



Society & Natural Resources

An International Journal

ISSN: 0894-1920 (Print) 1521-0723 (Online) Journal homepage: <http://www.tandfonline.com/loi/usnr20>

Poetic Inquiry as a Research and Engagement Method in Natural Resource Science

María E. Fernández-Giménez, Louise B. Jennings & Hailey Wilmer

To cite this article: María E. Fernández-Giménez, Louise B. Jennings & Hailey Wilmer (2018): Poetic Inquiry as a Research and Engagement Method in Natural Resource Science, *Society & Natural Resources*, DOI: [10.1080/08941920.2018.1486493](https://doi.org/10.1080/08941920.2018.1486493)

To link to this article: <https://doi.org/10.1080/08941920.2018.1486493>



Published online: 13 Aug 2018.



Submit your article to this journal [↗](#)



View Crossmark data [↗](#)



Poetic Inquiry as a Research and Engagement Method in Natural Resource Science

María E. Fernández-Giménez^a, Louise B. Jennings^b, and Hailey Wilmer^c

^aDepartment of Forest and Rangeland Stewardship, Colorado State University, Fort Collins, CO, USA;

^bSchool of Education, Colorado State University, Fort Collins, CO, USA; ^cUSDA Northern Plains Climate Hub, Fort Collins, CO, USA

ABSTRACT

Complex and “wicked” natural resource issues often require transdisciplinary research approaches—methods that span boundaries among disciplines and engage multiple sectors of society in the research process. Social-ecological systems approaches acknowledge the complexity of dynamics within and feedbacks between natural and social systems, but have insufficiently incorporated the subjective lived experience, agency, culture and power dynamics of people within these systems. We propose that poetic inquiry, together with poetry-based approaches to engagement and science translation, offers a novel set of methods for data generation, analysis, communication, and engagement for natural resource social scientists. We introduce arts-based research and poetic analysis, their benefits and criteria for quality, and reflect on the transformative potential of poetic inquiry. We present cases of poetic inquiry that disrupted hierarchies and humanized research by centering on the participants’ lived experience, evoking emotion, amplifying participants’ voices, fostering researcher reflexivity, and encouraging collaborative research and public scholarship.

ARTICLE HISTORY

Received 12 March 2018
Accepted 31 May 2018

KEYWORDS

Arts-based research;
de-colonial methodology;
feminist research; poetic
analysis; poetic inquiry;
social-ecological systems

Innovation

Before, we had to stay in the high passes all day
Now, with the electric fences, we can leave them,
Our sheep.
Our life is so much better.
So much freedom,
Peace, peace.
The grass is the same, but our life is better.

Complex natural resource problems, often characterized as “wicked” problems in which interdependent stakeholders face dilemmas with no single solution, require methods that transcend disciplinary and sectoral boundaries, and that engage scientists, managers, and nontechnical stakeholders in joint learning and solution-finding (DeFries and Nagendra 2017). In an increasingly polarized and inequitable society, there is a need for research and science communication methods that foster genuine listening, build

CONTACT María E. Fernández-Giménez  maria.fernandez-gimenez@colostate.edu  Department of Forest and Rangeland Stewardship, Colorado State University, Fort Collins, CO 80523-1472, USA.

empathy, and humanize the other. Unfortunately, conventional natural resource science often reinforces rather than challenges, hierarchical power structures (Smith 1999). Social-ecological systems (SES) research draws on theories of complex adaptive system behavior and institutional analysis to understand and manage complexity in natural resource systems (Ostrom 2009). Yet, research using this framework often fails to account for culture, agency, and lived experience of those dependent upon within natural resource systems (Davidson 2010; Cote and Nightingale 2012). This paper explores the potential of poetic inquiry, a form of arts-based research (ABR), as a method to generate, present, and interpret data, to communicate research results, and to engage in authentic interdisciplinary and cross-sectoral dialog. Drawing on our experiences with different facets of poetic inquiry, we consider how poetry may advance inquiry into subjective lived experience in natural resource management research and practice. We explore how poetry can humanize the research process, dismantle researcher-participant dualisms, support social and environmental justice within the academy, and consider how it raised our own critical awareness to the work and workplace of science (Smith 1999; Diversi and Moreira 2009). We first introduce ABR and poetic inquiry, then present varied cases of poetic inquiry in natural resource contexts. We close with reflections on what we have learned, challenges and future opportunities for poetic inquiry in natural resource social science.

Arts-Based Research and Poetic Inquiry

Poetic inquiry is one of many ABR practices that bridge what many see as an artificial divide of arts and science. Arts-based researchers bring the arts and humanities into scientific inquiry to craft more expansive ways of understanding the social and physical world and expressing this knowledge to wider audiences (McNiff 2017). A set of methods centered on the arts (e.g. music, theater, and visual arts), ABR is engaged during all phases of research, including data generation, analysis, interpretation, representation, and presentation (Leavy 2015, 2017a).

ABR is often viewed as an expansion of qualitative research, which emerged largely in response to a positivist/post-positivist scientific world view that external realities can be objectively measured to reveal universal truths. Much qualitative research grew out of interpretive and constructivist traditions that assume knowledge is socially constructed, situated, and subjectively experienced (Glesne 2016). Rather than test and measure human behavior, many qualitative researchers seek to make meaning of human experience to more fully understand the complex lived realities of social life (Merriam 2007). Initially marginalized within qualitative research (Leavy 2015), ABR has gained legitimacy for its capacity to more fully understand, express, and represent the human experience. Growth of ABR across disciplines is evident in ABR handbooks (Leavy 2017a), texts (Barone and Eisner 2012; McNiff 2013), and journal articles, particularly in *Qualitative Inquiry*. Well-established in health sciences and education (Cahnmann Taylor and Siegesmund 2008; Boydell et al. 2012), ABR methods remain novel in natural resource social science, where they offer promise for investigating human–environment interactions. A recent special issue of *Ecology and Society* (Scheffer et al. 2015) and review in *Trends in Ecology and Evolution* (Lesen et al. 2016)

demonstrate growing interest in melding art and science for both scientific inquiry and communication. Leavy (2015) argues: “Art and science bear intrinsic similarities in their attempt to illuminate aspects of the human condition. Grounded in exploration, revelation, and representation, art and science work toward thinking about art and scientific inquiry, a serious investigation regarding the profound relationship between the arts and sciences is underway” (3–4).

In our own efforts to “illuminate aspects of the human condition,” we have found poetic inquiry of particular benefit. Poetic inquiry can take several forms. Researchers create poems from qualitative data like interview transcripts, researchers write poems about the research process, and research participants or participants and researchers together create poems that they jointly interpret and analyze. Poetry is a unique form of expression that can “capture and portray the human condition in a more easily ‘consumable,’ powerful, emotionally poignant, and open-ended, nonlinear form compared with prose research reports” (Faulkner 2017, 211). This is accomplished through line and form, language use and alliteration, metaphor and image, and rhythm and repetition (Cahnmann 2003; Faulkner 2017). We share Faulkner’s (2017) view that poetry “embodies experience to show truths that are not usually evident” (211), opening our research to new understandings. Further, poetic inquiry may foster reflection on the researcher’s experience in the research process, her relationship with participants and colleagues, and issues of power in scholarly production.

Leavy (2015, 2017) describes 11 strengths of ABR (indicated in italics) that, while not necessarily unique to ABR, address our efforts to humanize and transform through poetic inquiry. ABR provokes *new insights and learning* and enables researchers to more effectively *describe, explore, discover, and problem-solve*. ABR *forges micro-macro connections* between individual lives and the larger contexts in which they live, humanizing inquiry. Good poetic inquiry is *evocative and provocative*, effectively communicating emotional aspects of social life to evoke empathy, compassion, and understanding. Regarding its disrupting/transforming potential, poetic inquiry can *raise critical consciousness* by drawing awareness to power relations through evocative images of the status quo and by cultivating empathy with subjugated people. Similarly, poetic inquiry can *unsettle stereotypes, challenge dominant ideologies, and include marginalized voices and perspectives*, through empathy and by “jarring people into seeing and thinking differently” (Leavy 2015, 24). Poetic inquiry often supports *participatory* research and *promotes dialogue* both by including participants as research collaborators who construct and interpret poetic data with us and by engaging the audience and stakeholders. Such democratic processes open up *multiple meanings* rather than privilege authoritative claims by the researcher. ABR and poetic inquiry, then, *advance public scholarship, usefulness, and social justice*. Rather than circulate among a small circle of scholars, poetic inquiry can engage relevant communities in science, making research more useful and transformative.

We hold that poetic inquiry is a disciplined and valid approach to social-ecological research; however, it cannot be evaluated through the same criteria as positivist/post-positivist science. Many ABR researchers apply conventional indicators of qualitative research validity and rigor, such as credibility via triangulation and member-checking, transferability (Lincoln and Guba 1985), and catalytic validity (Lather 1986). These criteria overlook artistic qualities, such as emotional verisimilitude, evocation, and

empathy (Leavy 2017b). Faulkner (2017) offers criteria unique to poetic inquiry, such as *artistic concentration* and the poet's craft, the capacity to use poetic language to evoke both *embodied experience* and *narrative truth*, and *discovery/surprise/inspiration*. Finally, Faulkner (2017) underscores that poetic inquiry should *transform* "by providing new insight, giving perspective, and/or advocating for social change" (227).

In the following section, we recount our personal experiences at the nexus of poetry and science, illustrating multiple modes of poetic inquiry. In keeping with feminist research principles of reflexivity, each author narrates her case(s) in her own voice.

Cases of Poetic Inquiry

Poetic Analysis

Here, I (María Fernández-Giménez) describe creating poems from qualitative data to see if poetic analysis yielded new insights into social-ecological dynamics in a particular place – a valley in the Spanish Pyrenees – not revealed in previous conventional qualitative coding analysis that I completed (Fernández-Giménez and Fillat Estaque 2012). Using a transcript from a single interview with a Spanish shepherd, I made seven poems. Each poem related to a major theme from this interview, and reflected a cross-cutting theme in all the interviews ($n=27$) from the study. For example, the opening poem, *Innovation*, communicates the freedom afforded to the shepherd by new technology. Each poem consists entirely of the participant's words. To construct the poems, I read through the transcript, underlining words and phrases that effectively expressed the meaning of the theme. Then, I arranged these phrases into lines, and used line breaks and punctuation to further relay meaning, retaining original language and repetition (Fernández-Giménez 2015). I translated from the original Spanish to English as I wrote. I back-translated the poems into Spanish, and presented them to the original interviewee, who responded by saying, "Those are my words. You can tell anybody, that is what I said." I read the poems to a variety of audiences, including ecologists, social scientists, and poets. Audiences' responses to the poems were largely positive. The poems even resonated with people who had no interest in the research topic, but who were moved by the shepherd's reflections on his life as represented in the poems.

I subsequently analyzed the poems as texts, focusing on the use of language, especially repetition, imagery, and metaphor. Poetic analysis revealed much about the lived experience of one individual in relation to place, community, and occupation, including his emotions (e.g. unbridled love for and pride in his animals) and psychological state (e.g. the brutality and near-madness of his youth as a transhumant herder). The analysis highlighted contradictions in the shepherd's experiences and attitudes, including his rejection of some past practices and reluctance to abandon others, his longing for the independence and self-sufficiency of the past and his embrace of new technology that allows a different kind of freedom, and his rejection of institutional or economic innovations that threaten his core identity (Fernández-Giménez 2015). This analysis helped me as a social-ecological researcher to understand in a new way the mutually reinforcing feedbacks between anthropogenic cultural landscapes, place and occupational identity, and ecosystem change.

This example illustrates the effectiveness of poetic analysis in revealing, through artistic concentration and poetic craft, the complexity and emotional-psychological dimensions of subjective lived experience – of one individual’s humanity – in relation to place and resource use. It demonstrates rigor and quality via the emotional and aesthetic response of audiences, narrative truth as demonstrated by the interviewee’s response to the poems, and transferability with respect to other interviewees from the same study area.

Learning Through Teaching Poetic Analysis

In this case, I (Louise Jennings) examine how I learned about the value and rigor of poetic inquiry by teaching it. I have engaged in interpretivist and critical qualitative research for three decades, but discounted poetic inquiry earlier in my career. ABR seemed to heighten critiques of qualitative inquiry as a lesser form of research. However, in my efforts to open students to new ways of seeing, being, and acting, I learned that poetic inquiry offers a disciplined and creative path forward. I started including poetic analysis in my methods courses, which include students from various disciplines, including natural resources. We review the use of poetic devices that can give voice to our transcripts, highlight emotion in field notes, and express deeper meanings of our data: imagery, rhythm, use of lines and space, repetition, metaphor, and voice (Cahnmann Taylor 2008; Leavy 2015). Most students resist poetic analysis at first. Poetry is not research! However, after creating data poems and reflecting on the process, most students come to value this creative act as a valid aspect of scientific inquiry. Many value exploring their data from a new angle that invites imagination and focuses on emotion, expression, and meaning in the lives of their research participants. One student focused on the most prominent codes in her interview transcripts of National Park Service personnel to highlight organizational barriers and opportunities for addressing climate change. She underlined key phrases and summarized lengthier statements into concise lines, then arranged them into two stanzas:

Organizational Barriers to Climate Change

Because we are decentralized,
 We lack effective communication.
 Because short term goals are the norm,
 We focus on quick fix solutions.
 Because we are not flexible,
 We miss the opportunity to change as needed.
 We need national leadership,
 To create a common vision.
 We need adaptive qualities,
 To transform as change is recognized.
 We need to focus on long term plans,
 To account for complexity and uncertainty.

The poem captures key points in a few lines. The repetition of the phrase “Because of” in the first stanza highlights institutional norms that create barriers to effective policy and practice, whereas repeating “we need” in the second stanza emphasizes what this agent sees as promising paths forward. The student reflected, “Using a poetic

analysis helped me to think about my data in different ways This was the first time that I linked organizational barriers to suggested solutions, which will be an important part for my future work with the National Park Service.”

The poetic analysis assignment demystified the process of poetic inquiry and prompted me, along with my students, to rethink what it means to conduct valid, rigorous analysis in social science. Initially, I worried about interjecting too much of myself into my research participants’ life worlds through poetic analysis, seemingly sacrificing rigor and validity. I now recognize that effectively expressing participants’ voices and bringing their experiences to life means more than merely representing their words, framed from my own distant academic gaze. Employing poetic criteria of artistic concentration and poetic craft heightens rather than threatens validity; poetic analysis can express the multiple meanings, complexity, and fullness of the lived experience more effectively than participant quotes lifted from an interview transcript. As one student commented, poetry is vital to really understand, not just study. I now appreciate how poetic inquiry can bridge the artificial divide between logic, emotion, and empathy – making us better social scientists.

Cowboy/Science Poetry

In this section, I (Hailey Wilmer) explore how writing and performing can give a voice to the lived experience of science. I consider the work of cowboy poet and rangeland science technician emeritus, Jeff Thomas. Cowboy poetry explores the human relationship with working ranchlands and livestock in Western North America. Jeff Thomas knew and loved working cowboy life. But unlike many poets in his genre, Jeff’s work and writing centered on cowboying for science. The range he rode for nearly four decades was the Central Plains Experimental Range (CPER), owned by the U.S. Department of Agriculture and maintained as a research location for the agricultural and ecological sciences. In 2016, Jeff performed a series of poems about the first 5 years of a ranch-scale collaborative “Adaptive Grazing Management” (AGM) experiment, a research effort that evaluates the ecological outcomes of grazing management decisions made by a multistakeholder group of ranchers, conservationists, and government agency staff.

Public demands for grassland management in the Western Great Plains increasingly require simultaneous consideration of conservation and agricultural production objectives. These stakeholders established goals to manage the land for grassland bird conservation, profitable ranching outcomes, and diversity in vegetation structure and composition, and Jeff responded with a poem from these different points of view. Jeff’s first poem about the project, “The AGM Scientist,” poked fun at experimental design and the project ecologists. Working long hours to “make scientific history” the “AGM Scientist” was puzzled by Jeff’s hesitations at hearing the orders for experimental treatment:

*“Let’s put 1400 head of cattle up in section eight;
I don’t see what’s wrong with that, why does Jeff hesitate?”*

In “AGM is for the Birds,” Jeff highlighted the conservation concerns and ecological requirements for grassland birds while commenting subtly on the challenges of meeting those requirements through collaborative management. In “AGM for the Rancher,” he

brought in the decision-making challenges of a family operator, tying stocking rate decisions to financial, social, and ecological consequences, while hinting that scientific recommendations may not always fit within traditional ranch management paradigms:

*“They say I can make money if I stock the range to death,
But I can’t afford to run that many and pay tuition for little Beth.”*

In “AGM for the Cowboy”:

*“They want to put how many head in 17? And leave ‘em for three weeks?
What the hell’s a pedometer, them stupid office geeks!
I never thought I’d see the day that I’m checking steers with collars,
I could buy an F-250 with all these wasted dollars!”*

Jeff’s use of humor brings the lofty goals of the scientist down to the reality of the rancher, grounded in economic and social contexts, while raising the voice of AGM cowboys/girls and technicians who do the brunt of the physical labor of field research at the site. Jeff’s poems convey not only that the work at CPER is science, but also that work and place have been, and have been because of, the lives of scientific technicians and the caretakers of the land and livestock on which rangeland science depends.

Poetry as a Medium for Interdisciplinary Collaboration

One of the main challenges in tackling complex or “wicked” natural resource problems is building capacity for interdisciplinary collaboration and communication, as the problems often transpire at multiple social and ecological scales and have an unequal impact on marginalized communities. Inspired by my initial poetic analysis experiment, I (María) organized a network of scientists who wrote poetry and poets interested in ecology and sustainability. The Land, People, Poetry (LPP) network eventually spawned the Poetry of Range Science (PORS) project. Both groups involved participants from diverse disciplinary backgrounds. In both groups, we found fertile ground for interdisciplinary conversation and collaboration, exploring the similarities and differences, synergies and apparent incompatibilities between poetry and science. The substance and quality of the discussions kept us coming back. Although poetry and science are distinct, both are concerned with close observation of the world recorded in concrete, specific, tangible detail. Both rely on creativity and intuition to yield new understanding.

Our explorations suggested that this process also works across disciplines, where poetry can yield scientific insight, and science can inspire poetic creativity. Scientists were surprised to learn that their concern for a tight link between the writer’s intention and reader’s understanding was not shared by poets, who used science as a muse not a source of facts, and readily accepted that readers make their own meanings from art. The science-inspired poetry, in turn, enabled the scientists to see our science in new ways, revealing beauty and emotion embedded therein. Meanwhile, several poets read scientific papers for the first time, and gained appreciation for the substance and methods of science.

Our interdisciplinary discussions forged meaningful dialog across social and disciplinary differences. Because both poets and scientists were reaching outside of our respective areas of expertise, we were more humble, listened harder, and strived to

communicate more clearly, avoiding or explaining our respective jargons. The experimental nature of our collaborative dialogs and writing forced us to take risks and assume a “beginner’s mind,” abandoning assumptions and adopting an openness to different ways of seeing and being in the world. For some of the more senior scholars, this was both frightening and liberating, and we found ourselves expressing profound gratitude for each other’s vulnerability, patience, and gentle but honest discourse.

Poetry as Science Translation

Multiple Use

The carbon buried deep below

We need it now

To make things go

Tear back the skin

Scrape off the grass

Reap the treasure

Oil, coal and gas

From Boroo Gold

To the Bakken Field

Wounded earth and

Poisoned waters

A legacy for

Our sons and daughters?

Jobs, profit, royalties

Impacts on communities

Science helped to hone the blade

Can science heal the mess we made?

Bring back the fires

Kill the weeds

Harvest and replant native seeds

Teach our people

Help them learn

What we grow is

What we earn.

Science loves simplicity

Elegance, replication, and objectivity

Yet simple solutions

Seldom succeed

Diversity and complexity

Are what we need.

Synthesis and communication of complex scientific information is an ongoing challenge in natural resource science and management. Poetry offers one arts-based alternative to conventional science communication (Lesen et al. 2016). I (María) first experimented with creating poems from scientific texts in an invited talk at the International

Rangeland Congress (IRC), where I was asked to synthesize papers from four thematic sessions. I first created poems from each of 44 papers in my assigned sessions. Then, I looked at the poems from each session as a whole and drafted a synthesis poem comprising four stanzas, one for each session. The second stanza, excerpted above, synthesized the session on multiple use, which included science on the environmental and social impacts of mining and energy development, as well as technical papers on restoration. Using poetry, I reflected back to the audience the unspoken subtext of these papers, and my critique, in an emotionally resonant way not afforded by a conventional talk. Human use of science has harmed our planet, and we now look to science for the solutions. Yet, technical solutions and conventional science are inadequate to address the social-ecological complexity of the crises we now face. I aspired to use poetry for its “jarring” effect (Leavy 2017) and to move the audience to see the world and science differently. This experience spawned further experimentation with creating poems from scientific texts, and eventually led to an anthology of poems with the working title *The Poetry of Range Science*, which includes works by multiple authors based on 15 scientific papers from the field of rangeland science.

Poetry for Transformation

In natural resource science, presenting poetry as science, poetry that communicates science, or poetry about the research process, may have transformative potential. The final synthesis poem presented at the IRC honored the diverse scientific voices at the conference, including many women and participants from the global South who were not well represented on the plenary panel (comprised of 13 mostly white men and one white woman), though they made up a significant share of conference participants. Through the medium of poetry, I (María) sought to highlight the value of including individuals from diverse backgrounds in science, to associate diversity with creativity and innovation, and to disrupt exclusionary conference conventions.

In another instance, I wrote a poem for an invited talk to women graduate students. Although I began the poem to overcome writer’s block, the resulting work helped me to recognize myself as a feminist researcher, and to share my lived experience as a woman scientist. The poem, “Unsolicited Advice” (Iniesta-Arandia et al. 2016) expressed my feminist research ethic “*give back/pay it forward/help each other out,*” the challenges of leading a balanced life as a female academic, “*take care of your body and spirit while you cultivate your mind,*” and the realities of power dynamics in the academy, “*speak truth to power/but only after you have tenure,*” with a dash of humor “*don’t take yourself so seriously.*” After I read the poem at a research seminar on my own campus, a male graduate student sent me the following email: “... By modeling for the rest of us what collaborative research can be, and what diverse kinds of thinking and knowing a successful scientist can integrate, you create the space for the rest of us to do the same. ... Thank you!”

In these cases, poetry intentionally or unintentionally challenged conceptions of scientific practice. The synthesis poem deliberately drew attention to discriminatory practices and to the benefit of diverse perspectives in science. “Unsolicited Advice” had the unanticipated outcome of inspiring and empowering at least one person by opening a

space for nontraditional methodologies, and emphasizing the importance of reflexivity, reciprocity, and relationships in research. By reading poetry as science and about science to scientific audiences, I embody the scientist as a whole person and defy the implicit dualisms between scientist and artist, objective scientific process and subjective lived experience and emotion.

Realizing the Humanizing and Transformative Potentials of Poetic Inquiry

We have shared our own experiences writing and performing poetry in the hopes of broadening the conversation in natural resources social science methods. While poetic inquiry can be intimidating and challenging for scientists at first, we hope that our narratives demonstrate the processes and complexities of poetry's transformative and humanizing role in our own research experiences and can inspire other researchers to engage in these novel methods. María found new inspiration in her work as a professor and researcher by engaging in poetic inquiry. Louise developed a greater ability to push past her distant analytic gaze to connect logic, emotion, and empathy in the research process. Hailey found that Jeff Thomas' cowboy/science poems connected her research experience to a place and community. Whether we are exploring data, or simply exploring ourselves and our own relationship to that work, the practice of poetry has the potential to make visible the complexity of natural resource management and science as a subjective experience. At best it may challenge dominant scientific cultures and facilitate collaborations across disciplinary boundaries.

As qualitative social scientists, we seek to amplify the less-often heard voices in our natural resource research, including women scientists and scientists of color, herders, and field technicians, so that they can reach beyond the local sphere, to managers and policy makers. In our cases, poetry also fostered reflexivity for each author to reconsider her own research experiences and make meaning of them, and even to transform her own approach to research and teaching. Poetry offers a potential method to reach a deeper level of understanding and collaborative learning than available to us through conventional modeling and survey research. Yet even as poetic inquiry may humanize science and raise these voices, when the researcher controls the "re-presentation" of interview transcripts as poetry, a power asymmetry is still at work. A future frontier is the melding of ABR and Participatory Action Research, where poems written by community research partners serve as a means of critical reflection and analysis of their situations, and where community members hold the power of the pen. Such work is being done in other applied fields (Mullett 2008). It is time to expand these participatory, community, and arts-based methodologies throughout the natural resource social science sphere to enhance and deepen our capacity to address "wicked" natural resource problems with and for those who are most impacted by environmental injustices.

Acknowledgments

A Colorado State University School for Global Environmental Sustainability Faculty Fellowship supported the formation of the Land, People, Poetry Network. We thank Jeff Thomas for allowing us to use his AGM poems in this paper, and for the insights provided by his poetic creativity, humor and wisdom.

References

- Barone, T., and E. E. Eisner. 2012. *Arts based research*. Thousand Oaks, CA: Sage.
- Boydell, K. M., B. M. Gladstone, T. Volpe, B. Allemang, and E. Stasiulis. 2012. The production and dissemination of knowledge: A scoping review of arts-based health research. *Forum Qualitative Sozialforschung/Forum: Qualitative Social Research* 13 (1). <http://www.qualitative-research.net/index.php/fqs/article/view/1711/3328>. (accessed July 23, 2014).
- Cahnmann, M. 2003. The craft, practice, and possibility of poetry in educational research. *Educational Researcher* 32 (3):29–36. doi:10.3102/0013189X032003029.
- Cahnmann Taylor, M. 2008. Arts-based approaches to inquiry in language education. In *Encyclopedia of language and education*, ed. K. A. King and N. H. Hornberger. Volume 10 of Research methods in language and education. 2nd ed. New York, NY: Springer Science and Business Media. pp. 243–256.
- Cahnmann Taylor, M., and R. Siegesmund, eds. 2008. *Arts-based research in education: Foundations for practice*. New York, NY: Routledge.
- Cote, M., and A. J. Nightingale. 2012. Resilience thinking meets social theory: Situating social change in socio-ecological systems (SES) research. *Progress in Human Geography* 36 (4):475–489. doi:10.1177/0309132511425708.
- Davidson, D. J. 2010. The applicability of the concept of resilience to social systems: Some sources of optimism and nagging doubts. *Society and Natural Resources* 23 (12):1135–1149. doi:10.1080/08941921003652940.
- DeFries, R., and H. Nagendra. 2017. Ecosystem management as a wicked problem. *Science* 356 (6335):265–270. doi:10.1126/science.aal1950.
- Diversi, M., and C. Moreira. 2009. *Between talk: Decolonizing knowledge production, pedagogy and practice*. Walnut Creek, CA: Left Coast Press.
- Faulkner, S. L. 2017. Poetic inquiry: Poetry as/in/for social research. In *Handbook of arts-based research*, ed. P. Leavy, 208–230. New York, NY: The Guildford Press.
- Fernández-Giménez, M. E. 2015. A shepherd has to invent: Poetic analysis of social-ecological change in the cultural landscape of the Spanish Pyrenees. *Ecology and Society* 20 (4):29.
- Fernández-Giménez, M. E., and F. Fillat Estaque. 2012. Pyrenean pastoralists' ecological knowledge: Documentation and application to natural resource management and adaptation. *Human Ecology* 40 (2):287–300. doi:10.1007/s10745-012-9463-x.
- Glesne, C. 2016. *Becoming qualitative researchers: An introduction*. 5th ed. New York, NY: Pearson.
- Iniesta-Arandia, I., F. S. Ravera, I. Buechler, M. E. Díaz-Reviriego, M. G. Fernández-Giménez, M. Reed, H. Thompson-Hall, L. Wilmer, P. Aregu, H. Cohen, et al. 2016. A synthesis of convergent reflections, tensions and silences in linking gender and global environmental change research. *Ambio* 45 (S3):383–393. doi:10.1007/s13280-016-0843-0.
- Lather, P. 1986. Issues of validity in openly ideological research: Between a rock and a hard place. *Interchange* 17 (4):63–84. doi:10.1007/BF01807017.
- Leavy, P. 2015. *Method meets art: Arts-based research practice*. 2nd ed. New York, NY: The Guilford Press.
- Leavy, P. 2017. *Handbook of arts-based research*. New York, NY: The Guildford Press.
- Leavy, L.P. 2017. Introduction to arts-based research. In *Handbook of arts-based research*, ed. P. Leavy, 3–21. New York, NY: The Guildford Press.
- Lesen, A. E., A. Rogan, and M. J. BLum. 2016. Science communication through art: Objectives, challenges and outcomes. *Trends in Ecology & Evolution* 31 (9):657–660. doi:10.1016/j.tree.2016.06.004.
- Lincoln, Y. S., and E. G. Guba. 1985. *Naturalistic inquiry*. Thousand Oaks, CA: Sage.
- McNiff, S. 2013. *Art as research: Challenges and opportunities*. Wilmington, NC: Intellect.
- McNiff, S. 2017. Philosophical and practical foundations of artistic inquiry: Creating paradigms, methods, and presentations based in art. In *Handbook of arts-based research*. ed. P. Leavy, 22–36. New York, NY: The Guilford Press.

- Merriam, S. B. 2007. *Qualitative research in practice: Examples for discussion and analysis*. 1st ed. San Francisco, CA: Jossey-Bass.
- Mullett, J. 2008. Presentational knowing: Bridging experience and expression with art, poetry and song. In *The SAGE handbook of action research: Participative inquiry and practice*, ed. P. Reason and H. Bradbury. Los Angeles, CA: Sage.
- Ostrom, E. 2009. A general framework for analyzing sustainability of social-ecological systems. *Science* 325 (5939):419–422. doi:10.1126/science.1172133.
- Scheffer, M., J. Bascompte, T. K. Bjordam, S. R. Carpenter, L. B. Clarke, C. Folke, P. Marquet, N. Mazzeo, M. Meerhoff, O. Sala, and F. R. Westley. 2015. Dual thinking for scientists. *Ecology and Society* 20 (2). <http://dx.doi.org/10.5751/ES-07434-200203>.
- Smith, L. T. 1999. *Decolonizing methodologies: Research and indigenous peoples*. London: Zed Books.