



Race and Gender Bias in the Research Community on African Lions

Hans Bauer^{1*†}, Fikirte Gebresenbet^{2*†}, Martial Kiki^{3,4}, Lynne Simpson^{5‡} and Claudio Sillero-Zubiri^{1,6}

¹ Wildlife Conservation Research Unit, The Recanati-Kaplan Centre, Zoology, University of Oxford, Oxford, United Kingdom, ² Department of Integrative Biology, Oklahoma State University, Stillwater, OK, United States, ³ School of Natural Resources and Environment, University of Florida, Gainesville, FL, United States, ⁴ Department of Environmental Engineering, Polytechnic College of the University of Abomey-Calavi, Abomey, Benin, ⁵ William E. Brock Veterinary Health Sciences Library, Oklahoma State University, Stillwater, OK, United States, ⁶ Born Free Foundation, Horsham, United Kingdom

OPEN ACCESS

Edited by:

Matt W. Hayward,
Faculty of Science, University of
Newcastle, Australia

Reviewed by:

Ricardo Rocha,
University of Cambridge,
United Kingdom
Sarah-Anne Jeanetta Selier,
South African National Biodiversity
Institute, South Africa

*Correspondence:

Hans Bauer
hans.bauer@zoo.ox.ac.uk
Fikirte Gebresenbet
fikirte.erd@okstate.edu

[†] These authors have contributed
equally to this work

‡Present Address:

Lynne Simpson,
G. Lamar Harrison Library, Langston
University, Langston, OK,
United States

Specialty section:

This article was submitted to
Conservation,
a section of the journal
Frontiers in Ecology and Evolution

Received: 31 October 2018

Accepted: 23 January 2019

Published: 11 February 2019

Citation:

Bauer H, Gebresenbet F, Kiki M,
Simpson L and Sillero-Zubiri C (2019)
Race and Gender Bias in the
Research Community on African
Lions. *Front. Ecol. Evol.* 7:24.
doi: 10.3389/fevo.2019.00024

We used bibliometric data to show that Black, African, and women researchers are underrepresented among authors of field studies on lions (*Panthera leo*) in Africa. This may lead to biased representation in institutions dealing with lion research and conservation and reinforce disenfranchisement with one of the most emblematic species in Africa. We discuss the causes, and ways for the lion research community to become more inclusive.

Keywords: *Panthera leo*, black, African, women, author, diversity, representation, inclusion

INTRODUCTION

Race and gender issues have a profound impact on society. Race is sometimes considered fluid, outdated, and overtaken by social categories perceived to be more important like ethnicity and religion in shaping inequities and injustice (Kothari, 2006), but it remains an important determinant especially in the context of conservation (Garland, 2008; Kepe, 2009; Mbaria and Ogada, 2016). However, frank discussions about race are still rare and often controversial (White, 2002) and so is research that examines racial bias in science and its consequences for the content and use of science. Available literature focuses on the role of social injustice in conservation practice (Brockington and Wilkie, 2015; Kinzig and McShane, 2015; Mollett and Kepe, 2018), but there is also some literature on geographical representation among conservation science editors (Campos-Arceiz et al., 2017) and among conservation authors (Karlsson et al., 2007). Similarly, gender bias has been described in academic literature, and in Science, Technology, and Mathematics (STEM) in particular; women scientists on average publish, earn, participate in collaborations, and get funding less than their male counterparts but there is no clear consensus on the reasons (West et al., 2013; Wang and Degol, 2017; Grogan, 2018; Holman et al., 2018). Here we look in more detail at authorship of scientific papers on lions (*Panthera leo*) in Africa. We did not look at literature on Asiatic lions, since their study and conservation in India is practiced by a distinct and separate community.

Conservation research in Africa is often performed with (co-)funding from philanthropic or institutional development organizations, e.g., as part of integrated conservation and development projects. Among these organizations' aims is local capacity building and gender inclusiveness, which is often mentioned as one of the objectives of many such projects. Most African nations will also have relevant policy, and often research permits are contingent on inclusive participation in research projects. These factors potentially promote diversity among lion researchers, but power

imbalances may lead to dominance of groups with more privileges and/or a stronger academic recognition. Others have found race to be a relevant factor in lion conservation in the field (Rust et al., 2016), here we analyzed race and gender bias in the composition of the lion research community. We place this work in the academic field of race studies where the use of Black to describe racial identity is conventional and omnipresent; in conservation literature this may be perceived as stigmatizing and politically incorrect.

METHODS

We aimed to work with a database of field studies on African lions, published in English academic journals. In July 2018, we downloaded citation data of papers with “*Panthera leo*” in the title, abstract, or keywords from seven databases going back to the year mentioned in brackets: Biological Abstracts (1949), PubMed (1974), Science Direct (1974), Scopus (1965), Web of Science (1995), Wildlife and Ecology Studies (1964), and Zoological Records (1969). We used EndNote to remove duplicates and included entries that contained the words “*Panthera leo*” in conjunction with “African lion” without further scrutiny. From the remaining list, we manually removed entries based on paleontological work or health and anatomical work based on captive lions, entries on lions in India, and entries that were included due to journals’ species indexing (for example: mountain lion, sea lion, lion’s share, Gulf of Lion). Finally, we read the abstracts of the remaining papers to exclude false positives. Our initial search criteria will have excluded lion papers that didn’t use the species name in the title, abstract, or keywords (false negatives). Our EndNote database is available on request.

For all authors with three relevant papers or more, we categorized race, nationality, and gender of the individuals; the lion research community is strongly networked and collectively we knew over half personally, for others we used profiles from public internet sources such as social media, researchgate, and staff pages of university websites, or by contacting others who knew the person. We used only binary classifications; Black vs. non-Black, male vs. female, and nationality from an African vs. non-African nation. These classifications were based on phenotype; we actually found very little ambiguity and the classification process was fairly easy, if time-consuming. Classification of nationality for people we did not know personally, or by proxy, was based on publicly available elements of life history and may have been more ambiguous. We used the minimum of three papers as an arbitrary but logical threshold for two reasons: (a) it would be prohibitively resource intensive to do the categorizations for more than a few hundred authors and (b) we propose three papers as a reasonable threshold to distinguish a lion researcher from an author with a passing interest in lion research. We also listed affiliations and categorized them by whether the postal address was in or outside Africa, but since affiliations may change during an individual’s career, analysis was more complex and limited to authors with six papers or more. This resulted in a classified list of authors publishing lion-based research up to July 2018. Since this is primarily a bibliometric

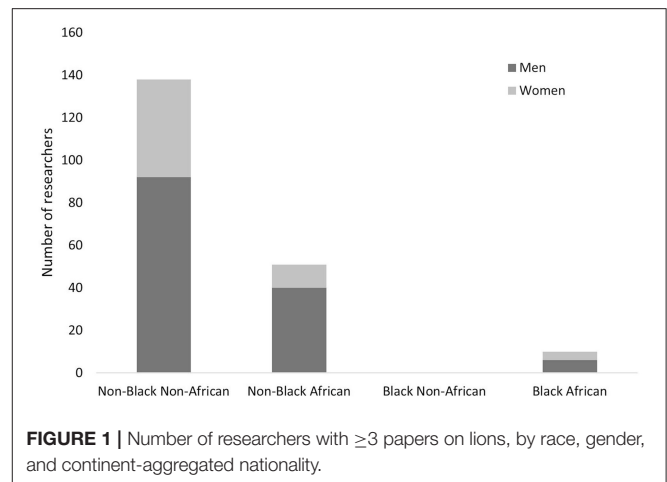


FIGURE 1 | Number of researchers with ≥ 3 papers on lions, by race, gender, and continent-aggregated nationality.

study, combined with publicly available information, we did not seek ethical clearance for this research.

RESULTS

Our initial search found 1,752 unique entries; after cleaning we had a list of 615 papers of interest. We found that, out of 199 authors with ≥ 3 lion papers, only 10 were Black, 61 were Africans, and 61 were women (Figure 1). Among the Black Africans the nationalities represented were Benin, Cameroon, Kenya, Tanzania, and Zimbabwe; four were women. We found 50 non-Black researchers that were African nationals, but none who were Black with non-African nationality. Most non-Black African researchers were from South Africa, whereas we found no Black researchers from that country.

Diversity was not much different among the sub-set of 51 researchers with ≥ 6 papers (4 were Black and 18 were women). Affiliations in this group showed a slightly more positive pattern than nationality; 21 had an affiliation in Africa, of which 13 in South Africa. Most prominent on this list was the University of Oxford (nine affiliated researchers, including three in the top-six), followed by the universities of Minnesota, Leiden, Port Elisabeth and Pretoria, and the non-governmental organization Panthera (three or four each).

DISCUSSION

Our race, gender, nationality, and affiliation classifications were based on accessible sources; it was impractical to conduct an in-depth analysis of the ancestry of each researcher or to ask for self-classification. Actually, self-classification is not necessarily better since race is a social construct that reflects how one is seen by others (e.g., a self-identified non-Black perceived as Black will be treated as Black). However, with half of the classifications based on direct acquaintance and the other half based on a wealth of public information, we argue that the potential for misclassification was limited. Error in race and gender classifications is typically below 5% for face pictures only (review in Han et al., 2015; probably much lower when full body

pictures and biographies were available), so misclassifications are unlikely to undermine our conclusions.

For listed researchers in Africa, we found no researchers of ostensible mixed race and the dichotomy Black/non-Black was unproblematic for a meaningful analysis of representation in the specific context of research on the African lion. Among listed researchers outside Africa we found researchers of various racial backgrounds but none that were ostensibly Black and therefore the Black/non-Black dichotomy was again unproblematic. In contrast, nationality was more complex and as a result we had to leave a few blanks. A caveat to the interpretation of affiliations is that many African scientists do doctoral study at non-African institutions that are then mentioned as affiliation, when, in fact, the person aspires to work in Africa (this is the case for two of the authors of the present paper; FG and MK). Evidently, it takes time to build a publication track record and the demography of upcoming cohorts of lion researchers may be different. The current student population in our own institutions suggests a possible recent increase in the number of Black Africans becoming lion researchers.

Nevertheless, our results show a distinct problematic pattern. The problem is not in the science, but in the availability of lion experts within range countries to contribute to lion conservation. An example of how bias pervades institutions is a screening of membership of the IUCN-affiliated African Lion Working Group. Members listed on their website (<http://www.africanliongroup.org/> accessed 31/7/2018) include only 12% Black Africans, and there is a male to female 2:1 ratio in a membership of 112. There are political tensions in international meetings when expert groups advising African decision-makers are populated mainly by White men. The implications have been widely discussed (Karlsson et al., 2007; Mammides et al., 2016), we add that this is particularly relevant for lions—a species that is increasingly conservation dependent, leading to increased political interest (Bauer et al., 2018; Hodgetts et al., 2018). The present study is only an assessment of a few dimensions of identity, further study can look at the potential synergy between these dimensions and look at other dimensions like religion, sexual orientation, and socio-economic background.

There is no natural reason why Black or women researchers would be less able to do lion research and publish it. Black, and to a lesser degree women, underrepresentation in the authorship of lion publications could be a sign of discrimination and/or systemic bias. Underrepresentation in the community of conservation practitioners could well play a role (Mbaria and Ogada, 2016). Career choice is influenced by socio-economic conditions; less privileged groups tend to take economic prospects more into consideration (Jayachandran, 2015) and the economic prospects of a career in lion studies are rather limited; self-selection against this career may therefore play a role. For South Africa, the legacy of apartheid could explain bias in older cohorts of researchers. Another plausible explanation could be a possible “macho” culture among lion researchers, or the more positive attitude toward lions among non-Africans compared to communities living closer

to them. Language barriers could be another issue; English has become the most common science language but it is not the first language for most Africans. Also, zoos, and wildlife information centers are rare in Africa, leading to less childhood exposure that could lead to increased interest in wildlife. These speculations, and possibly others remain to be tested.

However, such Individual-meritocratic have a limited explanatory potential; more importantly, there is a systemic problem (Nielsen, 2016). Scientific papers are primarily written by academic staff and graduate students, most of whom work in national higher education institutes that target their own citizens. The lion is a charismatic species, with an umbrella and keystone function, and it is therefore not surprising that many people around the world have been drawn to its study (Macdonald et al., 2015). In contrast, enrolment rates in tertiary education in Africa are the lowest in the world (Mohamedbhai, 2014), and from that smaller pool few academics with an interest in wildlife can afford the high cost of studying lions (i.e., relative to studying more abundant and less dangerous species). Many institutions worldwide have offered the opportunity to non-African scholars to study lions, but too few Africans appear to have had that opportunity.

Various instruments are available for affirmative action. One example is the use of research permits to pair foreign researchers with local counterparts. In Ethiopia for instance foreign individuals willing to study wildlife in Protected Areas are required to fund and involve local counterparts in any given study, and this typically includes formal University tuition and co-authorship of resulting scientific papers. Another example is the inclusion of parameters related to local participation in the evaluation criteria of grant-giving institutions, such as those practiced by the National Geographic Big Cats Initiative and the IUCN Save Our Species fund. Considerable development funding is also available for African science institutions generally, and for capacity building in the field of biodiversity conservation. However, these instruments have been used for many years, and have apparently not yet had the desired result.

We conclude that compliance with permitting and granting requirements are insufficient instruments to regulate equitable access to positions in the lion research community, or to maintain robust and consistent local participation in lion research and we call for additional efforts to involve Black, African, and women researchers in lion studies. Apart from the obvious benefit of brain gain for society in general, more inclusiveness can contribute to conservation effectiveness: having more lion researchers from lion range states would increase the voice and empowerment of important interest groups. In a sector already fraught with moral dilemmas (Duffy, 2016; Mollett and Kepe, 2018; Vucetich et al., 2018), this is an urgent shared responsibility.

AUTHOR CONTRIBUTIONS

HB and FG contributed to every aspect of the study. MK and CS-Z contributed to setting the research questions and

edited the entire manuscript. LS assisted in collecting and organizing bibliometric data. All authors equitably contributed to the creation of this review and approve submission to Frontiers.

REFERENCES

- Bauer, H., Nowell, K., Sillero-Zubiri, C., and Macdonald, D. W. (2018). Lions in the modern arena of CITES. *Conserv. Lett.* 11:e12444. doi: 10.1111/conl.12444
- Brockington, D., and Wilkie, D. (2015). Protected areas and poverty. *Phil. Trans. R. Soc. B* 370:20140271. doi: 10.1098/rstb.2014.0271
- Campos-Arceiz, A., Primack, R. B., Miller-Rushing, A. J., and Maron, M. (2017). Striking underrepresentation of biodiversity-rich regions among editors of conservation journals. *Biol. Conserv.* 220, 330–333. doi: 10.1016/j.biocon.2017.07.028
- Duffy, R. (2016). War, by conservation. *Geoforum* 69, 238–248. doi: 10.1016/j.geoforum.2015.09.014
- Garland, E. (2008). The elephant in the room: confronting the colonial character of wildlife conservation in Africa. *Afr. Stud. Rev.* 51, 51–74. doi: 10.1353/arw.0.0095
- Grogan, K. E. (2018). How the entire scientific community can confront gender bias in the workplace. *Nat. Ecol. Evol.* 3, 3–6. doi: 10.1038/s41559-018-0747-4
- Han, H., Otto, C., Liu, X., and Jain, A. K. (2015). Demographic estimation from face images: human vs. machine performance. *IEEE Trans. Pattern Anal. Mach. Intell.* 37, 148–1161. doi: 10.1109/TPAMI.2014.2362759
- Hodgetts, T., Lewis, M., Bauer, H., Burnham, D., Dickman, A., Macdonald, E., et al. (2018). Improving the role of global conservation treaties in addressing contemporary threats to lions. *Biodiv. Conserv.* 27, 2747–2765. doi: 10.1007/s10531-018-1567-1
- Holman, L., Stuart-Fox, D., and Hauser, C. E. (2018). The gender gap in science: how long until women are equally represented? *PLoS Biol.* 16:e2004956. doi: 10.1371/journal.pbio.2004956
- Jayachandran, S. (2015). The roots of gender inequality in developing countries. *Economics* 7, 63–88. doi: 10.3386/w20380
- Karlsson, S., Srebotnjak, T., and Gonzales, P. (2007). Understanding the North–South knowledge divide and its implications for policy: a quantitative analysis of the generation of scientific knowledge in the environmental sciences. *Environ. Sci. Policy* 10, 668–684. doi: 10.1016/j.envsci.2007.04.001
- Kepe, T. (2009). Shaped by race: why “race” still matters in the challenges facing biodiversity conservation in Africa. *Local Environ.* 14, 871–878. doi: 10.1080/13549830903164185
- Kinzig, A. P., and McShane, T. O. (2015). Conservation in Africa: exploring the impact of social, economic and political drivers on conservation outcomes. *Environ. Res. Lett.* 10:095013. doi: 10.1088/1748-9326/10/9/090201
- Kothari, U. (2006). *Critiquing ‘Race’ and Racism in Development Discourse and Practice*. Thousand Oaks, CA: Sage Publications Sage CA.
- Macdonald, E., Burnham, D., Hinks, A., Dickman, A., Malhi, Y., and Macdonald, D. (2015). Conservation inequality and the charismatic cat: felis felis. *Glob. Ecol. Conserv.* 3, 851–866. doi: 10.1016/j.gecco.2015.04.006
- Mammides, C., Goodale, U. M., Corlett, R. T., Chen, J., Bawa, K., S., Hariya, H., et al. (2016). Increasing geographic diversity in the international conservation literature: a stalled process? *Biol. Conserv.* 198, 78–83. doi: 10.1016/j.biocon.2016.03.030
- Mbaria, J., and Ogada, M. (2016). *The Big Conservation Lie*. Seattle, WA: Lens & Pens Publishing.
- Mohamedbhai, G. (2014). Massification in higher education institutions in Africa: causes, consequences and responses. *Int. J. Afr. High. Educ.* 1, 59–83. doi: 10.6017/ijahe.v1i1.5644
- Mollett, S., and Kepe, T. (2018). *Land Rights, Biodiversity Conservation and Justice: Rethinking Parks and People*. London: Routledge. doi: 10.4324/9781315439488
- Nielsen, M. W. (2016). Gender inequality and research performance: moving beyond individual-meritocratic explanations of academic advancement. *Stud. High. Educ.* 41, 2044–2060. doi: 10.1080/03075079.2015.1007945
- Rust, N. A., Tzanopoulos, J., Humle, T., and MacMillan, D. C. (2016). Why has human–carnivore conflict not been resolved in Namibia? *Soc. Nat. Resour.* 29, 1079–1094. doi: 10.1080/08941920.2016.1150544
- Vucetich, J. A., Burnham, D., Macdonald, E., A., Bruskotter, J. T., Marchini, S., Zimmermann, A., et al. (2018). Just conservation: what is it and should we pursue it? *Biol. Conserv.* 221, 23–33. doi: 10.1016/j.biocon.2018.02.022
- Wang, M. T., and Degol, J. L. (2017). Gender gap in science, technology, engineering, and mathematics (STEM): current knowledge, implications for practice, policy, and future directions. *Educ. Psychol. Rev.* 29, 119–140. doi: 10.1007/s10648-015-9355-x
- West, J. D., Jacquet, J., King, M. M., Correll, S. J., and Bergstrom, C. T. (2013). The role of gender in scholarly authorship. *PLoS ONE* 8:e66212. doi: 10.1371/journal.pone.0066212
- White, S. (2002). Thinking race, thinking development. *Third World Q.* 23, 407–419. doi: 10.1080/01436590220138358

ACKNOWLEDGMENTS

We acknowledge contributions from Luke Hunter and David Macdonald.

Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Copyright © 2019 Bauer, Gebresenbet, Kiki, Simpson and Sillero-Zubiri. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.