

Mentorship, equity, and research productivity: lessons from a pandemic

Mallika A. Nocco^{a,*}, Bonnie M. McGill^{b,1}, Caitlin McDonough MacKenzie^{c,1},
Rebecca K. Tonietto^d, Joan Dudney^e, Molly C. Bletz^f, Talia Young^g, Sara E. Kuebbing^h

^a Department of Land, Air, and Water Resources, University of California, Davis, One Shields Avenue, Davis, CA 95616, United States of America

^b Anthropocene Science Section, Carnegie Museum of Natural History, 4400 Forbes Ave, Pittsburgh, PA 15213, United States of America

^c Climate Change Institute, University of Maine, Orono, ME 04469, United States of America

^d Department of Biology, University of Michigan - Flint, Flint, MI 48502, United States of America

^e Department of Plant Sciences, UC Davis, Davis, CA 95616, United States of America

^f University of Massachusetts Boston, Department of Biology, Boston, MA 02125, United States of America

^g Rutgers University, Piscataway, NJ 08854, United States of America

^h Department of Biological Sciences, University of Pittsburgh, Pittsburgh, PA 15260, United States of America

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ABSTRACT

The coronavirus pandemic is more fully exposing ubiquitous economic and social inequities that pervade conservation science. In this time of prolonged stress on members of the research community, primary investigators or project leaders (PLs) have a unique opportunity to adapt their programs to jointly create more equitable and productive research environments for their teams. Institutional guidance for PLs pursuing field and laboratory work centers on the physical safety of individuals while in the lab or field, but largely ignores the vast differences in how team members may be experiencing the pandemic. Strains on mental, physical, and emotional health; racial trauma; familial responsibilities; and compulsory productivity resources, such as high-speed internet, quiet work spaces, and support are unequally distributed across team members. The goal of this paper is to summarize the shifting dynamics of leadership and mentorship during the coronavirus pandemic and highlight opportunities for increasing equity in conservation research at the scale of the project team. Here, we (1) describe how the pandemic differentially manifests inequity on project teams, particularly for groups that have been structurally excluded from conservation science, (2) consider equitable career advancement during the coronavirus pandemic, and (3) offer suggestions for PLs to provide mentorship that prioritizes equity and wellbeing during and beyond the pandemic. We aim to support PLs who have power and flexibility in how they manage research, teaching, mentoring, consulting, outreach, and extension activities so that individual team members' needs are met with compassion and attention to equity.

1. Introduction

The global coronavirus pandemic has disrupted physical, mental, and emotional health across the world. As of January 20, 2021, there are over 95 million confirmed cases and 2 million deaths from the pandemic worldwide ([Visual and Data Journalism Team, 2020](#)). Varying degrees of public health measures are in place with instructions to work from home and use personal protective equipment in public. In the United States (US) and other countries, many daycares and schools are constantly reopening and closing in response to changing local infection

rates; and caretakers are providing child care, homeschooling children, and continuing to work in this tense, isolating environment.

We are a group of early-career project leaders (PLs) and David H. Smith Conservation Research Fellows based in academia and non-profit organizations with broad conservation experiences working in US and international conservation areas that include urban, rural, backcountry, and agricultural ecosystems. Conservation scientists aspire to change the world by integrating several disciplines to improve biodiversity, ecosystem health, and livelihoods ([Kareiva and Marvier, 2012](#)). Ideally, conservation scientists link research to specific management and policy

* Corresponding author.

E-mail addresses: manocco@ucdavis.edu (M.A. Nocco), bonniemcgill@gmail.com (B.M. McGill), caitlin.mcdonough@gmail.com (C.M. MacKenzie), tonietto@umich.edu (R.K. Tonietto), jdudney@ucdavis.edu (J. Dudney), molly.bletz@gmail.com (M.C. Bletz), talia.rutgers@gmail.com (T. Young), sara.kuebbing@pitt.edu (S.E. Kuebbing).

¹ These authors contributed equally to this work.

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goals such as evaluating existing or past interventions, predicting future outcomes, and identifying new opportunities (Game et al., 2015). However, institutional exclusion in conservation science has facilitated research, management, and policy failures in understanding how race and intersecting factors (e.g. gender, sexuality, economics) shape ecosystem dynamics, biodiversity, and human livelihoods (Schell et al., 2020a). We call upon the conservation science community to address deep inequities and exclusion embedded in conservation education, institutions, history, and policies (Ali et al., 2020; Finney, 2014; Flores et al., 2018; Gatheru, 2020; Jones and Solomon, 2019; Kern et al., 2015; Schell et al., 2020b; Taylor, 2016, 2015).

Although Black, Indigenous, and other People of Color (e.g., Latinx and Asian people; BIPOC) make up 38% of the US population, less than 16% of the boards and staff of environmental organizations identify as BIPOC (Taylor, 2014). This lack of representation adversely impacts BIPOC communities and conservation science as a whole by translating inequity into research, management, policies and governance that ignore important ecocultural knowledge frameworks (Hankins, 2018; Méndez-Barrientos et al., 2020). Five decades of diversity recruitment efforts have primarily benefited white women, though men still comprise the majority of executive leadership roles (e.g., 76.2% of presidents) in environmental organizations (Taylor, 2014). Within our David H. Smith Conservation Research postdoctoral fellowship that has a goal of developing conservation leaders, for example, there have only been 10 fellows (10%) from BIPOC communities since the program started in 1999. Institutional racism and sexism enforce barriers against BIPOC in conservation science. One such barrier to entry for aspiring conservation scientists is the Graduate Record Examination (GRE). This exam still persists as an admissions requirement in over half of ecology and life sciences programs and over 90% of physical science US Ph.D. programs (Langin, 2019), despite clear evidence that it predicts race (Miller and Stassun, 2014), binary gender (Petersen et al., 2018), and economic status (Clayton, 2016), rather than success in science (Petersen et al., 2018).

Conservation spaces can condone exclusion, harassment, and violence through a phenomenon called ‘spatiality’ (e.g. white male spatiality, racial spatiality, gendered spatiality) where symbolic cues including place names, depictions, histories, and cultural norms dictate the treatment and lived experiences of excluded identities in social spaces (Engles, 2020; Harrison, 2013; Perry and Gillespie, 2019). The history of conservation is fraught with enslavers such as John James Audubon (Nobles, 2020), white supremacists such as John Muir (Purdy, 2015; Dowie, 2011; NoiseCat, 2019) and Theodore Roosevelt (Dowie, 2011; NoiseCat, 2019; Purdy, 2015), ecofascists like Aldo Leopold and William Vogt (Lin, 2014; Powell, 2016, 2014; Supplemental Materials), and eugenicists like Madison Grant (Purdy, 2015). The names, words, likenesses, and mythologies of these white men are woven into the cultural fabric of conservation institutions and landscapes. They deeply valued non-human nature, but did not value non-white humans. Our intent is not to erase their legacies, but rather to understand how their mythologies have contributed to an exclusionary conservation culture (Finney, 2020). The exclusionary legacies of Audubon, Muir, Roosevelt, and Leopold extend outside the U.S. by giving international organizations moral permission to continually exclude and displace global Indigenous and poor communities in the name of conservation (Kashwan, 2020, 2017). These white men also built conservation spaces that are so exclusionary (Students of Color Environmental Collective, 2019; Subbaraman, 2020), that they condone state-sanctioned violence against BIPOC (Nir, 2020; Schell et al., 2020a), as well as sexual harassment or assault (Clancy et al., 2014; Rinkus et al., 2018). Addressing spatiality impacts and barriers requires a paradigmatic and cultural transformation across government, academic, and private institutions, as well as within each level of administration and leadership hierarchies (Foxy et al., 2019; Maas et al., 2020). To this end, we offer guidance for primary investigators or PLs poised to shift the culture to promote equity and inclusion on teams. Because project teams are a

foundational building block for nearly all conservation institutions, improving equity and inclusion at this organizational level will propagate entry and retention of BIPOC people of all or no genders and white women at the base of the leadership pipeline.

Conservation PLs are individuals in academic, governmental, and nongovernmental or nonprofit organizations who lead research teams and mentor scientists. PLs can include, but are not limited to, principal investigators, teaching professors, extension specialists, research scientists, chief scientists, staff scientists, postdoctoral researchers, and graduate students. Outside of a pandemic, PLs and their teams engage in a multitude of activities, including field work, laboratory analyses, data science, stakeholder engagement, ongoing skill development, manuscript writing, and science communication (Franquesa-Soler et al., 2020; Grant et al., 2007; Januchowski-Hartley et al., 2018; Manolis et al., 2009). Often the goal of these activities is to inform and encourage changes in human behavior, policy, or governance (Zavaleta et al., 2018). In order to transform outputs to outcomes, early career scientists need active mentorship from PLs and other senior team members. Effective mentorship cultivates long-term skills, insights, and habits (Feldon et al., 2019). Mentorship alliances benefit PLs by expanding their networks, introducing fresh perspectives, and passing on their traditions and legacy (Wells et al., 2005). When mentorship is dysfunctional or neglectful, there can be long-lasting results on mentee confidence and development, especially for underrepresented scientists (NASEM, 2019). The coronavirus pandemic challenges project teams and mentorship alliances by disrupting many of the steps that transform data and experiences to knowledge and application.

The coronavirus pandemic will disrupt our discipline for many years to come (Bates et al., 2020; Corlett et al., 2020; Maas et al., 2020). Its disruptive effects on conservation science and scientists may be analogous to other natural or anthropogenic catastrophes such as hurricanes, fires, and war (Ahmad, 2020). In order to alleviate these impacts on research teams and individuals, we draw from a broad review of the leadership, mentorship, and equity literature with a focus on BIPOC-authored work, as well as our own experiences as both mentors and mentees with intersecting identities. The authors of this work identify as two Asian women and six white women; four of whom are parents of young children. As the primary benefactors of the last decade of diversity recruitment efforts, we recognize our privilege and growing power; we are all in project leadership positions. Here, we offer a basis for using a crisis, the pandemic, to transform research team dynamics towards long term equity. We provide recommendations for (1) recognizing and responding to inequities, (2) equitable career advancement, and (3) reframing mentorship to prioritize equity, flexibility, and well-being during this pandemic and beyond.

2. Recognizing and responding to inequities

Social inequities manifest the coronavirus pandemic differently for different groups of people. Within any research team, members are likely experiencing different stressors, challenges, and barriers that may affect their ability to fully achieve PLs’ expectations. Here, we lay out some of the inequities that team members may face related to race, genders, health conditions, and professional role; recognizing that there may be intersections of these and other identity-based inequities. We also consider the special circumstances of field and laboratory work during the coronavirus pandemic. Recognizing inequities, reorganizing team spaces, and welcoming disruption can support BIPOC people of all or no gender as well as white women to lead and thrive in conservation science. In contrast, maintaining the status quo sends BIPOC the message that they must assimilate to survive in the field’s toxic and dangerous culture (Halsey et al., 2020). Additionally, poor leadership decisions can unintentionally impact team member wellbeing by adding to ongoing stressors; only some of which are visible to PLs. For example, if PLs make project decisions during online lab meetings, members with children may not be able to participate fully or consistently. Over time,

this may cause these individuals to disengage, which may result in fewer opportunities in the future. If PLs can adapt their leadership and mentorship to accommodate the different constraints each team member faces, PLs will increase equity across members and ultimately increase idea generation and outputs to achieve conservation outcomes.

2.1. Pandemic inequities for BIPOC scientists

BIPOC, as well as migrant and asylum-seeking individuals experience higher rates comorbidities, face a two- to three-fold greater risk of coronavirus contraction, hospitalization, and death, and are excluded from widespread testing and epidemiological data collection relative to white Americans (Azar et al., 2020; Bhopal, 2020; Carpenter, 2020; Gravlee, 2009; Laurencin and McClinton, 2020; Nagle, 2020; Prats-Urbe et al., 2020; Price-Haywood et al., 2020). These health inequities are caused by structural racism in the forms of limited access to high-quality healthcare, greater exposure to environmental toxins and pollutants, and the chronic stress of living in a white supremacist society, all of which result in higher rates of comorbidities among different BIPOC communities (Bailey et al., 2017; Clark and Hurd, 2020; Hoffman et al., 2016; Nigra, 2020).

For BIPOC scientists, chronic exposure to and the stress of living in a violently racist society exacerbate the stressors of the coronavirus pandemic (Liu and Modir, 2020). For Black scientists, the coronavirus pandemic is compounded by racial trauma from concurrent police and vigilante violence against Black people (Montgomery, 2020). The most recent racial traumas include the murders of Ahmaud Arbery, Breonna Taylor, George Floyd, Rayshard Brooks, and the attempted murder of Jacob Blake (Schell et al., 2020b). Protesting for Black Lives has not increased the number of coronavirus cases or death rates in 315 of the largest cities in the U.S. (Dave et al., 2020), but additional police and vigilante brutality regularly occur at protests against this type of state-sanctioned violence (Gabbat, 2020).

Indigenous scientists and communities are especially vulnerable to the coronavirus pandemic as a product of colonialism, including settler-colonialism. Across the globe colonialism has been codified and translated into on-going structural violence (Hoss, 2020; Power et al., 2020). Colonialism, as it pertains to coronavirus susceptibility, often involves land dispossession; geographical isolation from community; limited access to quality food, water, and health care; and high epigenetic stressors related to sustained, intergenerational trauma and violence—especially violence towards women (Power et al., 2020). These inequities have resulted in higher coronavirus contraction and mortality among Indigenous peoples. For example, Indigenous communities in Brazil have twice the coronavirus death toll compared to the overall population of Brazil (Curtice and Choo, 2020; Ferrante and Fearnside, 2020). Though Indigenous communities all face the structural violence of the coronavirus pandemic (Power et al., 2020), challenges can manifest differently across the globe. For example in Aotearoa New Zealand the Māori face disproportionate economic losses from decreased tourism compared to non-Māori (Carr, 2020); in Brazil Indigenous people face virus transmission from missionaries (Ferrante and Fearnside, 2020); in the U.S. and Canada coronavirus challenges are compounded by the high numbers of missing and murdered Indigenous women (Curtice and Choo, 2020) and, worldwide, the loss of Elders to coronavirus further endangers native histories, knowledges, and languages (Curtice and Choo, 2020).

Asian scientists, businesses, and communities are also experiencing increased levels of physical and verbal abuse, discrimination, and racism because of the xenophobic perceptions of coronavirus's geographic origin perpetuated by US government officials (Choi and Kulkarni, 2020; Tavernise and Oppel Jr, 2020). Additionally, Latinx scientists and communities have been targeted by the current US administration's anti-immigration policies, which discourage coronavirus testing or treatment out of fear of discrimination, deportation, and family separation (Lopez et al., 2018; Singh and Koran, 2020). Latinx communities

have also experienced greater economic disparity resulting from the pandemic, e.g., as many essential workers are often not eligible for economic stimulus checks (Singh and Koran, 2020).

We discuss and reference racial trauma in *Biological Conservation* because it impacts the mental health, immunity, and productivity of conservation scientists from different BIPOC communities (Liu and Modir, 2020), where much of the work is self-motivated and creative. To compound matters, many well-intentioned conservation teams and institutions disproportionately rely on BIPOC scientists to advance justice, equity, diversity, and inclusion (JEDI) efforts, while maintaining documented excellence in their regular duties of research, teaching, and extension activities (Jimenez et al., 2019; Schell et al., 2020b). Though these JEDI efforts are well-intentioned, they may result in additional work for BIPOC scientists that is particularly difficult, uncompensated, and unrewarded under current merit systems (Jimenez et al., 2019; Miller and Roksa, 2020).

2.2. Pandemic inequities for women scientists

Women in science, especially women who are also BIPOC, pregnant, engaging in fertility treatments, or dependent care, have already lost significant professional productivity during the coronavirus pandemic (Boivin et al., 2020; Malisch et al., 2020; Preis et al., 2020; Stadnyk and Black, 2020; Staniscuaski et al., 2020b). Women published fewer first-author medical papers in March and April of 2020 compared to men (Andersen et al., 2020; Pinho-Gomes et al., 2020). A survey of 3345 Brazilian academics found that women—especially Black women—and parents—especially of young children—submitted fewer scientific papers and met fewer deadlines than their peers who identified as men or had older or no children (Staniscuaski et al., 2020a). Reasons for diminished productivity include increased child and eldercare responsibilities including homeschooling and loss of home health workers (Aubry et al., 2020; Minello, 2020).

We reference and discuss the adverse impacts of the coronavirus pandemic on women in *Biological Conservation* because women who were carefully balancing parenting with conservation leadership roles (Jones and Solomon, 2019) have been forced to restructure their time in response to public health recommendations or ordinances to slow the spread of the pandemic. Domestic and care work always has and continues to fall disproportionately on women (Alon et al., 2020). The combined responsibilities of professional, family, and community work have been called the 'triple burden' that falls to women during catastrophic events in both developing and developed countries (McLaren et al., 2020). Longer isolation also leads to higher risk of intimate partner violence, which is physical, sexual, psychological, and/or economic violence that is largely perpetrated by men against women (Van Gelder et al., 2020). Finally, isolation reduces access to social support structures, which can compound burdens and perpetuate intimate partner violence (McLaren et al., 2020; Van Gelder et al., 2020).

2.3. Pandemic inequities for scientists with health risks

Inequities in health risk factors and access to care are also important considerations. Individuals with specific health conditions and/or in older age brackets are more likely to experience serious illness from coronavirus infection (Prats-Urbe et al., 2020), which means that the risk and potential toll of infection is much higher for team members who meet these criteria and/or are caring for loved ones who meet these criteria. Likewise, health care access, paid time-off, and medical leave may be unevenly distributed among team members, such as graduate students, postdoctoral researchers, and faculty, even for those at the same institution. These differences mean that rejoining lab and field work efforts pose different risks to team members as coronavirus prevalence ebbs and flows in a community.

The health stressors and caregiving responsibilities associated with the coronavirus pandemic will be felt differently among team members.

Internally, research team members may be experiencing pain and/or guilt about ill or strained family members whom they cannot help in person; this is especially true for researchers living in remote areas or who live far from support networks (Burgio et al., 2020). Additionally, team members may have increased anxiety, depression, and other mental health issues exacerbated by or resulting from confinement during the pandemic (Corbera et al., 2020; Holmes et al., 2017).

2.4. Pandemic inequities for scientists with different roles

Conservation scientists often have several roles in addition to research such as teaching, consulting, extension, and institutional service/administration. Researchers are having to adapt their daily activities to accommodate remote teaching, consulting, mentoring and outreach. Team members may have different access to necessary work-from-home resources, such as uninterrupted spaces and high-speed internet. Teachers and teaching assistants are learning how to teach and support students in “hybrid” classroom structures. Navigating flipped classrooms, rapid changes in modes of instruction, and unpredictable shifts in student health status place undue pressure on teachers and teaching assistants (Foley, 2020). Teachers and teaching assistants who are also parents of school-age children are simultaneously supporting their students and children in these new hybrid classroom structures. Extension specialists, consultants, agents, and advisors are learning how to outreach and support clientele remotely, while also vetting and developing community education content related to the pandemic (Bruno et al., 2020; Kearns, 2020; Nocco et al., 2020).

2.5. Field work and laboratory considerations

Field work during the coronavirus pandemic is even more isolating (Howard, 2020), which compounds the power dynamic between PLs and field crews, adds new layers of pressure on field researchers to perform, and exacerbates social barriers. Coronavirus pandemic impacts on field workers should be incorporated into considerations regarding field data collection timelines, physical safety, and relationships with funding agencies (Jabbour, 2020; Tonnietto, 2020). Historic field norms can reinforce toxic masculinity, sexual harassment, and alienate individuals from groups historically excluded from participating in field work, which is often a gateway to further employment and education in conservation (Archie and Laursen, 2013; Beltran et al., 2020; Clancy et al., 2014; Fournier and Bond, 2015; Giles et al., 2020; Holmes et al., 2017). The isolated spaces and communities in which field work takes place can also pose existential threats to conservation scientists who have and express BIPOC, sexual, gender, religious and intersectional identities (Demery and Pipkin, 2020; Viglione, 2020). Though many institutions offer field safety courses, these courses focus on physical risks and treatments (e.g., heat management, first aid) rather than interpersonal threats. The responsibility falls on PLs to assess risks and work with team members to implement strategic safety plans for conducting field work (Demery and Pipkin, 2020). We strongly recommend PLs consult Demery and Pipkin (2020) for a comprehensive approach to identity-based risk assessment and field safety planning with team members.

Field work is often a time-sensitive, seasonal component of conservation research, management, and career advancement. In addition to conducting the identity-based risk assessments for field work described above, we suggest that PLs emphasize an individual’s right to decide and confidentially communicate whether field work is possible, safe (both psychologically and physically) and reasonable. PLs should also actively discuss with mentees how they can adapt and pivot mentee research goals to accommodate personal, professional, and seasonal constraints. Should mentees decide not to conduct field work, PLs need to encourage and help mentees develop alternate research plans that enable mentees, especially graduate students and postdoctoral researchers, to accomplish their goals within funding timelines. PLs should work with funders to extend graduate student and postdoctoral funding to accommodate

pandemic-related disruptions in productivity. Finally, PLs can emphasize that there are conservation careers that do not require field work and help mentees develop and highlight the skills for these positions (e.g. data science, policy analyses) (Emery et al., 2020).

Laboratory and data analyses may also be impacted by power dynamics without ensuring that scheduled access to facilities is equitable and safe. Because the coronavirus pandemic is now restructuring how laboratory research is conducted (e.g., reduced density of people at a given time in lab spaces, strict schedules to decrease exposure and assist with contact tracing), PLs need to consider safety for at-risk groups. For example, it can be unsafe to schedule BIPOC students on academic campuses at odd hours because of increased probability of harassment from campus or local police (Yu, 2020). Researchers caring for family members or home-schooling their children may need more flexible schedules to manage personal and professional responsibilities. Researchers with limited access to home work spaces should get priority for institutional office access. Medically high-risk researchers may need assistance getting lab work completed or pivoting to a new research plan when they cannot physically be present at the laboratory. Similar to field considerations, the responsibility falls on PLs to assess laboratory safety and equity issues to work with team members to implement strategic schedules.

3. Equitable career advancement during and after the coronavirus pandemic

Much of what we know about leadership and mentorship assumes team members are in strong overall health, have intact support systems, and are not living in fear and isolation. PLs may need to reconfigure typical mentoring styles to accommodate the individual needs and demands for each team member. While PLs might encourage short-term productivity using a top-down approach for all team members, prolonged productivity and fulfillment increases when mentors engage deeply to examine mentee values, aspirations, strengths, and weaknesses through custom mentorship plans (Montgomery et al., 2014). Though top-down mentorship approaches maintain institutional norms with minimal PL effort, custom mentorship plans have the power to facilitate new perspectives that can change the cultural landscape of conservation science (Montgomery, 2017). These goals and needs likely will not met by a single mentor. Instead, it can be useful to map out individual needs and then seek mentorship within and across institutions, through in-person interactions or social media. Social media is especially useful for people who are underrepresented at their home institution and/or department to connect with mentors of similar identities or backgrounds (Montgomery, 2018a; Rockquemore, 2013).

Conservation science has a goal of creating inclusive communities, welcoming diverse voices, and building pluralistic leadership from the ground up (Green et al., 2015; Tallis and Lubchenco, 2014). However, our field has struggled to recognize and reconcile decades of barriers to BIPOC people of all or no genders as well as white women (Bird, 2011; Gumpertz et al., 2017; Taylor, 2018). The additional burdens of the coronavirus pandemic outlined above are disproportionately impacting productivity among these same people. Conservation leaders should reflect on the intersection of equity and power in their research decisions during the coronavirus pandemic and in its legacy on careers. Now, seven months into a pandemic, it is clear that the impacts of pandemic-related illnesses, delays, and disruptions will impact conservation science careers for many years to come. While some institutions have stopped faculty tenure or promotion clocks for short periods of time (6 months to 1 year), these delays may turn out to be woefully inadequate to capture the impacts of a year or more of disruption to daily lives. Likewise, most academic institutions have made almost no formal accommodation for graduate students, postdoctoral researchers, or PLs without tenure-track positions (Corlett et al., 2020; Pain, 2020). We suggest that hiring, dissertation, and promotion committees help prevent the pandemic from widening the career advancement gap for

underrepresented groups by viewing a productivity gap as the norm, rather than unintentionally rewarding the more privileged who were able to conduct research more easily during the pandemic. Because we do not know when we will see an “end” to pandemic-related disruptions, PLs must be aware that a productivity gap may span a year or more for their mentees. We also suggest as much flexibility in hiring processes as possible; for example, offering remote researcher positions or later start dates (Burgio et al., 2020).

Promotion and advancement based on accomplishments during a global crisis can encourage a greater sense of entitlement and rule-breaking behaviors. Social psychologists demonstrate that people with greater entitlement believe they deserve more than others and are more likely to ignore the rules to secure advancement (Anastasio and Rose, 2014; Zitek and Jordan, 2019). Furthermore, people are more likely to feel compassion and motivation to help individuals compared to large groups facing a catastrophe—known as the “collapse of compassion” (Cameron and Payne, 2011). The combination of entitlement, motivated reasoning (Kunda, 1990), and the collapse of compassion incites self-serving rather than community-oriented behavior that will favor privileged individuals. Recent work focuses on how merit and advancement of PLs need to change at the departmental and institutional level to implement these types of assessments into official merit systems on tenure or similar career tracks during COVID-19 (Malisch et al., 2020; Oleschuk, 2020; Stadnyk and Black, 2020), including incentives and recognition for JEDI work within an institution or profession. We encourage cultivating a community of support in the workplace through holistic individual assessments that identify the possible privileges leading to differences in productivity.

PLs can actively promote individual holistic assessment and advancement on their teams, responding to recent calls by team members, such as graduate students (Pardo et al., 2020). A holistic assessment of mentees involves more than a count of publications, presentations, and funded grant applications. It involves consideration of the interactions between a mentee and their surrounding environment (e.g. inequities, privileges) and rewarding growth in reference to differing environmental conditions (Montgomery, 2018b). Additionally, a holistic assessment involves reallocating time and resources to improve challenging situations that occur within the mentee’s environment to facilitate growth (Montgomery, 2018b). This type of assessment model has been suggested to improve equity and facilitate BIPOC success in STEM overall (Montgomery, 2016; NASEM, 2019; Packard, 2015) and can be applied to conservation science.

4. Reframing mentorship priorities

Effective, compassionate mentorship is frequently cited as a critical component facilitating the advancement of BIPOC people of all or no genders and white women in science (Archibeque-Engle et al., 2020). From an ethical standpoint, cis-gendered white men can and should develop cross-cultural skills to empathize, amplify, and effectively serve as mentors for BIPOC people if they have the honor of being chosen for this trusted, collaborative role (Halsey et al., 2020; NASEM, 2019). We suggest leveraging the pandemic’s disruption to adopt a compassionate, growth-oriented approach to mentorship during and after the pandemic (Montgomery, 2018b, 2020).

The pandemic is a challenging and tragic event, but there may be opportunities for mentors to support researchers who are disproportionately impacted and effect permanent, equitable changes to project team management. On academic project teams, individuals in positions of power are generally more privileged. For example, the academic community increasingly and disproportionately represents people from more privileged socioeconomic backgrounds (Kezar and Sam, 2010; Marginson, 2016). Recognizing these structural privileges and focusing on compassion and innovation, as well as staying informed about new policies and safety concerns, will facilitate greater support for those more vulnerable to the impacts of the coronavirus.

Mentor words and actions are especially important at this time. Strong mentorship alliances promote educational development, transmit discipline-specific cultural norms, share oral histories, facilitate career advancement, increase mentee exposure and visibility, and provide coaching, counseling, support, and protection (NASEM, 2019, 1997; Wells et al., 2005). Effective mentors are fair, compassionate, accessible, active listeners; provide constructive criticism; and respond to psychosocial needs (Cooke and O’Connor, 2014). Great mentors demonstrate a commitment to their own lifelong learning, are humble and transparent, and do not espouse omniscient, elusive roles or strategies (Cooke, 2019; Rockquemore, 2013). Particularly during a pandemic, a critical component of mentorship is normalizing and recovering from failures (Posselt, 2018). This includes the small failures that happen on a daily to weekly basis as well as larger project, research, and policy failures.

Compassionate mentoring also means putting the needs of the mentee over the professional goals of a PL who needs to demonstrate research productivity. A well-intentioned approach underway in many organizations is to ask team members who do not “feel comfortable” going into the laboratory or field to openly express their concerns. Similarly, the onus is often placed on team members doing computer-based data science, modeling, and remote sensing to speak up and ask for extensions if they cannot maintain the same productivity at home. These opt-out mentorship strategies place undue burdens on team members who may be concerned about how they will be perceived if they ask for accommodations, when these changes are positioned as deficits or derivations from the PL’s plans (Montgomery, 2018b). This type of needs expression, along with underlying power differentials and rugged norms, threatens fruitful collaboration on scientific teams (Lotrecchiano et al., 2016).

Compassionate mentors recognize how intersectionality affects individuals’ experiences and look for ways to reduce pressure on individuals to explain their adversity. Adaptive, compassionate mentorship also requires carefully identifying when to apply pressure and when to give mentees space (Villanueva et al., 2019). These concerns should drive mentors and mentees to co-develop, revisit, and reflect on work plans that reduce stress rather than relying on mentees to express needs during and beyond the pandemic (Manolis et al., 2009). Compassionate mentoring might involve continuing to pay team members while altering or reducing their work load for the duration of the pandemic. Altering workloads can be especially important for team members who depend on scholarships. With compassionate mentorship, the coronavirus pandemic may create opportunities for new experiences that ultimately bolster creative thinking, cohesive collaboration, and effective science. Below we highlight ideas for PLs to (1) prioritize equity, (2) pivot to new research opportunities, both during and after the pandemic, and (3) prioritize wellbeing on project teams. We summarize these suggestions in Fig. 1, building on the plant-based framework for mentee growth and assessment developed by Montgomery (2018b).

4.1. Prioritize equity on research teams

Equity does not mean treating everyone equally. It means providing resources and flexibility based on individual needs and defining expectations based on individual goals and experience separate from PL career goals. There are a number of ways we, PLs, can improve and support equity on our project teams (Chaudhary and Berhe, 2020; Montgomery, 2020):

- Regularly talk with project teams about JEDI as a normal part of team meetings/activities (Chaudhary and Berhe, 2020)
- Authentically elevate BIPOC scientists, support speaking up every time against racism in conservation culture, listen and believe BIPOC scientists when they share their stories, and do not expect BIPOC scientists to assimilate to white spaces (Chaudhary and Berhe, 2020; Halsey et al., 2020; Schell et al., 2020b)

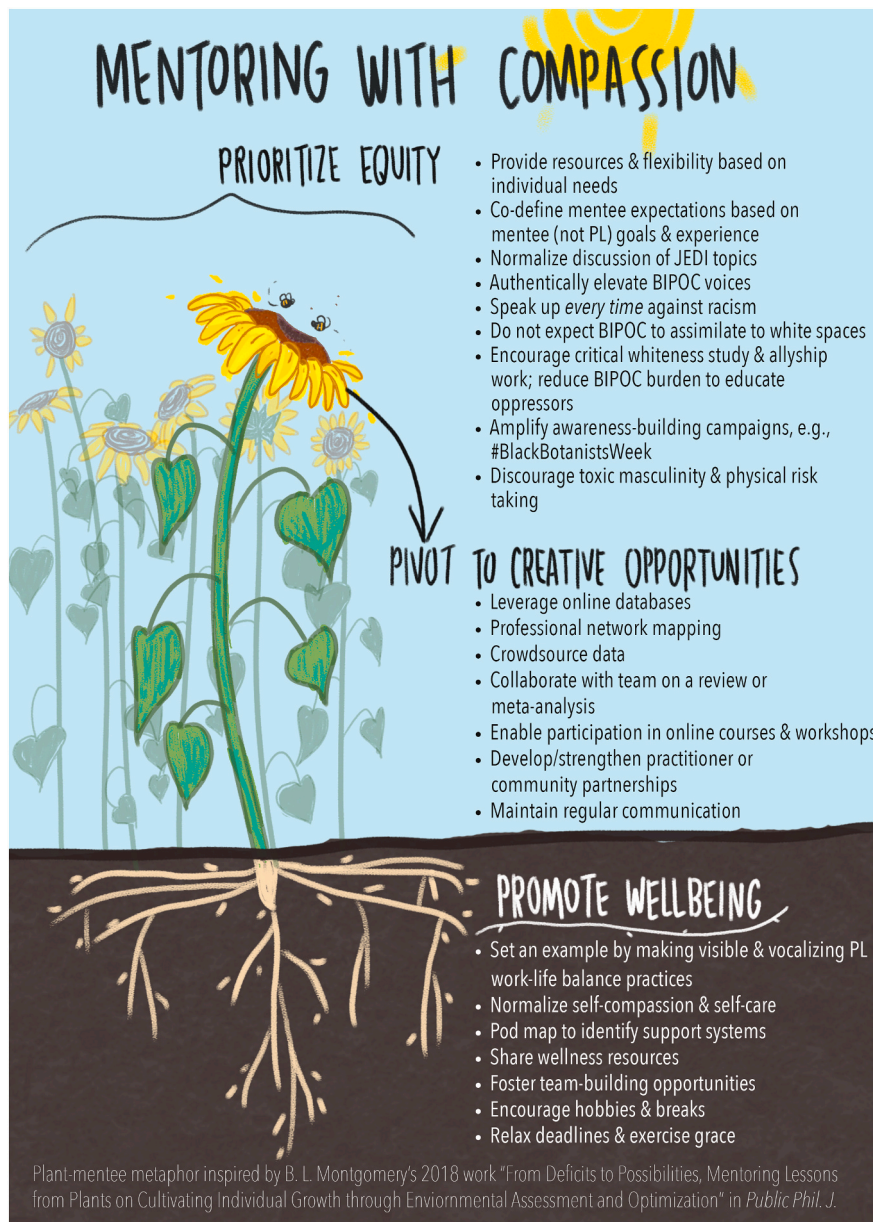


Fig. 1. Recommendations to prioritize equity (all mentees grow and need individual resources), pivoting to new research opportunities (phototaxis, as sunflowers track the sun), and prioritizing wellbeing (grounded in strong, secure roots and healthy soil) on project teams during and beyond the coronavirus pandemic. This plant growth metaphor for mentorship was inspired by and adapted from [Montgomery \(2018b\)](#). For more details on each bullet point see text.

- Encourage white, non-Black, and non-Indigenous team members to organize and participate in activities to work on how to be better allies/agents of change and remove the extra burden on BIPOC of having to educate white team members to be anti-racist ([Cabrerera et al., 2016](#); [University of California, 2020](#))
- Intentionally incorporate the work of BIPOC of all or no genders and white women conservation scientists into seminars, journal clubs, and citations ([Miriti et al., 2020](#))
- Encourage team members to amplify and participate in joyful, awareness-boosting events on social media, such as #BlackBotanistsWeek, #BlackBirdersWeek, and #LatinoConservationWeek ([Mallenbaum, 2020](#); [Morales and Peña, 2020](#); [Schell et al., 2020b](#))
- Discourage the culture of toxic masculinity in conservation by renaming happy hours as social hours to decentralize alcohol consumption ([Wade, 2020](#))
- Conduct risk assessments, discourage the braggadocio nature of proclaiming and rewarding physical feats of strength, and condemn

physical or existential risk-taking related to field work ([Demery and Pipkin, 2020](#); [Wade, 2020](#))

4.2. Pivot to creative new opportunities in research and science

If students and researchers are unable to conduct previously planned research during this stressful time, pivot to innovative strategies that can lead to new ideas, skills development, and research products ([Aslan et al., 2014](#)). One mentorship strategy that is particularly suited to diminishing external stressors across a variety of mentee groups is "appreciative inquiry." Appreciative inquiry invites mentees reflection on strengths and previous successes to build confidence and creativity for addressing current challenges ([Montgomery, 2018b](#)). This type of intake and reflection can aid mentors in identifying potential new directions and relevant sources of data for nurturing mentees as they pivot their research projects. For example:

- Leverage online databases (e.g. Environmental Data Initiative, DataOne) with under-utilized open-access data (Allard et al., 2020; Gries et al., 2020)
- Engage in network mapping with mentees to identify opportunities for mentorship and professional development within and outside of project teams, including in-person, virtual (e.g. social media), and prospective mentors/collaborators/mentees (Montgomery, 2018a; Rockquemore, 2013)
- Crowdsourcing through online platforms, like Twitter and iNaturalist to ask questions and use analytical packages developed for these types of “big data”
- Organize a team review or meta-analysis, which can be a great way to work together towards a common goal and feel mutually productive. Decide on the topic as a group to encourage engagement
- Encourage students and team members to take online short courses or virtual workshops to sharpen specific skill sets (e.g., software or data carpentry, geospatial analyses) as they are able. Provide financial support for these endeavors
- Develop or strengthen practitioner or community partnerships remotely to build or maintain trust and respect—follow the community liaison’s lead for how much capacity they have to communicate at this time
- Maintain regular communication with team partners to resolve doubts or problems as they arise

4.3. Prioritize wellbeing on research teams

There are many ways we can promote wellbeing on project teams, while respecting individual constraints and schedules (Hund et al., 2018; Maestre, 2019):

- Set an example by making visible and vocalizing PL work-life balance practices
- Normalize a culture of self-care and self-compassion (Corbera et al., 2020). This does not mean PLs overshare or burden team members with personal challenges. Instead, it means normalizing hardships, small daily victories, and disruptions, so we can better support others to make healthy, informed decisions
- Engage in pod-mapping activities for team members to identify trusted relationships (including outside of teams) who can be called upon for mutual aid during illness, trauma, needed support (Mingus, 2016). Because conservation careers often isolate individuals, PL-led pod mapping may gently encourage support system development (Mingus, 2016)
- Share information on wellness online resources, ways to access remote counseling and therapy programs for staff that might be available through institutions.
- Encourage team-building exercises that maintain a sense of social connection through online venues, such as audio/video meetings or Slack channels. Optional events, such as game nights, social hours, or daytime tea and coffee breaks can help teams stay virtually connected and supported. However, PLs should be cautious about being the originator and mindful of the frequency and duration of these events to attenuate Zoom fatigue
- Encourage breaks and hobbies outside of science, such as gardening, cooking, crafts, photography, and enjoying the outdoors, which may bolster creativity, confidence, and brain productivity (Barton and Pretty, 2010; Finkbeiner et al., 2016)
- Relaxing deadlines and exercising grace for every day failures related to circumstances outside of control

5. Concluding remarks

The coronavirus pandemic widens equity gaps within conservation research as well as society more broadly. Black, Indigenous, and People of Color (BIPOC) of all or no genders comprise only 16% of academic,

government, and private environmental organizations because of the exclusionary history, culture, and institutional barriers to entry and retention in conservation (Taylor, 2014). Though white women have fared better than BIPOC in terms of representation, women as a whole still only occupy 23% of conservation leadership positions because of institutional barriers and inequity (Taylor, 2014). The disruptions of the coronavirus pandemic can be used to change research team management and dynamics to improve equity in student and career advancement. While communities cycle between opening and sheltering-in-place, the stresses of the pandemic are ever-present. This means that primary investigators or project leaders (PLs) must continue to adapt and pivot their research and outreach programs to accommodate team members in the long-term, which requires greater awareness of the differential impacts of the coronavirus pandemic on individual productivity. This is not a one-solution problem; there are unique considerations for each research location, research type, team size, current location, etc.

Here, we highlighted multiple opportunities that exist to encourage safe, inclusive, and mutually beneficial productivity for all team members. Project leaders can thoughtfully improve equity and create a welcoming space for new scientists in the conservation research community by implementing new decision-making processes and compassionate mentorship activities. We emphasize that mentoring with compassion is essential, not only in the pandemic era but for improving equity in conservation science long term. Ultimately, we, as a scientific community, can emerge from the coronavirus pandemic with better leadership and institutional practices in place that facilitate greater resilience and equity in the face of current and future challenges.

CRediT authorship contribution statement

Mallika Arudi Nocco: Conceptualization, investigation, Writing-original draft preparation, Writing-review and editing, project administration **Bonnie M. McGill:** Conceptualization, investigation, Writing-review and editing, Visualization **Caitlin McDonough MacKenzie:** Conceptualization, investigation, Writing-review and editing **Rebecca K. Tonietto:** Conceptualization, investigation, Writing-review and editing **Joan Dudney:** Conceptualization, investigation, Writing-review and editing **Molly C. Bletz:** Conceptualization, investigation, Writing-review and editing **Talia Young:** Conceptualization, investigation, Writing-review and editing **Sara E. Kuebbing:** Conceptualization, investigation, Writing-review and editing.

Declaration of competing interest

We have no conflict of interest.

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Appendix A. Supplementary data

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