

Ecological research should consider Indigenous peoples and stewardship

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Abstract

The relationship between Indigenous peoples and the functioning of terrestrial ecosystems has received increased attention in recent years. As a result, it is becoming more critical for researchers focusing on terrestrial ecosystems to work with Indigenous groups to gain a better understanding of how past and current stewardship of these lands may influence results. As a case study to explore these ideas, we systematically reviewed articles from 2008 to 2018 where research was conducted in North America, South America, and Oceania. Of the 159 articles included, 11 included acknowledgement of Indigenous stewardship, acknowledged the Indigenous Territories or lands, or named the Indigenous group on whose Territory the research was conducted. Within the scope of this case study, our results demonstrate an overall lack of Indigenous acknowledgement or consideration within the scope of our review. Given the recent advancements in our understanding of how Indigenous groups have shaped their lands, we implore researchers to consider collaboration among local Indigenous groups as to better cultivate relationships and foster a greater understanding of their ecosystems.

Key words: historical ecology, land acknowledgement

There is a growing body of literature that acknowledges the relationship Indigenous peoples have had, and continue to have, with the functioning of terrestrial ecosystems. These influences have been documented in forest productivity (Trant et al. 2016; Hoffman et al. 2017), forest composition (Levis et al. 2017; Franco-Moraes et al. 2019), and patterns of plant biodiversity (Heckenberger et al. 2007; Cook-Patton et al. 2014; Fisher et al. 2019). Yet, despite these persistent influences, many researchers conducting ecological field studies do not acknowledge Indigenous Territories or consider the ecological legacies associated with land that was managed or cared for by Indigenous peoples (henceforth stewardship; Power et al. 2018). These ecological field studies often fail to incorporate traditional Indigenous knowledge, which in itself holds a vast wealth of information stemming from deep relationships with place (Kulchyski et al. 1999; Eckert et al. 2018). Consequently, most ecological field studies may not capture the entire narrative of the ecosystems they are studying.

To explore the prevalence of this phenomena, we systematically reviewed papers published between 2008 and 2018 using Web of Science (accessed on 6 April 2018) with the search terms: “ecolog*” and “composition” and “vegetation” and “dynamics” and “diversity”. An asterisk denotes wildcard search terms. We chose to focus our analysis on regions that have undergone colonization of Indigenous lands within the last 500 years, which included North America, South America, and

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Oceania. The exclusion of Europe, Africa, and Asia from consideration does not discount the importance and influence of Indigenous peoples on landscapes in these regions, but instead signifies the difficulty in disentangling the long history of colonial influences in each of these respective regions. From the initial list of 516 papers, we excluded papers that: (i) were outside the regions of interest; (ii) did not have a field component, were meta-analyses or syntheses, or were primarily focussed on aquatic ecosystems or invertebrates; or (iii) were not available in English or we were unable to access. See [Supplementary Material 1](#) for the complete list of papers used.

Of the 159 papers satisfying our stated criteria, only 11 (6.9%) papers addressed the effects of Indigenous stewardship, acknowledged the Indigenous Territory or lands, or named the Indigenous group on whose territory the research was conducted ([Fig. 1](#)). Of these, three of the papers were from Oceania, while the remaining eight were published within North America (one from Canada, four from the United States, two from Mexico, and one from Costa Rica). Of the 40 papers reviewed from South America, none contained information regarding past Indigenous habitation or stewardship.

First and foremost, acknowledgement of Indigenous stewardship and Territories represents the ethical standard that we as researchers should abide by, regardless of the utility provided to the researchers by such acknowledgement ([United Nations General Assembly 2011](#)). The results obtained here demonstrate a lack of acknowledgement of Indigenous territory and inadequate consideration for Indigenous stewardship. In addition to the ethical standards currently not being upheld, failing to acknowledge Indigenous stewardship can confound and influence observed patterns relevant to scientific questions or hypotheses. Furthermore, the acknowledgment of historical and contemporary Indigenous presence not only contributes to explaining ecological processes and patterns, but it also reinforces collaborations between western science and Indigenous knowledge ([Gauvreau and McLaren 2016](#); [Ban et al. 2018](#)). Inclusion and acknowledgement of Indigenous stewardship of Territories, can help advance our understanding of landscapes and the role that people have played, and continue to play, in shaping ecosystems ([Day 1953](#); [Bird and Nimmo 2018](#)).

Within ecological research, the inclusion of an Indigenous presence on the land should take one, or all, of several forms. Past habitation should be included as a variable in models, archeological evidence

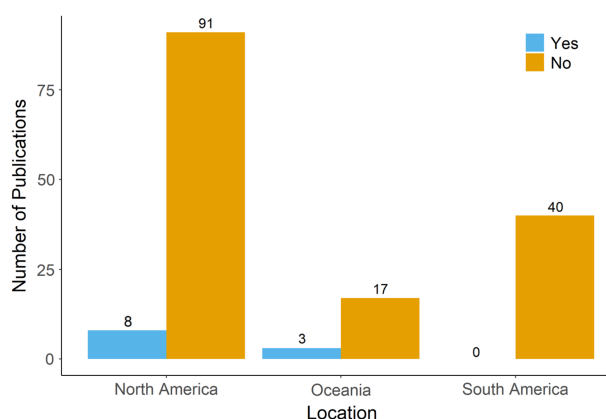


Fig. 1. Bar plot demonstrating the number of peer-reviewed publications that made reference to Indigenous territories or Indigenous peoples based on geographical location. Numbers above bars represent the total number of publications in a given category. Blue bars represent publications that had Indigenous acknowledgement. Orange bars represent publications that had no Indigenous acknowledgement.

should be explored in a new context, and local Indigenous knowledge holders should be engaged, with permission. For researchers conducting fieldwork at sites that may have been managed in the past, this potential ecological modification should, at the very least, be explored in the discussion with proper recognition given to the Indigenous peoples. We stress that ecologists should seek to understand the potential ecological impact that previous and ongoing Indigenous stewardship has on patterns of biodiversity and ecosystem function today. We are at a pivotal time where Indigenous knowledge should be considered as valuable as, and complementary to, scientific ecological research. Cultivating this relationship is in the best interest of both researchers and Indigenous peoples to gain a more fulsome understanding of ecosystems.

Author contributions

KAS and AJT conceived and designed the study. AJT, SAB, AMC, KPM, and SBW performed the experiments/collected the data. AJT, SAB, AMC, MH, KPM, RGW, and SBW drafted or revised the manuscript.

Competing interests

The authors have declared that no competing interests exist.

Data availability statement

All relevant data are within the paper and in the Supplementary Material.

Supplementary material

The following Supplementary Material is available with the article through the journal website at doi:[10.1139/facets-2019-0041](https://doi.org/10.1139/facets-2019-0041).

Supplementary Material 1

References

- Ban NC, Frid A, Reid M, Edgar B, Shaw D, and Siwallace P. 2018. Incorporate Indigenous perspectives for impactful research and effective management. *Nature Ecology & Evolution*, 2(11): 1680–1683. PMID: [30349090](https://pubmed.ncbi.nlm.nih.gov/30349090/) DOI: [10.1038/s41559-018-0706-0](https://doi.org/10.1038/s41559-018-0706-0)
- Bird RB, and Nimmo D. 2018. Restore the lost ecological functions of people. *Nature Ecology & Evolution*, 2: 1050–1052. PMID: [29867099](https://pubmed.ncbi.nlm.nih.gov/29867099/) DOI: [10.1038/s41559-018-0576-5](https://doi.org/10.1038/s41559-018-0576-5)
- Cook-Patton SC, Weller D, Rick TC, and Parker JD. 2014. Ancient experiments: forest biodiversity and soil nutrients enhanced by Native American middens. *Landscape Ecology*, 29(6): 979–987. DOI: [10.1007/s10980-014-0033-z](https://doi.org/10.1007/s10980-014-0033-z)
- Day GM. 1953. The Indian as an ecological factor in the northeastern forest. *Ecology*, 34(2): 329–346. DOI: [10.2307/1930900](https://doi.org/10.2307/1930900)
- Eckert LE, Ban NC, Frid A, and McGreer M. 2018. Diving back in time: extending historical baselines for yelloweye rockfish with Indigenous knowledge. *Aquatic Conservation: Marine and Freshwater Ecosystems*, 28(1): 158–166. DOI: [10.1002/aqc.2834](https://doi.org/10.1002/aqc.2834)
- Fisher JA, Shackelford N, Hocking MD, Trant AJ, and Starzomski BM. 2019. Indigenous peoples' habitation history drives present-day forest biodiversity in British Columbia's coastal temperate rainforest. *People and Nature*, 1(1): 103–114. DOI: [10.1002/pan3.16](https://doi.org/10.1002/pan3.16)

- Franco-Moraes J, Baniwa AFMB, Costa FRC, Lima HP, Clement CR, and Shepard GH Jr. 2019. Historical landscape domestication in ancestral forests with nutrient-poor soils in northwestern Amazonia. *Forest Ecology and Management*, 446: 317–330. DOI: [10.1016/j.foreco.2019.04.020](https://doi.org/10.1016/j.foreco.2019.04.020)
- Gauvreau A, and McLaren D. 2016. Stratigraphy and storytelling. *Hunter Gatherer Research*, 2(3): 303–325. DOI: [10.3828/hgr.2016.22](https://doi.org/10.3828/hgr.2016.22)
- Heckenberger MJ, Russell JC, Toney JR, and Schmidt MJ. 2007. The legacy of cultural landscapes in the Brazilian Amazon: implications for biodiversity. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 362: 197–208. PMID: [17255029](https://pubmed.ncbi.nlm.nih.gov/17255029/) DOI: [10.1098/rstb.2006.1979](https://doi.org/10.1098/rstb.2006.1979)
- Hoffman KM, Lertzman KP, and Starzomski BM. 2017. Ecological legacies of anthropogenic burning in a British Columbia coastal temperate rainforest. *Journal of Biogeography*, 44(12): 2903–2915. DOI: [10.1111/jbi.13096](https://doi.org/10.1111/jbi.13096)
- Kulchyski P, McCaskill D, and Newhouse D (*Editors*). 1999. *In the words of elders: Aboriginal cultures in transition*. University of Toronto Press, Toronto, Ontario.
- Levis C, Costa FRC, Bongers F, Peña-Claros M, Clement CR, Junqueira AB, et al. 2017. Persistent effects of pre-Columbian plant domestication on Amazonian forest composition. *Science*, 355(6328): 925–931. PMID: [28254935](https://pubmed.ncbi.nlm.nih.gov/28254935/) DOI: [10.1126/science.aal0157](https://doi.org/10.1126/science.aal0157)
- Power MJ, Coddling BF, Taylor AH, Swetnam TW, Magargal KE, Bird DW, et al. 2018. Human fire legacies on ecological landscapes. *Frontiers in Earth Science*, 6: 151. DOI: [10.3389/feart.2018.00151](https://doi.org/10.3389/feart.2018.00151)
- Trant AJ, Nijland W, Hoffman KM, Mathews DL, McLaren D, Nelson TA, et al. 2016. Intertidal resource use over millennia enhances forest productivity. *Nature Communications*, 7: 12491. PMID: [27572157](https://pubmed.ncbi.nlm.nih.gov/27572157/) DOI: [10.1038/ncomms12491](https://doi.org/10.1038/ncomms12491)
- United Nations General Assembly. 2011. Article 11. United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP). DOI: [10.7551/mitpress/7532.003.0025](https://doi.org/10.7551/mitpress/7532.003.0025)