

Better Together? The Values, Obstacles, Opportunities, and Prospects for Collaborative Research in Environmental History

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Environmental historians have long argued for the value of collaborative research, many have called for more of it, and some have experimented with new forms of teamwork. Yet data gathered from three prominent journals—*Environmental History*, *Environment and History*, and the *Journal of Historical Geography*—show that, over the fifteen-year period from 2006 through 2020, coauthorship on published research remained remarkably rare, with no discernible trend over time. Why do environmental historians still collaborate so infrequently on published research? What are the causes and consequences of this failure to work together? And how can we help better fulfill long-standing calls in our field for a more collaborative research culture? This essay answers these questions, and it offers practical remedies for fostering a culture of greater collaboration in environmental history.

Environmental historians have long understood the value of collaboration. Working in teams enables scholars to share resources, develop new skills, integrate disparate perspectives, mentor early-career researchers, increase intellectual diversity, reward effort with credit, produce novel insights, and engage diverse audiences beyond the discipline of history. Collaboration is especially important in environmental history because answering complex questions about past environmental conditions, biophysical changes in the environment, and human-environment

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relations requires eclectic theories and methods that no one scholar can ever hope to master.¹

It is not surprising, therefore, that scholars in our field repeatedly have called for more collaboration—both among environmental historians and between environmental historians and researchers from other historical fields and academic disciplines.² Environmental historians are increasingly heeding these calls by experimenting with new forms of collaboration, such as journal forums, interactive multimedia projects, and articles published in interdisciplinary periodicals and book-length anthologies.³ These are encouraging signs. Such efforts are not suitable for every scholar or every research project, but they have great potential to expand the purview and enrich the substance of our field while creating new opportunities for its members and audiences for their work.

Yet, according to data we gathered from three prominent journals that publish environmental history research, over the fifteen-year period from 2006 through 2020, article coauthorship—an imperfect but useful indicator of collaboration—has remained remarkably limited, with no discernible trend upward or downward over time. This is particularly the case for the flagship journal *Environmental History*, where only one in ten feature-length research articles was coauthored.

Traditionally, most historians have worked, or at least published, alone. Most of the best-known scholarship in environmental history, including almost all of our most widely read and highly cited books and articles, has been single authored. We argue, however, that teamwork is increasingly indispensable for pushing the methodological, conceptual, and stylistic boundaries of our field. It is also essential for promoting a greater public understanding of the historical roots and resonances that underpin contemporary environmental crises. Helping diverse audiences understand how the world got to this point—and what these crises mean for species, ecosystems, cultures, and communities—lies at the core of environmental history. Our field could be even more effective in these areas, and have even greater public and scholarly impact, by invigorating its work with new methods, ideas, and forms of storytelling capable of reaching more diverse audiences. One way to accomplish these goals is to foster new collaborations.

To write this essay, we reviewed hundreds of articles published in the journals *Environment and History*, *Environmental History*, and the *Journal of Historical Geography*. We were humbled and inspired by the

remarkable rigor and sophistication of the works we read, but we also noticed a troubling pattern. Today, when you open a journal such as *Environmental History*, you know what you're going to get: articles that are technically superb but eerily familiar. The foundations have been laid, the standards have been set, and the boundaries have been drawn. Our field has become predictable.

We, the three authors of this essay, are all mid-career scholars who have spent most of our professional lives working in teams. We deeply value collaboration, but we also understand the challenges it presents and the obstacles that hinder it. We do not contend that every article or book should be coauthored, and we acknowledge that there is no fixed proportion of publications that would constitute an optimal balance between individual and collaborative work. Given the relatively low level of collaboration in our field today, however, we argue that more teamwork would almost certainly be better.

Much of this essay focuses on collaborations with scientists. Since environmental historians work in a field that deals with biophysical objects and processes—and that sometimes even ascribes agency to these aspects of nonhuman nature—they must often engage with the sciences and scientists that can aid in their understanding of the material world. All three authors of this article have found collaborations with scientists to be productive and intellectually stimulating. Our call for increased collaboration, however, is not limited to working with scientists. As demonstrated by the interdisciplinary works we cite in this essay and the various disciplines identified in figure 1, numerous fields in the humanities, arts, and applied professions—as well as civic, community, and Indigenous groups—also offer untapped opportunities for collaborative environmental history research. In our view, collaboration is not a particular set of disciplinary arrangements but rather a diverse array of communal, interactive research methodologies.

This article begins below by exploring the current state of collaboration in environmental history, including its advantages and challenges, the risks of working in teams, and the structural forces that discourage it. We also describe incipient signs that teamwork in our field is increasing, creating the need for a more vigorous and sustained conversation both about best practices for collaborators and how such work fits into our scholarly cultures and institutions. We then turn to three examples from our own experiences, which show how collaborating has enabled us to address complex historical questions that, without such teamwork,

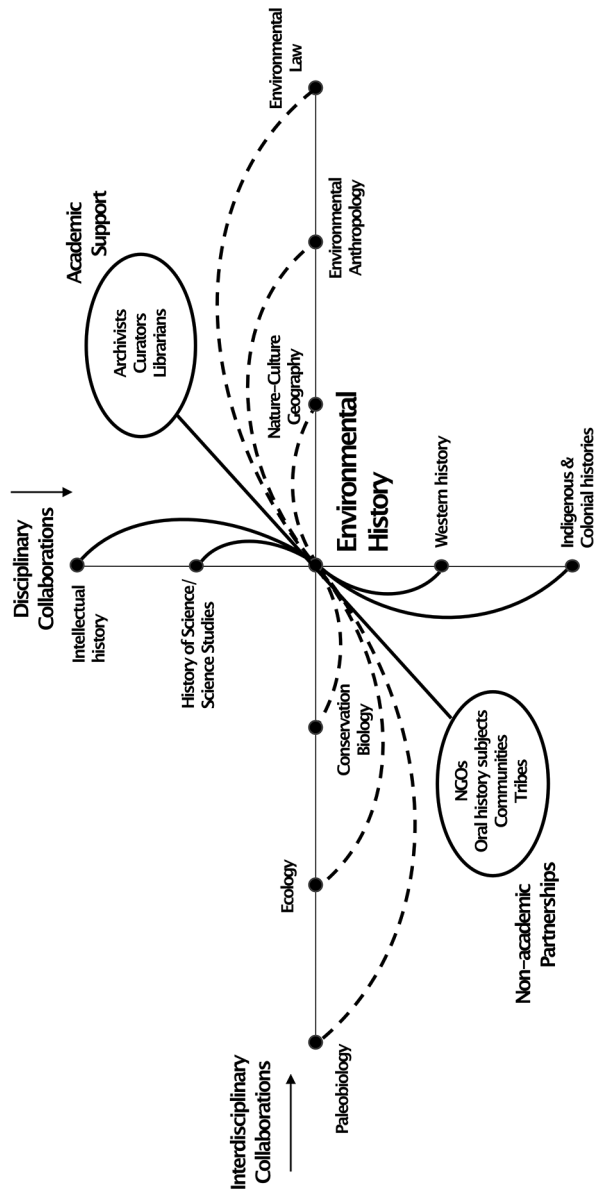


Figure 1. Some possible disciplinary and interdisciplinary collaborations for an environmental historian studying conservation in the US West. Collaboration includes research partnerships between scholars both within and among academic disciplines. Credit: Figure drawn by the authors.

we would have been unable to answer—or even unlikely to ask. We conclude with recommendations intended to promote more, and better, collaboration in our field.

The Status of Collaboration in Environmental History

All environmental historians collaborate. We rely on conversations with mentors, students, and colleagues, as well as crucial assistance from librarians, archivists, research assistants, interview informants, and community members. We also sometimes collaborate with other scholars to produce book-length anthologies, multimedia products, and journal special issues and forums. Based on conversations at conferences and in other venues, interest in collaborative work appears to be increasing as junior scholars in our field seek to answer complex questions requiring diverse perspectives, skills, methods, and presentation formats.

Such collaborations may take many forms. These include writing joint grant proposals, attending workshops, creating research labs or networks, sharing space or equipment, participating in programs or centers, and coauthoring books and articles. Collaboration includes interdisciplinary work with scientists, but it may also involve projects that bring together multiple environmental historians or pair environmental historians with scholars from other fields of history or the humanities that have related interests or complimentary skills (fig. 1).

Collaboration has been the norm in the physical, biological, and biomedical sciences for more than a century. Some fields, such as nuclear and particle physics, now take collaboration to an extreme, producing articles with hundreds of coauthors.⁴ This trend has even spawned a “science of team science,” which seeks to identify the structures and processes that lead to successful research outcomes.⁵ Environmental historians will probably not wish to reproduce the arrangements that characterize big science, but we can learn much from approaches in these fields.

Consider a typical scientific lab. Labs provide formal and informal spaces for scholars at different stages in their careers to interact, research, and write with one another. Labs are often interdisciplinary, or at least multiperspectival spaces, producing manuscripts that are published in varied formats and venues. Such arrangements enable principal investigators to tap more resources, including funding for students. Some students in these groups adopt projects spearheaded and/

or funded by their advisors, but those that don't also benefit from the lab community's support in developing their unique research interests and professional careers. Problems, from gender and racial bias to free-riding and intellectual theft, persist in some labs as they do in academia more broadly. Much remains to be done to overcome these challenges, but in recent years, principal investigators, lab managers, and research administrators have developed policies, protocols, and best practices that aim to make labs safer and more inclusive spaces for the diverse scholars who work in them.⁶

Environmental historians can also learn from the increasing collaborations in social sciences such as anthropology and economics.⁷ The growing prevalence of team-based work in and across these disciplines has opened up new areas of research, led to the development of novel tools and methods, inspired the formation of vibrant intellectual communities along disciplinary boundaries, and prompted discussions in professional societies, funding agencies, and universities about how to support and evaluate jointly produced scholarship. The increasing use of biological methods—from dendrochronology to carbon dating and stable isotope analysis—to help answer questions at the boundaries of history and archaeology exemplifies the kinds of fresh insights that can be gained when scholars from multiple fields join forces.

Recent analyses suggest that collaborative research tends to make a greater impact than single-authored work. According to one study that analyzed citation statistics for thousands of articles, each time a researcher from a new discipline was added as a coauthor, the number of citations an article received grew by 20 percent.⁸ This increased impact is likely due to several factors, including improvements in the content, framing, analysis, presentation, and visibility of coauthored articles. Another recent study showed that coauthoring with established researchers can have long-term benefits for junior scholars.⁹ Research impact also tends to increase when teams are composed of racially and ethnically diverse members.¹⁰

Many environmental historians already have recognized the value of—and unrealized potential for—collaboration in their field. In 2003, for example, Eric Pawson and Stephen Dovers wrote that “With more elaborated engagement, environmental history . . . may not only improve its own explanations, but become the leading laboratory in the interdisciplinary experiment.”¹¹ In a 2011 interview reflecting on his long record of collaborative research, Joel Tarr said that working with

engineers had taught him about complex technologies, opened up new avenues of research, allowed him to reach diverse communities, and enabled him to secure funding.¹² Two years later, Christine Keiner noted that, from the perspective of marine environmental history, “no discipline is an island.”¹³ More recently, John Haldon and his coauthors lamented historians’ poor record of collaboration in studying social responses to environmental changes, noting that historians have “a crucial contribution to make to these interdisciplinary collaborations.”¹⁴

Many environmental historians, especially those based outside the United States and in cognate disciplines such as geography, have worked collaboratively with coauthors and research teams. John McNeill’s work on the Anthropocene offers a well-known example of such influential collaborative research.¹⁵ Scholars such as Libby Robin, Sandra Swart, Emily O’Gorman, Marina Miraglia, Anita Guerrini, Heather Goodall, Joana Gaspar Freitas, and Sverker Sörlin have worked with diverse academic researchers, as well as collaborators and informants from local and Indigenous communities.¹⁶

Some closely related fields and subdisciplines within environmental history have rich histories of collaboration. Climate history has been a site of considerable collaborative scholarship, from Christian Pfister’s research in Europe since the 1970s to Dagomar Degroot’s recent work, published in *Nature* with eighteen coauthors, on social responses to climate change.¹⁷ Fields such as historical ecology and critical physical geography bring together archaeologists, cultural anthropologists, human and physical geographers, historians, ecologists, botanists, geologists, and other scholars to tackle complex research questions.¹⁸ Public historians also collaborate extensively in cross-disciplinary teams.¹⁹

To better understand the state of collaboration in environmental history more broadly, we surveyed three leading journals—*Environmental History*, *Environment and History*, and the *Journal of Historical Geography*—over the fifteen-year period from 2006 through 2020. We identified instances of coauthorship in feature-length research and review articles in each journal. For consistency across publications, we did not include short pieces such as reviews, galleries, or forums. These may be important spaces for collaborative work, but they are still considered niche venues within a single journal and are thus difficult to compare across publications. We did not examine articles coauthored by environmental historians that appeared in journals other than these three. This is an important point because some environmental historians,

finding journals in their home field relatively unreceptive, may have turned to other outlets for their work.

During the period we studied (fig. 2), 29 percent of the articles (148 out of 504) published in the *Journal of Historical Geography*, 23 percent (68 out of 290) of the articles published in *Environment and History*, and just 10 percent (26 out of 263) of the articles published in *Environmental History* were coauthored. The percentage of coauthored articles in these publications varied by year but showed no statistically significant trend, up or down, over time. In interpreting these results, it is important to understand that journal article coauthorship is an imperfect but useful metric by which we can assess collaborative research over time. Tracking coauthorship in core environmental history journals is useful because it provides consistent and well-defined data and because journal publication is an indicator of larger trends in our field. It is imperfect because it does not account for diverse forms of collaboration that do not produce research articles in environmental history journals.

Since focusing on percentages of published articles has limitations, we expanded our research to include a second indicator of coauthorship: prizes awarded by the American Society for Environmental History (ASEH). The George Perkins Marsh Prize, established in 1989, is given

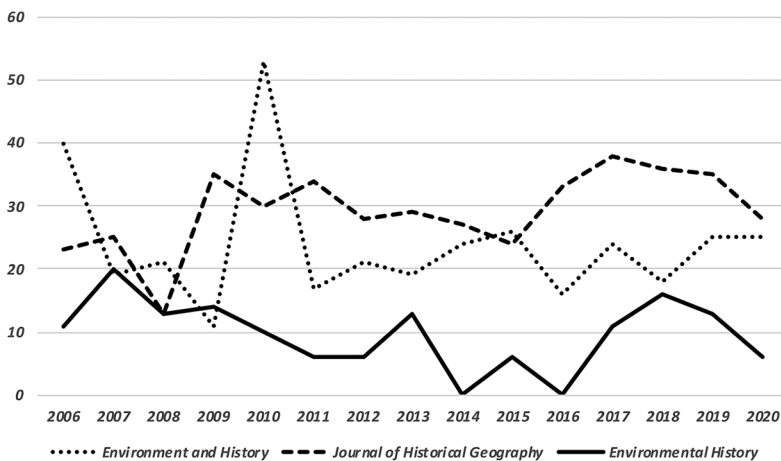


Figure 2. The percentage of coauthored research articles by year in three prominent journals. The proportion of coauthored articles published in these journals has varied from year to year but shows no significant trend during the fifteen-year period from 2006 through 2020. Credit: Chart produced by authors.

to the year's "best book in environmental history." No coauthored volume has ever won this award. The Leopold-Hidy Prize, created in 1993, is given annually for the best article published in *Environmental History*. Since 10 percent of the articles published in the journal are coauthored, and every feature-length article published in the journal is eligible, one would assume that roughly 10 percent of Leopold-Hidy prizes should have gone to coauthored pieces. Yet of the twenty-seven prizes awarded, only one (4 percent) has been given to a coauthored article.²⁰ The Joel A. Tarr Envirotech Prize, established in 2004, is given to the best article or book chapter on the historical relationships between technology and the environment. This prize has never been awarded to a coauthored article, an outcome that contrasts with Tarr's personal record of pioneering collaborative work.²¹ There is little reason to believe that coauthored articles in our field are, on average, of lower quality than single-authored articles, yet our results suggest that awards committees recognize them less frequently.²²

The Barriers to Collaboration in Environmental History

Given all of the compelling reasons to collaborate, why do environmental historians still do it so infrequently? The first set of reasons falls under the category of "disciplinary culture." Students in history departments are not generally encouraged, trained, rewarded for, or provided with opportunities to engage in collaborative work, and most of these students see few examples of their mentors doing so. What they do typically absorb is the myth of the lone scholar: a reclusive genius who travels to exotic locales and disappears into dusty archives, emerging years later with some novel and brilliant insight shared in a beautifully crafted, single-authored book. Of course, very little about the last sentence describes the messy reality of how most historians produce their scholarship. Yet the myth endures, reproducing the very sort of heroic narratives that so many of us disavow in our actual research, while discouraging young scholars who feel that they don't fit into this mold.

Publishing traditions and trends also have tended to hinder collaboration. Books, which are even more likely than journal articles to have a single author, play a central role in environmental history. In recent years, some presses have moved further away from coauthored or collected volumes. This is in part a response to market forces, including

the decades-long decline in library book acquisitions, which have caused some publishers to seek manuscripts from more media-friendly authors who can reach larger potential audiences. With book publishing tilted so heavily toward sole authorship, journals have a crucial role to play in promoting collaborative work. Yet journals in history and the humanities often impede, rather than encourage, collaboration. They do so in part by prolonging the process. Whereas time from submission to publication in scientific journals usually spans from weeks to months, time to publication in history and humanities journals often extends from months to years. Delays in the publication process can give the impression that research does not address pressing or timely concerns, and it can harm or dissuade junior scholars who must rack up accomplishments on a predetermined time line. Few of the scientific collaborators we have worked with over the years think that publishing in a journal with a yearlong turnaround time is worth the wait.

The bias toward single-authored work in environmental history also stems from deeply held beliefs about the relationship between style and substance. One of the few things on which almost all environmental historians agree is the importance of narrative to our work. Narratives have settings, characters, tensions, plots, and resolutions. Many historians and their editors thus believe that a good story must have a good storyteller: a single person whose “voice and vision,” in the words of Stephen Pyne, give a tale its distinctive texture, cadence, and mood.²³ After all, most works of narrative fiction and fine art have single creators. Yet we believe that collaborative writing can—with creativity, dedication, and hard work—achieve the high stylistic standards of our field. Only accepting manuscripts that “look like history” for publication in history journals places artificial limits on creativity, discouraging scholars from using innovative methods and forms of presentation. We would never want to sacrifice good writing for good teamwork, but we also believe that our field need not sacrifice creativity to maintain a narrow vision of acceptable style.

Funding structures are diverse and vary from country to country, but overall they have contributed to a culture of sole authorship in environmental history by providing meager support for collaborative work. In the sciences, writing grants, conducting lab and field work, operating instruments, and performing sophisticated analyses often requires teamwork. Grants for work in these fields often supports whole teams or even collaborative networks. The common belief that historical

research is an inexpensive solo endeavor, however, contributes to a culture that underfunds historians and the humanities more broadly. Agencies and foundations—such as the National Endowment for the Humanities and American Council of Learned Societies—offer grants that cover a portion of a single applicant's salary, with little or no support for collaboration. The National Science Foundation (NSF) provides bigger grants but funds relatively few environmental history projects.

Institutional barriers also exist within colleges and universities. History departments, and the humanities divisions within which many of them sit, often lack clear and appropriate policies for how to evaluate coauthored scholarship. Some faculty and administrators, failing to recognize the benefits of collaboration and the hard work it requires, may discount coauthored research as less important or requiring less effort than comparable single-authored publications. If a faculty member contributes an equal amount of work to a coauthored article as a single-authored article (which is often the case), but receives only half the credit for doing so, then their institution has created a powerful disincentive for collaboration. The traditional requirement to publish a single-authored book in order to qualify for tenure also presents an obstacle. Even when official tenure and promotion policies in history departments permit articles, instead of a book, to serve as the basis for review, there is often pressure to produce single-authored books for career promotions, leaving little time for other projects during the most productive stages of many academic careers.

Collaborating is hard work that comes with nontrivial risks. Many collaborative projects falter. Conflicts among authors sometimes develop, and finding venues to publish interdisciplinary or otherwise unconventional work can be challenging. One recent study found that scholars who conduct interdisciplinary work tend to have a greater overall impact but publish fewer total pages. The authors concluded that interdisciplinary research is “a high-risk, high-reward endeavor”—one not for the faint of heart or the institutionally vulnerable.²⁴ This and other similar studies suggest that collaborative publishing may be better reserved for established scholars—a statement that erects even further barriers for junior scholars hoping to conduct cutting-edge collaborative and interdisciplinary research.

Historians' training as solo practitioners has done little to help most of us prepare for the challenges teamwork presents. Even researchers

in disciplines accustomed to collaboration face problems and obstacles. Abuses persist, of course, but many team-related problems stem from miscommunication.²⁵ The authors of the recent article “Ten Simple Rules to Ruin a Collaborative Environment,” for example, open with some reflections on their collaborative experiences: “having worked on dysfunctional teams from time to time, we found writing this set of rules to be both cathartic and vastly cheaper than therapy.”²⁶ Researchers with experience have a lot to say about group dynamics, the importance of shared research in the field, setting realistic goals, and assembling a cohesive and productive team. Environmental historians need not reinvent the collaborative wheel.

Finally, although collaboration offers the potential for recognizing research contributions more broadly through coauthorship, assigning credit can be a fraught endeavor. A white paper on coauthorship in the humanities and social sciences by Taylor and Francis, for example, noted that “When asked about the most commonly occurring problems associated with coauthorship, the highest scoring responses related to the order in which author names should be listed and determining who should receive an authorship credit.”²⁷ Politics, institutional hierarchies, and other forms of inequality may influence author order, down-listing those with less power or prestige and discouraging disadvantaged or otherwise vulnerable scholars.²⁸

The factors described above—intellectual culture, the publishing industry, funding structures, institutional mandates, and academic politics—function not only as abstract, conceptual barriers to teamwork but also as tangible filters that screen out scholars who might otherwise engage in collaborative work. Considered together, they show why, although so many environmental historians think their field would benefit from more collaborative publishing, so few of us actually do it.

Case Studies of Collaboration—Our Personal Perspectives

One problem with reading published research articles to learn about collaborative research is that readers usually only see the finished product, not the process. Reflecting critically on our own experiences of working as part of collaborative teams offers an opportunity to consider how collaborative efforts work, and sometimes don’t work, as well as the benefits and drawbacks of engaging in such efforts. Here

we provide three examples of collaboration from our own experiences. While it is impossible for these to be more than “edited highlights,” we hope that they can provide some insights into the motivations, challenges, and rewards of collaboration in environmental history. Our examples describe collaborations in which historians worked with other historians, or where historians worked with natural scientists, but the insights and lessons should extend to collaborative projects with researchers from any discipline or entity.

CASE STUDY 1. THE TEST OF TIME: HOW
HISTORICAL METHODS CAN CHANGE THE WAY
WE THINK ABOUT SCIENTIFIC MODELS

One of the most important ways that environmental scientists conduct their work is by building models that describe processes in the systems they study. Conceptual models identify the key variables in a system and map the relationships among them. Numerical models take this a step further, attaching equations to these relationships and then quantifying the model’s variables using data collected in the lab or field. Yet many numerical models suffer from a common problem: their data are based on short-term observational or experimental studies, which are useful for isolating proximate causes and effects in a system, but say little about the system’s driving forces or the larger-scale and longer-term changes that shape it over time.

For this project, I (Alagona) teamed up with two early career scholars, Timothy Paulson and Kevin Brown. We were a team of three historians, not multidisciplinary collaborators, but we brought diverse skills, backgrounds, and training to our work. I posed our initial questions, secured funding, provided mentorship on research design and publishing, and conducted extensive editing of our manuscript while Tim and Kevin performed most of the archival research, data gathering, and spatial analyses.

I had approached my two collaborators because I was curious about whether models from the ecological literature reflected landscape changes documented in historical records, but I lacked the skills and resources to conduct a study to answer this question. Tim brought a deep knowledge of the cattle industry and of using archives to study patterns in livestock production and ranch land use over time. Kevin had

extensive experience in institutional records, and he wanted to develop technical skills working with remote sensing imagery and geographical information systems.

We decided to focus on California's hardwood rangelands: a subtropical, seasonally arid landscape of grasslands, chaparral, and oak woodlands that covers around four million hectares of mostly valley and foothill terrain. We chose three study sites owned by the University of California and aligned on a south-north climatic gradient: the 2,388-hectare Sedgwick Ranch Reserve in Southern California, the 960-hectare Hastings Natural History Reservation in central California, and the 2,168-hectare Hopland Research and Extension Center in Northern California, 56 percent of which burned, during the course of our project, in the Mendocino Complex Fire of 2018.

After an extensive review of the literature, we identified three models that scientists had used to describe vegetation changes in this system. The famous "succession and climax" model describes vegetation communities as coherent entities that, if disturbed, are predisposed to return to a climax configuration determined by their climates, soil types, and other physical variables. The increasingly popular "state and transition" model assumes that systems will remain stable for extended periods, but a rare disturbance of sufficient magnitude or intensity can push them beyond a transition, or tipping point, into an entirely new state. The lesser-known "cyclical replacement" model describes how interactions among plants—such as overstory shading, leaf litter deposition, and the release of allelopathic compounds that deter competing species—shape the statistical likelihood that a particular location will shift to a new vegetation type during a given period.

These three models offered qualitative predictions about change over time, which we considered hypotheses that could be tested using historical methods. We spent more than eighteen months collecting diverse sources—including land survey maps, ranch records, air photos, and satellite images—and then converting and arranging these sources into usable formats. To track changes in land cover, Kevin spent dozens of hours collecting air photos, stitching them together using GIS software, and then cataloging the vegetation shown in them during different time periods at thousands of randomly generated points. Tim conducted exhaustive archival research and then administered a survey to understand what ranchers, researchers, and reserve managers believed about

the histories of these sites and where they got their information. For our analysis, we identified seven indicators—vegetation cover, fire, livestock numbers, wild ungulate populations, carnivore populations, precipitation, and soil erosion—and then scoured our data searching for patterns of change.

Environmental historians may not be surprised to learn that the historical record contained some evidence supporting the predictions of each model, but none of the three models was sufficient to explain all of the patterns we identified. In a more practical sense, our collaborative analysis showed that historical research can help clarify the spatial scales at which some ecological models outperform others. The succession and climax model offered a weak description of hardwood rangeland change at all spatial scales; the state and transition model performed best at the small scale of the plot or pasture (0.1–100 ha) and large scale of the bioregion (4 million ha); the cyclical replacement model performed well at the intermediate scale of the landscape or typical cattle ranch (100–10,000 ha). None of these models tell us much about patterns of change prior to the late eighteenth century, because the European colonization of California itself prompted a wave of unprecedented transitions leading to novel states, and little high-resolution data exists from before this crucial period.

This collaborative, mixed-methods project required thousands of hours of work and took almost four years to produce a single journal article.²⁹ It was a side project for all three of the participants—two of whom were working on books and one on a dissertation—which meant that it drew us away from other pressing tasks. Bringing it to completion, however, provided substantial professional benefits for the two early-career researchers. It also enabled us to build on our complementary skills and chart a potentially fruitful new path for environmental history research. Instead of merely borrowing results from scientists, providing data for their analyses, critiquing their assumptions, or putting ourselves in the position of having to explain to them the value of our work, we flipped the script, subjecting scientific models to rigorous historical scrutiny. We learned that models can vastly improve our understanding of ecological change, but they do so best when applied at certain spatial and temporal scales that become apparent with historical context.

CASE STUDY 2. WALKING THE WALK: HOW
INTERDISCIPLINARY RESEARCH ILLUMINATED
PATTERNS OF KNOWLEDGE PRODUCTION IN
ANTARCTICA'S MCMURDO DRY VALLEYS

For the past decade, I (Howkins) have been involved as a coprincipal investigator in the McMurdo Dry Valleys Long Term Ecological Research (LTER) site in Antarctica. Funded by the National Science Foundation (NSF), this project aims to understand long-term ecological change in the largest predominantly ice-free region of Antarctica. My efforts seek both to contribute data from historical research into the efforts to understand ecological change and to ask wider questions about the interaction of science, politics, and the environment in the history of this fascinating landscape. Over time it has become clear that goals are separate but closely linked: the wider historical questions inform the science at the same time as the science informs the historical research. The work is fundamentally collaborative and has involved a number of interdisciplinary efforts.³⁰

Much of our recent work in the McMurdo Dry Valleys has focused on anthropogenic environmental impact. To understand how human activities have impacted the environment of this region, it is necessary to understand the history of those activities alongside an investigation of the biophysical consequences. How many people were present? Where were they? How long were they there? What were they doing? Only by addressing these historical questions is it possible to understand how human disturbances have impacted the environment of the McMurdo Dry Valleys. This knowledge, in turn, can help environmental managers to put protocols in place to minimize future impacts.

Human activity in the McMurdo Dry Valleys has been concentrated on the sixteen field camps (nine of which are still in operation) that have served as logistical hubs for scientific research in the region. In addition to serving as manifestations of the politics, culture, and society of this remote but highly international region, these field camps offer useful locations for studying the environmental legacies of human disturbances.³¹ Unsurprisingly, field camps have also been the sites for some of our most productive conversations about interdisciplinary research, as we waited for a helicopter or sat down to eat and drink together after a long day of fieldwork.

One example of our work on human impacts relates to the way field camps have shaped patterns of scientific knowledge creation. In examining the history of Vanda Station, New Zealand's main field camp in the region, we observed anecdotally that in the early years of the station, from the late 1960s into the 1970s, New Zealand scientists seemed to roam widely around the McMurdo Dry Valleys, surveying the landscapes and looking for interesting features to study. Into the 1980s, however, research seemed to get closer to the station, as particular study sites were revisited year after year to look for change over time, and as more advanced (and often heavier) equipment was used in the research. We speculated that the location of field camps such as Vanda Station would have important impacts on scientific research questions and the trajectory of field-based research over time, as well as having implications for environmental impact and management.

As part of an interdisciplinary research team, we realized that by working collaboratively, we collectively had the skills to move beyond anecdotal observation and could try to measure whether research sites really were getting closer to field camps over time. Jokingly referring to this as the "Lazy Kiwi Hypothesis," we set out using bibliometrics, geographic information systems (GIS), and statistical analyses to examine the geographical relationship between the locations of study sites and field camps across the McMurdo Dry Valleys. We used bibliographic data created by historical research and targeted database searches to put together a list of as many of the scientific publications on the region as we could find. We then assigned each paper a study site or sites based on a brief reading. This enabled us to map the location of each study site in a GIS of the McMurdo Dry Valleys and calculate the distance from each study site to the nearest field camp. Historical knowledge that scientists have rarely traveled beyond twenty kilometers to visit research sites helped to define an important subjective parameter for the study. The results, in short, confirmed our original hypothesis: research sites in the McMurdo Dry Valleys have indeed gotten closer to field camps over time, although this applies to both New Zealand and American scientists. The study was published in the open-access scientific journal *PLOS ONE*, and the results have the potential to inform environmental management.³² When planning a new field camp, for example, it is useful to know that the human impacts will likely become increasingly concentrated over time, and

particularly sensitive areas should probably therefore be avoided when choosing a location.

The published results and management implications, however, only tell part of the story of the interdisciplinary collaboration that led to this study. Excited by the possibilities of doing things differently and working together in creative ways, we were deliberately looking for new approaches to studying the history of the McMurdo Dry Valleys. We had created the bibliographic database of scientific publications as part of an earlier project using social network analysis to understand changing patterns of scientific collaboration in the McMurdo Dry Valleys.³³ It was only when we had gathered all the publications together that we realized that these data also gave us the opportunity to examine the geographic and temporal trends of study sites. My background as an environmental historian meant that I was asking questions about change over time and environmental impact that the other team members may not have thought about. The process of assigning geographic locations to study sites was laborious and only really possible because we had money for the project and because one of our coauthors had time between her master's degree and PhD research. Most of the paper was written during the COVID-19 pandemic, which meant we did most of the collaborative work over Zoom. As the writing developed, we realized that the statistical analysis was not quite as simple as we had initially thought (or at least as I had initially thought as a historian), which led to the more complex mathematical analyses described in the paper.

One important observation from taking part in this interdisciplinary study is the need for trust in interdisciplinary teams. The GIS work and the statistical analysis rapidly went beyond my areas of expertise as an environmental historian, and we relied on frequent conversations to explain our work to each other. Asking questions like "I don't understand how this works; can you explain it again?" really helped to ensure we were all on the same page in a project with a lot of data and moving parts. The fact that we all had experience of conducting fieldwork in the McMurdo Dry Valleys helped us in collaboratively designing the project and in interpreting the results. Both the geographer and environmental modeler on the paper are graduate students, and the fact that they know a lot more about some of the methods than I do changed the dynamics of the traditional teacher-student relationship: I learned at least as much from them as they did from me. Without over-idealizing the process, the sense of shared endeavor around a

common goal created a genuine sense of teamwork. The publication of the paper felt like a real achievement, as much for being the culmination of a successful interdisciplinary collaboration as for the actual results we obtained.

CASE STUDY 3. CRITIQUE THROUGH COLLABORATION

Environmental historians obviously rely on the natural sciences for our work. But historians tend to prove more critical of the contexts, trajectories, and uses of scientific research than natural scientists. For example, historians of science and health have exposed how cartography, medical sciences, biology, and the earth sciences have at times been tools of geopolitics and imperialism.³⁴ Others have shown how environmental determinism can still linger in climate models and environmental narratives.³⁵ In other cases, environmental historians have complained that the media and policy makers neglect historical insights. In short, environmental historians both utilize and critique the natural sciences. Rather than pointing fingers from the sidelines, however, we can instead work directly with researchers in other disciplines, including the natural sciences. We can engage with them and their work rather than just reading and incorporating it into our studies. By collaborating with them, we can offer new perspectives at the outset of research. We can reach new audiences beyond our field. We can pursue different avenues to place historical scholarship into public discussions. And we can work to rewrite the models and story lines about environmental change. Our critiques, in other words, can come through collaborations.

These were some of my (Carey's) goals when collaborating with a large team of natural and social scientists working on the impacts of glacier retreat in the Peruvian Andes. I wanted to work with the modelers themselves to help rethink public discussions about glacier retreat. I balked at both the simplistic story line about glaciers (e.g., ice loss will trigger water shortages, as if all people share equal access to water and natural resources) and the way hydrologic models failed to account for societal variables in the distribution of water over time (wars, authoritarian governments, etc.). Water scarcity is, after all, produced by people, just like the so-called natural disasters that are actually social disasters. At the same time, the glacier scientists and modelers also complained that popular climate narratives failed to explain

the multiple factors influencing water as it flowed down-valley from the ice to the ocean. No one researcher could analyze all these intertwined variables of both water availability and water allocation alone. So we collaborated and proposed “hydrosocial modeling” as a more integrative way forward.³⁶

Our team came together over a half decade, well before we ever applied for the National Science Foundation (NSF) grant that facilitated joint fieldwork and inspired our coauthored publications. I had been reading their publications since graduate school, and I often presented my work at scientific conferences and glacier-focused workshops, where we learned about each other’s insights. We also sought each other out when we were in the Andes doing our research. We talked over ceviche and pisco sours, becoming friends as well as colleagues. Ultimately, I joined a research team with glaciologists, climatologists, hydrologic modelers, biogeographers, botanists, and political ecologists to help study the effects of glacier retreat. The rest of the team had extensive collaboration experience, so at first I learned from them about how to collaborate. I also saw it as an opportunity to put my money where my mouth was: if I was going to critique the scientific narratives and climate-related models, then I ought to work directly with these colleagues to produce something better—to offer a solution instead of just criticism. My interactions thus required more diplomacy, collaboration, and even compromise than a straight historical critique in the pages of a humanities journal might have offered. We all questioned and listened to each other, trying to meet rather than critique. To this day, my glaciologist colleague says he hears my voice when he’s doing his research, just as I hear his in my own work—and I hear it very differently and more deeply than I would have if I had simply read his publications or listened to a lecture.

Collaboration across a half dozen disparate disciplines is not straightforward, but we tried several strategies to smooth the process. It started with an NSF grant proposal to the Coupled Natural and Human Systems program, which was challenging to boil down everything from so many disciplines and subprojects into one fifteen-page proposal. We also committed to doing shared fieldwork together in Peru, thanks to the NSF funding we received. Each summer for three years, all of us met in Peru, and we committed to actually participating in each other’s research. One day we were on the glacier measuring ablation, the next day doing inventories of riparian plants, the next collecting water samples in downstream rivers, and the next reading fifty-year-old newspapers in

the Peruvian National Library. The four of us leading the project each went to Peru with at least one undergraduate student and one graduate student. We rented a small bus so we could get around together. All the students did everyone else's research, everyone mentored each other's students—not only in Peru but also after we returned home, where we served as external committee members on PhD committees for those students with whom we had measured water together in Peru. Every year we all attended the same conference together, usually in Peru or at the American Geophysical Union or the American Association of Geographers. We also found journals that were open to multiauthored collaborative articles, and we committed to the difficult work of coauthoring interdisciplinary articles together.

In one of our articles, published in the *Journal of Hydrology*, we proposed a new “hydrosocial model.” We analyzed seventy years of glacier change and downstream water flow, ultimately revealing that hydrology was influenced not only by biophysical factors such as El Niño Southern Oscillation (ENSO), climate change, ice loss, and riparian ecology but also by major human historical variables such as laws, water rights, government agencies, technologies like irrigation canals, export crop choice (there was an asparagus explosion), mining leases, and social protests. Without the human story, the models had misrepresented the hydrology—and what influences water as it flows through a watershed. The simplistic story line that ice loss yields water insecurity fell apart once we started to see a new set of variables affecting both water availability and water allocation. But without the hydrology and climatology, I could not understand the nuance of hydrologic changes, the temporalities of water flows, and the multiple biophysical forces affecting glacier meltwater. I could not have grasped those dynamics solely by reading and summarizing scientific papers.

Collaboration was essential for rethinking climate models and challenging deterministic narratives of ice loss. None of us could have offered such comprehensive and complex interventions alone. Teamwork helped us answer “wicked” research questions. It also enhanced training for our students, improved access to NSF grants, allowed me to publish in new venues like the *Journal of Hydrology*, and even facilitated my inclusion as a contributing author for Intergovernmental Panel on Climate Change (IPCC) assessment reports. The collaboration also inspired me to create the Glacier Lab for the Study of Ice and Society, through which I have hired about thirty undergraduate research assistants and three

postdocs while working with a dozen graduate students. Yet I also learned that I cannot just wait for others to invite my input on projects or respond to my critiques published in books and humanities journals. I need to build relationships over time. The onus is also on us historians to engage with multidisciplinary teams. As my research team concluded in our article: “While it is critical for hydrologists to understand the importance of integrating the social sciences and human variables into hydrological models, the burden of collaboration and cross-disciplinary interaction does not of course rest solely on water scientists and engineers. In fact, social scientists have often failed to reach out and pursue collaborative relationships, instead offering critiques of science, technology, and engineering or modeling without proposing solutions.”³⁷ When environmental historians collaborate with other researchers—whether they are other historians, human geographers, or hydrologists—they have the potential to ask different research questions, to learn more deeply about human and nonhuman environments, to understand better environmental change, to engage the public, and to shift environmental narratives based on new findings.

Fostering Greater Collaboration in Environmental History

While writing this essay, we queried four journal editors about our ideas. All four responded by pointing to previous calls for, and examples of, collaborative or interdisciplinary work published in the pages of their journals. They implied that this topic had been discussed and, at least in part, resolved. Our data and observations suggest otherwise. In this final section, we offer five sets of practical recommendations for increasing the quantity and quality of collaborative research in environmental history (see table 1). These recommendations are not comprehensive, but they are intended to start a broader conversation.

Our first set of recommendations pertains to professional societies and institutions. To help tackle institutional and cultural barriers to collaboration, we ask that the American Society for Environmental History (ASEH), the European Society for Environmental History (ESEH), and the International Consortium for Environmental History Organizations (ICEHO) adopt a joint resolution endorsing collaborative research and encouraging relevant institutions to support and reward such work. This resolution should encourage joint publishing and provide guidance for institutions to give appropriate credit for collaborative publications

Table 1: Examples of Recommended Actions to Enhance Collaboration in Environmental History, Noting Some Benefits for the Field and Its Practitioners

<i>Recommended Actions</i>	<i>Benefits</i>
Journals	
Publish more coauthored articles	Rewards effort with authorship credit; supports different methods, talents of historians
Showcase nontraditional methods and styles	More appreciation for other disciplines, subfields; tackles big questions beyond one person's expertise
Shorten review and publication time lines	Invites nonhistorians into environmental history
Professional societies	
Adopt resolution endorsing collaborative research	Supports diverse methods
Give prizes, awards for coauthored work	Fosters intellectual diversity, research innovation
Institutions	
Support collaborative work in faculty hiring, reviews, tenure, and promotion cases	Diversified profession and scholarship
Reject notion that having more authors means less work for each author	Recognizes, rewards effort with authorship credit; acknowledges challenges of interdisciplinary work
Support diverse publication pathways in careers	Accommodates real life and diverse personal trajectories; fosters equity, inclusive of diverse contexts
Research teams	
Give credit for contributions through coauthorship	Contributes to equity and inclusion
Develop codes of interaction for collaborators	Builds trust, transparency, inclusivity
Communicate openly to build trust and be inclusive	Helps avoid bias by gender, race, career stage, etc.
Training and mentoring	
Train/mentor students by coauthoring with them	Supports early career researchers; provides hands-on, real-world training
Seek funding for teams, not just individuals	Opens access to new funding (e.g., NSF, NIH, NASA, etc.)

Source: Table by authors.

when hiring new faculty, conducting personnel reviews, and evaluating tenure and other promotion cases. Once completed, we recommend that the ASEH, ESEH, and ICEHO submit their joint resolution to the American Historical Association (AHA) as a model for a broader guidance statement on collaborative scholarship aimed at the entire discipline of history. Similar past AHA statements have covered topics such as peer review for historical research (2005), IRBs and oral history research (2008, 2015), productivity (2012), professional evaluation of digital scholarship by historians (2015), and tenure, promotion, and the publicly engaged academic historian (updated 2017).³⁸

Our second set of recommendations applies to journals (table 1). We recommend that the editorial boards of *Environmental History*, *Journal of Historical Geography*, and *Environment and History* help stimulate collaboration and coauthorship in our field by publishing more articles that tackle important historical questions in collaborative ways using nontraditional historical methods, presentation formats, and/or narrative approaches. We also recommend that these journals redouble their efforts to shorten their review and publication processes whenever possible so as to encourage collaborative teams, including authors from outside history, to submit their manuscripts. We recognize that this would require readers to review manuscripts more quickly, which in turn raises important questions about maintaining the quality of reviews. If established journals are unable to accommodate such work, then it may be time for the ASEH to consider establishing a new periodical, perhaps in a digital-only or digital-first format, which would have the capacity to publish creative scholarship addressing historical questions using nontraditional formats. ASEH awards committees should seriously consider such work.

Our third set of recommendations pertains to research teams. To manage the challenges of collaborative research, we encourage scholars to develop codes of conduct and follow best practices, such as those published in the *Proceedings of the National Academy of Sciences* in 2018.³⁹ Any such code or list of best practices should include mutually agreed-upon language related to inclusion, respect, shared vision, delegation of responsibilities, transparent leadership, deadlines, mentoring opportunities for early-career team members, credit for final products, and protocols for handling disagreements among team members.⁴⁰ Trust and communication are key. Regular group check-ins can facilitate successful coauthorship and long-term partnerships. Every publication

should have a team leader or manager, who will usually serve as the lead author, and may perform logistical tasks including communicating with editors. The team leader may help mediate when differences of opinion emerge and serve as the final editor of a submitted or revised manuscript, ensuring that the concerns of all coauthors have been addressed.

Our fourth set of recommendations relates to publishing and author teams themselves, particularly pertaining to author inclusion and order. It is crucial to have open conversations about authorship and make shared, transparent group decisions about author order. To avoid conflicts, expectations for authorship, and the criteria for determining author inclusion and order, should be discussed early and often. These conversations are particularly important given the different cultures of author order across disciplines, which range from alphabetical lists in economics, to having the lead author or principal investigator listed last in biological sciences, to listing authors by their proportional workload in the geosciences. Historians working in teams will likely follow a variety of author order protocols and cultures. A good starting point is that each listed author must have made a meaningful contribution to the manuscript—in research, analysis, coordination, or writing—the lead author should usually be listed first, and the coauthors should follow in alphabetical order if they cannot be listed in order of their relative workload contributions.

A fifth set of suggestions focuses on faculty who mentor and train students. Coauthorship within the lab or research group advances students' professional development, while introducing them to the complexities and challenges of publishing. Like scientists, historians can foster research groups that offer opportunities for research, mentoring, and collaborative publishing. Hiring graduate students and undergraduates as research assistants is an excellent way to initiate the collaboration while also supporting students financially. Where financial support is unavailable, other forms of compensation, such as awarding credit through independent study units, may be appropriate. Coauthorship on an article shifts the dynamic away from the one-directional delivery of information from teacher to student to a shared outcome and collaboration, thereby building trust and learning more about one another's skills and interests. Pursuing these collaborations to coauthor with students has resulted in some of the proudest and most rewarding moments in our careers.

Conclusion

Writing this collaborative article on collaboration was not easy. It began as a session at the 2018 ASEH conference in Riverside, California. Several months of conversations and queries to editors followed. We agreed on our core message, but we debated about the supporting arguments and the best venue in which to submit it. Through multiple drafts, we gently edited one another's prose and discussed how best to engage our colleagues with constructive criticism. We also faced more mundane challenges, juggling other research projects, teaching commitments, administrative duties, the pandemic, and home lives—not to mention other collaborations. Yet all three of us have come away from this process more convinced than ever that the field of environmental history would benefit from more and better collaboration.

Our field and its journals are ready for new directions. For more than two generations, environmental history has been one of the leading spaces for innovation within the larger field of history. Collaboration, both more and better, offers yet another way to enhance environmental history while connecting it to other fields, disciplines, and communities. John McNeill recently captured this sentiment when writing about a coming methodological revolution in our discipline. "I would predict that more and more of what we know about the human past will come from other disciplines than history," McNeill said. "To the extent that environmental historians equip themselves to collaborate . . . they will be able to do things that my generation has been unable to do, and I think some of that is going to happen, and not just in environmental history, but in history in general. To me that's the most interesting and exciting prospect for the future of environmental history."⁴¹ Our analysis here suggests that environmental history is well positioned for such a revolution, but at least for now, we are moving slowly and uphill.

A good way for an individual historian to start on this path is by beginning small and going slowly. Build relationships with researchers outside your discipline. Join a team that has seasoned leaders and collaborators. Pick your most promising students, give them clear guidance, have high expectations but offer them opportunities to learn by making mistakes. Coauthor something short with a student, or assign them a clearly demarcated section of an article to write as a first step. Go to conferences that few other historians attend but where researchers

are discussing topics of interest to you from other disciplinary perspectives. Knock on doors, and share ideas over food and drinks. Inquire about opportunities with leaders of ongoing projects. Write a grant proposal with someone from outside your discipline. Research together and write together. And then, when you're ready, submit your best coauthored manuscripts to this journal.

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