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"A shepherd has to invent": Poetic analysis of social-ecological change in the cultural landscape of the central Spanish Pyrenees

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ABSTRACT. Since the mid-20th century, the Pyrenean pastoral social-ecological system (SES) has undergone socioeconomic and demographic transformations leading to changes in grazing practices and a decline in the livestock industry. Land abandonment has contributed to an ecological transition from herbaceous vegetation cover to shrublands and forests, leading to a loss of ecosystem services, including biodiversity and forage. I interviewed 27 stockmen (*ganaderos*) in two valleys of the central Pyrenees to document their traditional ecological knowledge and observations of environmental, social, economic, and cultural changes in the valleys. I used poetic analysis, a qualitative data analysis approach, to illustrate and analyze one ganadero's experience of social-ecological change. First, I created seven poems based on an interview transcript with this ganadero. Second, I analyzed the poetry I created, to see what new insights and understanding about system dynamics and the lived experience of SES change emerged from analysis of the transcript re-presented as poetry. Third, I compared key themes that emerged from this analysis with findings across the other 26 interviews. Fourth, I read the poems and presented the associated analysis to multiple audiences, to gauge their impact and effectiveness in communicating research findings. Finally, I synthesized across the themes raised in the seven poems. Poetic analysis revealed emotional and cultural dimensions of change, especially the importance of occupational and place identity, in the experience of the ganadero. The transcript re-presented as poetry portrayed the ganadero as an agent in creating and maintaining a cultural landscape and as both an adaptor and resister to SES change. Poetic analysis also uncovered telling contradictions, adaptive capacities, and barriers to adaptation in this SES that went unappreciated with conventional qualitative analysis approaches. This exploratory study illustrates the potential of poetry as a method of data analysis and communication in SES research.

Key Words: *arts-based analysis; cultural ecosystem services; pastoralism; place attachment; place identity; rangelands; resilience*

INTRODUCTION

In this article I explore the use of poetic analysis to understand social-ecological change in the cultural landscape of the western central Pyrenees in Aragón, Spain. Poetic analysis complements other ecological and social science methodologies for documenting and explaining social-ecological change by revealing how such transitions are experienced and interpreted by individuals within the system. This is important because it can lead to new ways of seeing, understanding, and communicating about change, which in turn could motivate novel and actionable approaches to guiding, responding, or adapting to change. In this study, the use of poetic analysis uncovers insights and contradictions in human-environment relationships, and communicates them in a compelling way, pioneering the use of arts-based analysis in social-ecological research.

Social-ecological systems and resilience

Social-ecological systems (SES) conceptualize human-environment interactions as part of a single, linked, dynamic system, with an emphasis on complex system dynamics and feedbacks within and between ecological and social subsystems (Ostrom 2009). Resilience theory posits that complex systems undergo repeated cycles of change and adaptation in response to shocks and stresses, but resilient systems are able to learn, adapt, reorganize, and innovate such that their essential parts and functions persist over repeated cycles of change (Gunderson and Holling 2002, Walker and Salt 2006). Traditional ecological knowledge (TEK), which includes biophysical observations, cultural values, management practices and institutions, is dynamic and evolving, created through use, and socially and culturally transmitted (Berkes 1999). TEK is one component of a SES's social memory, and may serve as a resource for system reorganization following

a major disturbance (Folke et al. 2003). Empirical studies of resilience are recent and the methodology for assessing resilience of coupled systems is still developing (Carpenter et al. 2001, Walker et al. 2002, Resilience Alliance 2007).

Resilience assessments call for incorporating the perspectives of multiple stakeholders, understanding their values, uses of the system, and governance institutions. However, some social scientists have been critical of this approach, challenging the normative tendencies of much resilience literature, and calling for greater attention to human agency, culture, and power within SES and resilience frameworks (Davidson 2010, Berkes and Ross 2013, Brown 2014, Olsson et al. 2015). Cote and Nightingale (2012:483-484) argue for shifting the focus away from the content of knowledge toward contextualizing knowledge, as a means to tap into "subjective identities and affective relationships." Crane (2010) argues for an internal analysis, "one conducted in the minds and communities of people who live within them." Further, Crane proposes a definition of cultural resilience as "the ability to maintain livelihoods that satisfy both material and moral (normative) needs in the face of major stresses and shocks." In this study, poetic analysis is used to reveal affective relationships, identities, and socially constructed meanings of people living in this SES.

Cultural landscapes and ecosystem services

Cultural landscapes are places where people have shaped the landscape either through deliberate design or through a process of evolving land-use, and which are valued for their aesthetic appeal, biodiversity, cultural significance, and connection to local identity (Rössler 2006), in addition to their economic contribution to livelihoods. As such, cultural landscapes embody a notion of reciprocal human-environment relationships whereby culture and

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identity simultaneously are shaped by and create or maintain the landscape in which they are embedded. Cultural landscapes are recognized and protected by the UNESCO World Heritage Convention for their tangible and intangible natural and cultural values, including traditional knowledge, management systems, and institutions (Rössler 2006). However, many cultural landscapes, especially those created and maintained by traditional land-use systems, are under threat from a variety of sometimes contradictory demographic and development pressures ranging from land abandonment to intensification and urbanization of land use, which may affect a broad range of ecological services provided by these landscapes (Plieninger et al. 2014a).

Current research at the intersection of cultural landscapes, resilience, and ecosystem services, the benefits nature provides (Plieninger and Bieling 2012, Plieninger et al. 2014a), advances the infusion of social and cultural perspectives in SES analysis. When this work delves deeply into the cultural dimensions of landscape change, it illuminates potential social and cultural causes and consequences of these changes. Although researchers have explored how macro-level socioeconomic, demographic, and policy changes affect provisioning, regulating, and supporting ecosystem services (Nelson et al. 2006, Elmhagen et al. 2015), few studies have examined the impacts of these changes on local communities and cultural ecosystem services such as place attachment and identity (Iniesta-Arandia et al. 2014, López-Santiago et al. 2014, Szücs et al. 2015).

Pastoral social-ecological systems in transition

Pastoral/rangeland social-ecological systems, which cover ~45% of Earth's land surface, face many challenges, including climate change; competing land uses; conversion to urban and cultivated land and resulting fragmentation; political and ethnic conflict; more globalized and competitive markets; increased government regulation; and pressure on mobile pastoralists to settle (Galvin 2009, Reid et al. 2014). In European mountains generally (García-Martínez et al. 2009, Renwick et al. 2013, Plieninger et al. 2014b), and Spain particularly, rural depopulation and land abandonment are leading to cultural and environmental transitions, such as the decline in extensive livestock husbandry (Gomez-Ibañez 1977, García-Ruiz and Lasanta-Martínez 1990, Manzano Baena and Casas 2010, Sancho-Reinoso 2013) and an increase in shrub and forest cover (Lasanta-Martínez et al. 2005, Gartzia et al. 2014). Mobility, and specifically transhumance, i.e., repeated movements between seasonal pastures along an elevational or latitudinal gradient, have greatly declined in Spain during the last 50 years (Gomez-Ibañez 1977, Ruiz and Ruiz 1986, Manzano Baena and Casas 2010). Recent recognition of the ecological, economic, and cultural values of transhumance, as well as changes in the conditions and technologies of herding, suggest that the disappearance of transhumance is not inevitable (O'Flanagan et al. 2011, Oteros-Rozas et al. 2013, Oteros-Rozas et al. 2014), but rather may be part of the dynamic ebb and flow of mobility in extensive livestock systems (Fernández-Giménez and Le Febvre 2006).

Although these transitions within Spain and the Pyrenees have been well analyzed with regard to broad-scale policy and economic drivers, and demographic and environmental responses (García-Ruiz and Lasanta-Martínez 1990, 1993, Lasanta-Martínez et al. 2005, García-Martínez et al. 2009, Sancho-Reinoso 2013, Gartzia

et al. 2014), much less is known about how individuals in the system experience change, and the impacts on local culture, including herders' traditional knowledge. The potential loss of TEK, which includes the knowledge of how to live in and manage landscapes, could stifle adaptive capacity (Gómez-Baggethun et al. 2010, Fernández-Giménez and Fillat Estaque 2012, Kassam 2013).

Poetic analysis

Poetic analysis is one facet of the emerging field of arts-based inquiry (Cahnmann Taylor 2008), through which social science researchers use artistic expression, including literature, visual art, and performance, throughout the research process. Arts-based methodologies provide new ways of seeing, and may reveal previously hidden complexity and contradictions that improve understanding of social phenomena (Cahnmann 2003), for example, by uncovering cultural and emotional dimensions of social issues. Presenting research findings in artistic form such as poetry may also make them more compelling and accessible to a broader audience (Cahnmann 2003).

Poetic analysis can take several different forms and is distinct from the anthropological subfield of ethno-poetics, which investigates indigenous poetics (Maynard and Cahnmann Taylor 2010, Moore 2013). One form of poetic analysis is the representation of data in poetic form, in which the researcher creates poems from interview transcripts or other primary texts. In this form, poems are a means of data reduction, similar to other qualitative data analysis approaches (Furman 2006). A second form of poetic analysis uses poetry as a means of inquiry, whereby the researcher analyzes poems, created by the researcher or a research subject, to identify themes, and reveal meaning and emotion. In a third form, sometimes referred to as ethnographic poetry, the researcher writes ethnography or research results as poetry (Maynard and Cahnmann Taylor 2010). In the first and third approach to poetic analysis, poems created by the researcher are both a means to an end (greater understanding and more effective communication) but also an end in themselves (an original creative expression by the researcher/author). Poetic analysis initially emerged in the 1980s and has been most widely applied in education research (Cahnmann 2003), and more recently in other social science fields, such as health professions (Furman 2006, Kooken et al. 2007, Boydell et al. 2012) and anthropology. Poetic analysis and ethnographic poetry are published in social science journals such as *Anthropology and Humanism* and *Qualitative Health Research*, among others.

Arts-based inquiry faces challenges, however. If art is an inherently creative endeavor, what distinguishes poetry used in a scientific context from artistic invention? What are the criteria for quality and validity? And how do we ensure that findings are useful as well as novel? (Cahnmann-Taylor and Siegesmund 2008, Maynard and Cahnmann Taylor 2010). There is some debate as to whether and to what extent conventional measures of validity in qualitative research apply to arts-based research, and some contend that additional, aesthetic and emotional, criteria for judging quality apply (Leavy 2009). Because poetry as research is new terrain in ecology, I propose to apply many conventional measures of validity and trustworthiness in qualitative research to this study, including triangulation, and close attention to internal consistency or contradictions within the interview text

and resulting poems. As proposed by Leavy (2009), I also use audience response to gauge the emotional truth and aesthetic merit of the poems.

In this paper I explore the application of poetic analysis of qualitative data to advance understanding and communication of complexity in social-ecological systems, especially the subjective, lived experience of change, adaptation, and resilience by humans in a complex SES. This paper applies the first and second forms of poetic analysis, in which I first created original poems from an interview transcript and then analyzed the language and form of the poems to identify themes, contradictions, and insights that were obscured to me in the original transcript and revealed when the same material was presented as a poem. Poetic analysis was a good fit because the language of the interviews was full of figurative speech, and poetry seemed a natural way to present the results. Further, Spain has a long literary history of pastoral poetry (Irigoyen-García 2013), vernacular verse (Aulestia 1995), and traditional songs about shepherds' work and life (Serrano et al. 2006), which made poetry a culturally resonant choice. In this study, poetic analysis reveals and conveys in a concise yet powerful way, the inherent contradictions in the identity and experience of a herder in a SES potentially on the brink of a major transformation. Poetic analysis complements positivist approaches to understanding complex system dynamics by focusing on the subjective experience of actors within the system and the ways they construct meaning from and interpret complexity and change.

STUDY AREA

Cultural landscapes and social-ecological change in the Valles Occidentales of the Aragonese Pyrenees

The Valles Occidentales of the Central Aragonese Pyrenees, like many European mountain landscapes, have a long history of human habitation, use, and management, leading to an anthropogenic ecosystem largely created and until recently maintained by human activity: cultivation, extensive livestock grazing, wood-cutting, and burning (Puigdefàbregas and Fillat 1986, García-Gonzalez et al. 1990, García-Ruiz and Lasanta-Martínez 1990, 1993, Lasanta-Martínez et al. 2005, García-Martínez et al. 2009). The Valles are a cultural landscape in the sense described by Rössler (2006:334), "at the interface between nature and culture, tangible and intangible heritage, biological and cultural diversity—they represent a closely woven net of relationships, the essence of culture and people's identity."

Since the mid-20th century, the Valles Occidentales have experienced major demographic and socioeconomic shifts, including a decline in human and livestock populations, a shift away from an agriculture-, livestock- and forestry-based economy toward a tourism-oriented economy (García-Ruiz and Lasanta-Martínez 1990, 1993, Lasanta et al. 2007), and the establishment of a Natural Park administered from a distance by the government of the Autonomous Region of Aragón (Carbonell 2010). Macro-level political-economic drivers of these changes include the birth of Spanish democracy in 1976, the formation of the European Union, promulgation of the EU's Central Agricultural Policy, and subsequent changes in the structure of the livestock industry in Spain, and the development of destination tourist attractions including downhill ski resorts in other valleys within the Central

Pyrenees. These socioeconomic and policy changes have resulted in significant ecological changes, especially an increase in shrub and forest cover and decline in grassland and cropland (Lasanta-Martínez et al. 2005, Gartzia et al. 2014). These ecological changes, in turn, affect the supply of ecosystem services, including regulating, provisioning, and cultural services that historically supported rural communities in these valleys (Lasanta-Martínez et al. 2005). The trend toward increased shrub and forest cover results in a more homogeneous landscape with less fragmentation, plant biodiversity, and forage production, increased fire risk (Lasanta-Martínez et al. 2005), and decreased water yield, erosion, and sediment transport (García-Ruiz and Lana-Renault 2011). Although some of these changes could be interpreted as ecologically beneficial, for example, reduced fragmentation and erosion, these landscape changes are almost universally viewed as undesirable by local stakeholders, especially stockmen (Fernández-Giménez and Fillat Estaque 2012).

The interview used in this analysis was with a herder from the Valley of Ansó, the westernmost of the Valles Occidentales, and among the most remote and traditional (Kruger 1995). The stockmen of Ansó hold communal grazing rights to the high alpine summer pastures of the Pyrenees that date to the reign of Jaime I in 1271 (Berdusán 2004), and the village archive holds grazing records on centuries-old parchment inscribed with the names of families that still reside in Ansó's traditional stone houses. Ansó was once renowned for its sheep industry, and the fine quality of the wool from the local Ansotano sheep. Today, the traditional costume sewn from wool cloth continues to be a source of community pride, celebrated at the annual Ansó Costume Festival and the Ansó Costume Museum. Ansó's livestock industry, like that of most neighboring valleys, has waned since the mid-20th century. The number of registered livestock enterprises declined from 29 to 21 between 1999 and 2009 and the village lost nearly half its population between 1960 and 2014, falling from 831 to 436 inhabitants (Instituto Nacional de Estadística 2015). A recent study of land-cover changes in the municipality of Ansó from 1956 to 2009 determined that pasture and open shrubland declined from 20% of the total area to 1% over this 50-year period (Romeo Gaston and de la Riva Fernandez 2013). A few of the remaining stockmen still trek their sheep on foot (or move them in trucks) from the high mountain summer pastures to the Ebro River plains (La Ribera) 300 km distant, but the majority keep their stock in barns near the village for the fall, winter, and spring, and graze the mountain pastures in the summer.

METHODS

The purpose of the primary study was to document Pyrenean pastoralists' TEK and their observations of environmental change (Fernández-Giménez and Fillat 2012), and potential contributions of TEK to resource management and adaptation in a changing SES (Fernández-Giménez and Fillat Estaque 2012). The overarching objective was to understand how SES change is affecting the social and cultural fabric of the community, including the creation and transmission of ecological and resource management knowledge gained through continual experience in the landscape and transmitted among herders within families and the community. With this article I report on a secondary analysis of the interview data that sought to understand stockmen's experiences of changes within the pastoral

SES from their perspective. To achieve this aim, I apply poetic analysis, which uses the literary form of poetry to analyze and present qualitative research results (Cahnmann 2003).

Data for the primary study were collected through semistructured interviews with 27 pastoralists in two adjacent valleys of the western Aragonese Pyrenees. Sampling and data analysis for this study are described elsewhere (Fernández-Giménez and Fillat Estaque 2012). During the initial analysis of interview transcripts for the primary study, I was struck by the poetic language used by some interviewees as well as the startling candor with which they spoke about herding work and life. At the same time, I was both experimenting with alternative creative and accessible ways to present research results to a broader audience, such as blogs or storytelling, and searching for theoretical and methodological approaches to incorporate more of the complexity of human experience and decision-making into SES research. Several graduate students in my lab took a course in qualitative data analysis methods where poetic analysis was taught and I learned about this approach from them and the professor. One student included a poem in a publication based on her dissertation research on Mongolian pastoralists (Baival and Fernández-Giménez 2012). These motivating factors, and the guidance and encouragement from qualitative research colleagues, led to this exploratory application of poetic analysis to a single interview transcript from the 27 interviews conducted in 2010.

The transcript selected for this study touched on most of the major themes that emerged from the set of transcripts as a whole, and thus may be representative of the experiences of other stockmen in the valley. A social network analysis revealed that this informant occupied a position of high centrality within the community as a person with whom all other interviewed stockmen in the village exchanged information and from whom many sought advice. Nevertheless, his experience is his own and the language through which he expresses it is unique to him.

The interview took place over about 1.5 hours in October 2010 along a roadside outside the informant's village, while he was tending his sheep with his teen-aged son. The sheep had recently been brought down from high mountain pastures and were grazing fall pastures in the forests and small meadows near the village. During the winter they would be enclosed in a barn and stall-fed hay. The day was windy but seasonably warm and he leaned on his staff and spoke emphatically and with few pauses in answer to my questions. The interview was audio-recorded and transcribed verbatim.

I created the poems by arranging passages of the interview transcript into poetic form, selecting the portions of the transcript to present, arranging them into lines, and using line breaks and punctuation to convey meaning. In most cases the text used to create the poems was sequential or nearly sequential within one part of the interview. In a few cases, such as the first poem, *Transhumance*, passages from several different parts of the interview that addressed one or similar themes were brought together into one poem. Where possible, I constructed the poems to present the verbatim order and language of the interview excerpts. Where a word or phrase is repeated in a poem, it was repeated in the transcript. I conducted the interview in Spanish (my second language, and my father's native tongue), and translated the interview into English (my first language) as I

created the poems. Later, I translated the complete interview excerpts used to create the poems into English to compare my initial, poetic translation with a more complete translation of the transcript. Appendix I includes two examples of how the poems were constructed from the original Spanish transcript, so that readers may assess for themselves how the poems are related to the original language of the interview. From an anthropological perspective, the creation of poetry from the text of an interview may be understood as the writer/researcher's outsider (etic) perspective overlain on the insider/subjective/emic perspective of the interviewee. Although my intent in writing the poems was to distill what I took to be the essence of the meaning the stockman conveyed, my decisions about which passages and words to choose, and how to arrange the lines, inevitably reflect my own interpretations. In many regards, this is no different from other qualitative coding and data reduction methods, which are always a reflection of the researcher's decisions.

I analyzed the poems by reading each one closely and interpreting literal and symbolic meanings with particular attention to the use of metaphor, imagery, and repetition, and to what they expressed about the stockman's life experience as a herder in this valley and witness to its changes. The process of analyzing the poems created a second layer of interpretation of the original interview, parallel to the process of identifying and interpreting themes from codes in conventional qualitative analysis. Throughout the analysis process, I repeatedly compared the poems to the original transcript to ensure correct representation and interpretation. To triangulate with other interviews, and determine which themes were common to other informants and which were unique to this one, major themes in the poems were compared with the summarized findings from all 27 interviews. Many of the major themes in the poems were common to other interviews, and these findings were validated through member checking via community workshops held in the two study villages in 2011 following initial data analysis. I also conducted participant observation in the communities for nine months during 2010-2011, spent time with stockmen while they tended their animals, and participated in transhumant migration with one shepherd. These processes ensure the credibility and overall trustworthiness of the analysis according to conventional measures of qualitative research quality (Lincoln and Guba 1986, Creswell 2013). In addition, the poems and initial interpretations were orally presented to groups of undergraduate and graduate students, at a professional meeting of ecologists, and at a department seminar, and presented in written form to several literature scholars to determine if they met criteria of emotional truth and aesthetic quality as poetry (Leavy 2009).

RESULTS: POETIC ANALYSIS OF CHANGE

I present each poem in turn, followed by a brief interpretive analysis, and placed in the context of the results of the larger pool of interviews.

1. *Tradition: Transhumance*

In summer we climbed, more than 1000 meters upwards

And it was much cooler

We keep climbing

We climb like the animals

Like the stags

They come down in the winter, and we see them here, near the

village
It is a natural thing, like nature
Without thinking of anything
We did what we had to do, that's all.
In autumn, we went from the Aspe to Tarragona
350 kilometers
20 days
On foot
We had a job
To get the livestock down, without any dying
The livestock had to eat
It was the war, the war
Those months down below
In those days we went down seven months to La Ribera
In a shepherd's stone hut
I wasn't a wild boar, but almost. Almost.
I became timid.
When I returned to the village after seven months,
I could not leave the house
I crept to the corner of the street, then went back
Seven months in a hut.
With only sky and land
In four or five years I would have become like the wild boars
I am not ashamed to say it
I lived it
It was bad.

In this poem the stockman recalls his early life as a transhumant herder, identifying this way of life with that of the wild animals in the landscape. He recounts the seasonal migration up to the mountains as being natural, "like the animals, like the stags," but also recalls how the isolated months in the lowland winter pastures left him feeling as unkempt and unsociable as a wild boar (*javali*). The work and the routine of seasonal movements are initially described as second nature, so instinctual or so deeply socialized that "without thinking of anything, we did what we had to do." As the recollection progresses, the work is remembered as physically and psychologically grueling, described in life and death terms as "the war, the war," fighting to keep the flocks alive during the 300 km trek on foot. Even decades later, at the time of the interview in 2010, the stockman's declaration that "I am not ashamed to say it," belies a sense that he still bears emotional scars from this experience, saying simply, "I lived it. It was bad." Other stockmen also spoke of the severe conditions of the transhumant life. One man recalled his father's daily life, saying, "They lived like Siberians, almost like Siberians. They stayed in shacks, came to the village once a week for food, and returned to the mountain."

2. Innovation

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

This short poem expresses palpable elation at the liberty and peace of mind afforded by the recent introduction of a technological innovation in the village: portable electric fencing to contain a flock of sheep within a particular area of the high mountain

pastures. The stockman's sheer joy at this newfound freedom echoes in the repetition of the words and phrases, "peace, peace" and "our life is better. Our life is much better." His deep appreciation for the change this innovation has brought to his quality of life, implies that life before electric fencing was one of constant stress and worry for the well-being of his flock. He acknowledges that innovation has not affected the productivity of the land, yet technology has brought a valued improvement: "the grass is the same, but our life is much better." The liberty brought by electric fences was a theme mentioned in 12 of the 27 interviews.

3. Change in the mountains

The biggest change is the shrubs, the brush
It is climbing and it is winning
The middle pastures
It is eating them
Enebro, aliaga, the pines as well
All of them are growing, growing, growing.
It is due to the lack of people
The brush in the middle pastures
We used to be there, all of us
From October to December
And we made small fires
Burning the brush
One here, one there
And we had our camps
And cut our wood
With the decline in livestock
The people have disappeared
Now we don't burn
It's not allowed
Not allowed
This does a lot of damage.

Here, the stockman responds to the interview question, "What are the biggest changes you have seen in the environment during your lifetime?" Like every interviewee in this study, he responds that the increase in shrub and forest cover is the biggest change. Like many other informants, he uses language that personifies both the vegetation and the mountains, in this case describing the brush as "climbing," "winning," and "eating" the pastures. The voracious appetite of the various shrub and tree species is emphasized by the repetition in the assertion that "all of them are growing, growing, growing." To this stockman, the cause of this change is clear as he describes the complex interactions of vegetation cover, livelihoods, land-use practices, demographic and socioeconomic trends, and institutional changes. Striking here is the use of the first person plural, "we used to be there, all of us" [emphasis added], harking to a time when a larger community of herders were an active force in shaping and maintaining the landscape: "and we made small fires, burning the brush...and we had our camps and cut our wood" [emphasis added]. Interestingly, it is not the decline in grazing pressure due to declining livestock populations that this stockman highlights, but rather the decline in a whole suite of human activities in the landscape that waned with falling livestock and herder numbers. He also alludes to the changing regulatory environment, which now prohibits the small-scale "artisanal" burns that pastoralists customarily practiced. The essence of his explanation for the changes, i.e., lack of people in the mountains, was mentioned in

89% of herder interviews in his village of Ansó (Fernández-Giménez and Fillat 2012).

4. *The sheep*

The sheep, apart from a living, one loves them
My sheep, I wouldn't trade for any others
In the world
Others might be better, of course
But I won't trade them
The thing is that I know them
I know that sheep, and that I can't replace
It's not economics, it's something else.
The pleasure of being a shepherd
And having my sheep.
Besides, I'm convinced these Ansotanos are the best
If not, we'd already be broke.
These sheep can compete with any others
The others aren't better
Mine are smaller and now the trend is for bigger
But I'm not in it for that
I'm in it to keep this sheep.

This poem speaks of fundamental relationships between shepherd and animal in the pastoral SES, and their connection to the motivation and identity of the shepherd. He admits that he loves his sheep as individuals, "I know that sheep and that I can't replace," and as an autochthonous breed, "I'm convinced these Ansotanos are the best." This pride in the local breed, in his own flock, and in knowing individual animals within his herd, are all part of what it means to him to be a shepherd. The motivation, he claims, is not economic. In the closing line "this sheep" could refer to an individual ewe or to the local breed. By choosing not to raise a more productive and lucrative commercial breed, the shepherd is both sustaining local pastoral culture and identity and contributing to genetic and biological diversity by helping to maintain a distinct locally adapted heritage livestock breed (Hall 2004). Not all stockmen interviewed professed such love for their animals, but neither was this man alone in his fondness for livestock.

5. *Agricultural entrepreneurs*

Now, everything is about money
They told me we had to be agricultural entrepreneurs
I won't stand for it
Because the day I am in the high mountains and my sheep need to go here
But they go there, and there is a rock slide or a cliff
What kind of entrepreneur do I need to be?
I need to be a man adapted to the mountains
A little more than the sheep
But not much
And an agricultural entrepreneur
is something else.

Here again, the stockman reflects on what it means to be a shepherd, in contrast to the government-promoted role of stockman as agricultural entrepreneur. As in the first poem, he identifies with the natural world "I need to be a man adapted to the mountains," and with his flock as creatures well-adapted to the mountain environment. For him, being a shepherd is about understanding how to live and work in the mountains, how sheep behave in mountain conditions, and how to use this knowledge

of the ecosystem, from terrain and geomorphology to animal behavior, to keep his flock safe and healthy. He sees this kind of knowledge as entirely different from the knowledge and skills of an agri-businessman.

Although many other stockmen spoke of changes to the livestock industry, such as the demand for a different type and age of lamb, others did not specifically raise the distinction between herding as an occupation and livelihood, and stock-raising as a business. However, the theme of identity as a stockman and its relationship to the experience of herding within this cultural landscape was expressed in several interviews. One of the youngest herders interviewed, a 36-year-old man from a family of transhumant herders with centuries of history in Ansó, recounted how he initially sold his herd and went to work as a truck driver, only to abandon trucking after six months and buy back his sheep. "It is clear to me. I like to do it. I tried to leave it and I couldn't. I got my trucking license and one year I left just 200 sheep and after six months I had to buy the rest back because I couldn't do it. I was born to this, I'm sorry."

6. *Subsidies*

It's behind us now,
That freedom we shepherds had
If the year was good, it was good
We had lambs, we earned money
If the year was bad, it was bad
But it was ours.
Now, we depend on what they give us
The subsidies
Without the subsidies
We would die of hunger
But the subsidies will kill stock-raising.
In those days, it was different
It was up to the shepherd
To do it well,
Sell his lambs better than anyone
Now, the ones who do well
Are the ones who know the payments
The rest of us,
Don't do so well.

On one hand herders are asked to become agricultural entrepreneurs, as we saw in poem 5, and on the other, they increasingly rely on government subsidies for their livestock-based income. Here the stockman laments how the skills a successful shepherd needs have shifted away from knowledge of how to manage the herds in a complex and variable natural environment, toward knowledge of how to game the complex system of subsidies that flow from the EU Central Agricultural Policy. The poem highlights the paradox of the subsidies from the viewpoint of this stockman. Without the subsidies, livestock rearing in the Pyrenees would quickly become so economically unfeasible that herding would disappear altogether: "without the subsidies we would die of hunger." However, in this stockman's view, the dependence on the subsidies has undermined the essence of herding culture and identity. In his view, independence, self-reliance, and skill were the hallmarks of an excellent shepherd, who was judged by his final product: the quality of the lambs he raised. The sentiments expressed in this poem were a very common theme mentioned in almost all interviews with stockmen, who

readily acknowledged their dependence on the subsidies. Many also expressed a fervent preference for earning their living directly from their product, rather than government payments.

7. *The future*

The future isn't good, the present isn't good
But if there must be sheep, if we want to eat lamb,
Then the future here is no better or worse than anywhere else.
Because this place has its advantages
If my son stays, I will be content
If he does things right, he will make a living
For me, well,
I lived the freedom of the mountain
Of doing things myself
A shepherd has to invent
No day is the same as another
Don't think: today I will take my sheep up here, and then move
them over there;
It will come out the opposite
And you have to change
You have to change gear
Not be of one fixed opinion
You always have to be thinking
Because the days change even in the same place
The days change like night to day.

The cycle of poems closes with a reflection about the future. The stockman reveals himself as a pragmatist, "the future here is no better or worse than anywhere else." He thinks of the future in terms of this particular village and valley, speaking of "the future *here*," and noting that "*this place* has its advantages" [emphasis added]. He goes on to emphasize the dynamic nature of this system and to describe the shepherd's role as an inventor, who always must be ready to alter thinking and behavior in response to the changes around him. Despite, or perhaps because of, the ancient and place-based nature of his occupation, he is no stranger to change, surprise, and adaptation: "Don't think: today I will.... It will come out the opposite." The skilled herder possesses deep knowledge of place, and of animal behavior in this place, and uses this knowledge to adjust management to the constantly shifting interactions of ecosystem and animals.

DISCUSSION

Place, identity, and traditional knowledge in the cultural landscape of the central Pyrenees

This poetic analysis draws attention to the role of the stockman within this SES, and specifically, the importance of occupational identity and place attachment in the stockman's experience of change and adaptation in this system. Reformulating the interview transcript as a series of poems, and analyzing the use of language in these poems, helped to identify the multiple and sometimes contradictory ways in which the stockman sees his role in this SES, and how he understands the causes and consequences of system change.

The first contradiction is between the stockman's identity as an adapted, native element of the ecosystem, and his identity as an active creator of the cultural landscape through burning, grazing, and wood-cutting. His identity as part of the natural system has both positive (like the wild stags) and negative (like a wild boar) connotations, embodying the age-old tension between an

indigenous world view that sees people and nonhuman beings as kin and a dualistic world view that sees nature as the "other." He believes that the disappearance of people from the mountains has caused shrub encroachment, highlighting human agency and activity as a self-regulating feedback mechanism within this SES. Human agents, through cultivation, deliberate burning, wood harvesting, and grazing, created and maintained landscape heterogeneity and the flow of ecosystem services associated with this cultural landscape. The poems thus provide insight into the way that an individual pastoralist within this SES understands himself as shaped by and adapted to this landscape, and as an active agent in creating and maintaining it.

A second contradiction lies in the stockman's attitudes toward tradition and especially traditional management practices. On one hand, he rejects some traditional practices (transhumance), embraces new technologies (electric fences), and describes his role as an "inventor." On the other, he bemoans the outlawing of other traditional practices (burning, woodcutting), conserves a locally adapted heritage livestock breed, and takes pride in his traditional knowledge of animal behavior and mountain terrain. This apparent contradiction aligns with an understanding of TEK as a dynamic and evolving body of knowledge and practice, and illustrates that while TEK may contribute to adaptation and resilience, innovation is also an essential component of adaptive capacity. The stockman draws on both tradition and innovation to adapt within this SES.

Building on the theme of tradition, a third contradiction is expressed in the stockman's conflicting attitudes toward the past and present. Although he idealizes the freedom and self-reliance of the shepherd's life in the past, he gives an unvarnished account of the hard work and harsh living conditions of the transhumant herder. In the present, he bemoans increasing dependence on subsidies, burdensome and, in his view, damaging environmental regulations, loss of freedom, and preoccupation with profit. Yet he celebrates the newfound freedom and peace brought by labor-saving innovations and acknowledges pragmatically the necessity of subsidies if herding is to continue as a lifeway, land use, and occupation in the central Pyrenees.

The stockman's identity, as it emerges from these poems, is formed through the interaction of occupation and place. Being a shepherd in this cultural landscape has made him a man adapted to the mountains, who prizes freedom and self-reliance, a person who loves his sheep, an inventor and flexible thinker. It has made him value his knowledge of herd and terrain, and ability to raise high-quality lamb, over the ability to make a profit or manipulate bureaucracy to maximize subsidy payments. Here lies a final and fundamental contradiction. Although the stockman sees himself as adapted to the mountains and ready to change gear and alter opinions and behavior, a paragon of adaptability, he also strongly resists some changes, like the call to become an agricultural entrepreneur. One explanation of this final contradiction is that the mandate to change his production model fundamentally threatens key elements of his identity and therefore must be rejected.

What are the implications of these insights into one individual's subjective experience of change in one valley of the Pyrenees? First, these insights emphasize the role of cultural landscapes in shaping individual identity; which identity in turn influences how

and why individuals prefer certain landscapes, in this instance a heterogeneous mosaic of pasture, meadow, shrubland, and woodland rather than a homogeneous forest. Second, this analysis provides an example of human agency in creating and maintaining a long-functioning cultural landscape/SES. Third, by illuminating the role of humans in this cultural landscape/SES from a subjective perspective, this analysis reveals from a human emotional and psychological perspective, the consequences that loss of this cultural landscape may bring. If identity and place attachment are important cultural ecosystem services, poetic analysis illustrates poignantly how the provision of these services is threatened by the current transformation, as is the cultural resilience of the system (Crane 2010). Fourth, this analysis highlights potential barriers to adaptation or constructive transformation, again from the subjective psychological and emotional perspective of one key individual in the system, namely strong resistance to adopting a more agribusiness-oriented production system and objection to increased dependence on government support. Fifth and finally, insights into these barriers to adaptation and transformation lead to the practical implication and recommendation that actions and policies to motivate stockmen should avoid appeals to entrepreneurship or government support, which conflict with this individual's core identity. Instead, incentives should appeal to core aspects of the stockman's identity and sense of place to motivate adaptation and change.

Does poetry have a place in social-ecological systems research?

What has poetic analysis brought to our analysis of a complex adaptive SES? Can it contribute to deeper understanding of human roles within coupled systems or stronger social theories to explain them? Is it an effective way to communicate human experience of coupled system dynamics?

The process of constructing and analyzing the poems led to a closer reading of the transcripts and a different type of data interpretation than the coding I typically use when searching for common patterns and variability in qualitative data. Turning transcripts into poems forced me to reread and return to the transcript multiple times as I interpreted the poems to be certain that the analysis was faithful to the meaning in the verbatim transcript. Thus, I have high confidence that the poems and interpretation captured the intended meaning of the informant. In addition, creating and analyzing poems led me to focus more closely on the language the informant used, and the meanings embedded in images, metaphors, and repetition in the transcript. This attention to language, in turn, helped me to avoid simplifying assumptions, romanticizing the past or being overly optimistic or pessimistic about the future. It also underscored the multidimensionality of human identity and agency within the landscape, and the contradictions that arise from the interactions of place, identity, traditional knowledge, innovation, and social-ecological change. Finally, the poems captured and expressed the affective relationship of the stockman to his sheep, village, livelihood, and landscape in a way that conventional coding and data representation could not.

Although theory-building was not the main focus of this exploratory analysis, the process of poetic analysis led me to think about SESs through multiple theoretical and conceptual lenses

that I had not previously applied or had not attempted to integrate into a cohesive analytical framework, including cultural landscapes, ecosystem services, traditional knowledge, resilience, sense of place/place attachment, and identity. Initially, my theory of the relationship between traditional ecological knowledge (TEK), ecosystem services, and resilience was a simple one. Traditional ecological knowledge, i.e., biophysical observations, management practices, beliefs, and institutions intergenerationally transmitted, dynamically evolving, and specific to a particular people and place, is important to SES resilience because it is the cultural memory of the system and thus can be a resource for adaptation (Berkes et al. 2003, Kassam 2013). TEK can help maintain desired ecosystem services, and a resilient system produces certain services, which in turn maintain the system's resilience (a self-reinforcing feedback). Prior to this exploratory poetic analysis, arts-based inquiry had not been connected to these themes as a way of analyzing data about coupled social-ecological systems.

A more complex conceptual framework emerged as a result of the poetic analysis, which led me to see identity and place, and identity with place, as central to this SES, and cultural landscapes as a mediating concept between the subjective psycho-emotional concepts of identity and place attachment, and the concepts of resilience and ecosystem services, which initially emerged from biophysical and social science disciplines rooted in empirical realism and positivist epistemologies. Under this framework, the cultural landscape of the Valley of Ansó is the place; it has physical characteristics including the natural and built environments, their specific social and cultural manifestations ("place character"), both material artifacts (such as the Ansó traditional costume), and traditions, customs, and institutions specific to this location (such as the annual festival of the Ansó traditional costume), and it engenders distinct emotional and psychological responses ("place attachment," "sense of place"). This landscape both shapes the identity of the stockman (as a person from Ansó, as a man adapted to the mountains, and as a member of the human community in Ansó), and is shaped by him through his (and others') traditional land use and resource management practices. The cultural landscape provides flows of ecosystem services, including cultural services such as sense of place and identity, as well as provisioning, regulating, and supporting services. TEK is generated and maintained through interactions with and experiences in this cultural landscape and through membership in a community that collectively identifies with this place. TEK creates the cultural landscape from which the ecosystem services flow, is a source of cultural memory to support system resilience, and is an expression and reflection of identity and experience in place.

This framework raises the question: what does resilience of this SES mean? Is it maintenance of this cultural landscape, which requires also maintaining to some degree the active stewardship of the landscape by people whose identity and attachment to place in turn are formed through these interactions? If the system loses resilience and the cultural landscape is transformed, place and identity will also be lost or transformed. In this analysis, poetry helps us understand what it is that may be lost. However, poetry also helps us to see human agency and capacity for adaptation and transformation.

This poetic analysis helped to bring specific elements of subjective human experience into analysis of an SES, thereby increasing our understanding of the “social” in this social-ecological system, but there is much room for additional work in this area. Key themes that were not addressed within these poems, for example, include social differences, including gender, and power dynamics within the community. Further, the use of poetry, the contradictions it illuminated notwithstanding, may lead to a somewhat conservative and idealistic representation of the past.

CONCLUSION

This poetic analysis identified contradictory aspects of one human’s experience in this SES. What remains constant and central in his narrative is the stockman’s attachment to this cultural landscape, and his identification with this place and with his occupational role as shepherd, which are inextricably intertwined. The herder’s identity as a man adapted to the mountains, an inventor, able to change mind and practice, is created through interaction with this dynamic SES. In turn, important biophysical characteristics of this cultural landscape have been shaped by the actions of generations of rural inhabitants and infused with meaning through their collective experiences living in and from, and stewarding, these valleys, the peaks above, and the plains below.

As the landscape changes again, this time as a result of rural depopulation and land abandonment, how will the shepherds adapt? Will this cultural landscape and SES retain its identity or will it be transformed, at least for a time, into an alternative regime, as the forests, through secondary succession, reclaim the mountain slopes, and herding becomes impossible. And if this happens, as seems inevitable to many local and scientific observers, what will the consequences be for the agro-pastoral society that created and maintained this cultural landscape, whose heritage is inscribed in it, and whose livelihood and identity depend on it? This analysis does not attempt to answer this question, but rather sheds light on the psychological and cultural implications of this potential SES transformation and the complexity of social-ecological interactions embedded within it.

For an interdisciplinary researcher who constantly navigates the boundary between social and ecological sciences, this exploration in poetic analysis provided a welcome creative outlet while at the same time helping to “keep it real” by grounding the interpretation and discussion in the language and experiences of an ordinary, extraordinary man. Through his words I came to understand the valley of Ansó as an inhabited and historic place, resonant with emotional and cultural meaning for a particular person and community, rather than solely as a social-ecological system and object of study. Poetic analysis has been heralded as a more concise and penetrating way to communicate research results. Although I cannot judge the aesthetic quality of these poems as poetry, the audience and reader responses to the poems and analysis have been positive, and the work has inspired several students and colleagues to explore poetic analysis with their own data. This experiment leads me to conclude that poetic analysis, when applied with careful attention to the standards of qualitative analysis validity and rigor, can help me, as a researcher, reach a deeper level of analysis looking inward at the data, while at the same time achieving a greater outward impact on the reader/audience. This impact, I posit, arises from the unique way in which

poetic analysis allowed me to combine the interviewee’s voice, my own creativity, and scholarly analysis and interpretation within one integrated work of combined art and scholarship.

Responses to this article can be read online at:

<http://www.ecologyandsociety.org/issues/responses.php/8054>

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Appendix 1. Interview excerpts and translation.

In the interest of illustrating how I turned an interview transcript into a poem, I provide here the interview excerpts that were used to create two of the poems, Innovation and Change in the Mountains. First I provide the transcription of the interview in Spanish, then a rough translation into English. The phrases that were used in the poems are underlined.

Interview Excerpt used to create *Innovation*

GANADERO Hombre en los puertos antes teníamos que estar todo el día, o sea en un puerto llegabas hasta.. Ahora con los pastores eléctricos y nos dan muchísimos. Los puedes dejar. Muchísimo libertad. Se sienten la electricidad y se vuelven. No hace falta estar. Simplemente para llevar el ganado en atajos diferentes. Claro. Cada uno lleva las suyas y entonces hay que tener esos mujones, esos lindes. Y esos lindes antes había que con el perro. Antes tenías que estar tu allí para volverlas pa atrás. Los pastores eléctricos ayudan muchísimo. Paz, paz. La hierba es lo mismo, pero la vida nuestra ha mejorado. Es muchísimo mejor.

STOCKMAN Man in the high passes before we had to be there all day, in other words in one pass you arrived until... Now with the electric fences and they give us a lot. You can leave them [the sheep]. Such freedom. They feel the electricity and they turn away. You don't have to be there. Only to move the sheep to a new pasture. Of course. Each person brings their sheep and then we put up the fences. Before we used dogs. Before you had to be there to turn them around. The electric fences help a lot. Peace, peace. The grass is the same, but our life is better. It is much better.

Interview Excerpt used to create *Change in the Mountains*

RESEARCHER Y que cambios ecológicos ha observado durante su vida aquí?

RESEARCHER *And what ecological changes have you observed during your lifetime here?*

GANADERO El principal cambio es el arbusto, la mata. Eso es el principal cambio. Y está subiendo y está ganando. Esos puertos que hablaba yo, intermedios, se los están comiendo las matas. Las matas. Matas digo yo, enebro, aliaga, los pinos también van muy a más, muy a más, muy a más.

STOCKMAN The biggest change are the shrubs, the brush. This is the main change. And it is climbing and it is winning. These pastures that I was speaking of, the middle pastures, the shrubs are eating them. The shrubs. Shrubs I tell you, enebro, aliaga, the pines as well, are getting much more, much more, much more.

RESEARCHER Y eso es por falta de ganado?

RESEARCHER *Is it due to the lack of livestock?*

GANADERO Eso es por falta de personas. Esos matas en los puertos de intermedios. Yo estaba, y todos, para otoño hasta diciembre con las ovejas. Y estábamos haciendo fuego, quemando los matas. Una mata aquí, otra mata allá. Y eso sujeto y eso. Y las personas habían campos, campos pequeños y cortaban para hacer, estos abonar y por allí. Eso ha sido falta de personal. Falta de ganado, claro. Al bajar el ganado, han desaparecido la personal. Entonces

ni quemamos y eso no. El quemar, no nos dejan quemar. Que es una barbaridad, eh, para mi. A mi corto. No se puede quemar indiscriminadamente pero esos terrenos tan.... Había que quemarlos. No se puede, no se puede. Y eso lo hacen, para mi hace muchísimo daño.

STOCKMAN This is due to the lack of people. These shrubs in the middle pastures. I was there, and all of us, from the fall until December with the sheep. And we were making fires, burning the shrubs. One shrub here, another shrub there. ... And the people..there were camps, small camps and they cut wood, and fertilized and so on. This is due to the lack of people. Lack of livestock of course. As the livestock decrease, the people have disappeared. So now we don't burn or anything no. The burning, they won't let us burn. Which is a disaster, for me. [A mi corto] One mustn't burn indiscriminantly but these lands, they had to be burned. Now it is not allowed, not allowed. And this, for me, this causes a lot of damage.