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## ETHNOBIOLOGY, POLITICAL ECOLOGY, AND CONSERVATION

Steve Wolverton<sup>1</sup>, Justin M. Nolan<sup>2</sup>, and Waquar Ahmed<sup>3</sup>

*Ethnobiology is increasingly recognized from within and outside of its boundaries as interdisciplinary. The Society of Ethnobiology defines the field as “the scientific study of dynamic relationships among peoples, biota, and environments.” Ethnobiologists are able to skillfully assess challenges of biocultural conservation across the divides of political ecology. They are situated to mediate between conservation programs that target biodiversity preservation with little concern for the needs of human communities, and those (such as the New Conservation movement) that privilege those needs. Ethnobiology also transcends the pervasive assumption in these fields that Western knowledge and economic goals should guide change. Because of ethnobiology’s importance as a bridging discipline, it is important to ask what unifies ethnobiology. Is it common subject matter? Or, is there an underlying emphasis representing an “ethnobiological perspective?” Answers to these questions are explored here using content analysis and discourse-and-ideology analysis. We use the results to identify the unique roles ethnobiologists play in biocultural conservation. This analysis also proved useful in the systematic identification of four salient themes that unify ethnobiology—ethics in ethnobiology, shared environmental and cultural heritage, interdisciplinary science and non-science, and ecological understanding. How ethnobiologists conceive of themselves is critical for further enrichment of the field as interdisciplinary human-environmental scholarship, particularly in reference to biocultural conservation. Self-definition makes explicit the unique strengths of the field, which by its very nature integrates a sophisticated understanding of political ecology with appreciation of the value of traditional ecological knowledge (TEK), social science, and the biological sciences.*

**Keywords:** *ethnobiology, political ecology, New Conservation, biocultural conservation, conservation biology*

### Introduction

Ethnobiology has recently entered an age of application (Nabhan et al. 2011; Saslis-Lagoudakis and Clarke 2013; Sillitoe 2006). Biodiversity conservation can no longer be decoupled from local and traditional knowledge (Ahmed 2008; Davidson-Hunt et al. 2012; Huntington 2011; Lepofsky 2009; Müller and Dan Guimbo 2010), though integration of local communities into conservation efforts is not without its challenges (Agrawal 1995; Birkenholtz 2008; Sahai et al. 2005; Soulé 2013; Stoll-Kleemann et al. 2010). As Stoll-Kleemann et al. (2010:28) point out, “fostering local empowerment or development might not necessarily be compatible with sustainable natural resource use.” Correspondingly, biologists may favor policies that enhance biodiversity and social scientists may lean toward policies that alleviate concerns of social or environmental injustice (Chapin 2004). These divides and their consequences for human communities are part of the subject matter of political ecology, which examines the converging effects of politics, economics, and social values on ethnobiological, biocultural,

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and conservation policy and research (Peet and Watts 2004; Robbins 2012). Political ecological perspectives are not uniform and may or may not be conflicting, but in the context of what is increasingly referred to as “biocultural conservation,” ethnobiologists clearly play a pivotal role because our studies straddle human-environment relationships as well as science and social science (sensu Dunnell 1982; Howell 1994; Pilgrim and Pretty 2010). Although much of what the ethnobiologist has to offer is theoretical (Nabhan et al. 2011), it is the empirical nature of ethnobiology that is particularly promising for engaging biocultural conservation (references in Albuquerque et al. 2014 and in Lockyer and Veteto 2013).

Ethnobiology is uniquely suited to this role because bridges between ethnography and archaeology and biology mold cultural *data* into the context of human environment interactions, often manifesting as “subtle ecologies,” which can be defined as “slow relations that rely on diffuse causalities and micro-effects related to invisible or fleeting action” (Wyndham 2009:272). Subtle ecologies represent embedded and intrinsic interactions of indigenous (and other) peoples with the landscapes they occupy and are part of. These interactions are nuanced from cross-cultural and political-economic perspectives; what may be comprehended as important in one cultural context could be invisible to someone connected to a different political-economic, cultural and environmental heritage (Figueroa and Waitt 2008, 2010). Subtle ecologies are local in scale and represent direct human-environment experiences and knowledge. These subtle ecologies are essential for addressing contemporary environmental problems; such delicate, diaphanous components of biocultural conservation constitute a significant part of ethnobiological scholarship. If conservation is to be locally impactful, then it must necessarily incorporate ecological knowledge inherent in the subtle (and also discrete and visible) ecologies of those who know one or another place best—often indigenous people. Ethnobiologists take seriously the need to understand that “traditional ecological knowledge is scientific and makes sense” (Anderson 2013:47). We believe this is what makes it possible for ethnobiologists to straddle political ecological divides that commonly exist between cultural and biological forms of conservation.

The unique relevance of ethnobiological research for biocultural conservation stems from its intellectual development as a discipline. Ethnobiology began as an empirical and descriptive interdisciplinary endeavor and has evolved accordingly (Clément 1998). Hunn (2007) provides a template for the evolution of the field, and definitions of ethnobiology have morphed during that evolution (Anderson 2011; Ford 2011). The definition currently adopted by the Society of Ethnobiology is “the scientific study of dynamic relationships among people, biota, and environments” ([www.ethnobiology.org](http://www.ethnobiology.org)). The history of ethnobiology can be summarized into four phases described by Hunn (2007; Table 1). Of Hunn’s phases, we devote attention here to Ethnobiology IV, or indigenous ethnobiology, because of its embedded concern with the ethics of cross-cultural research. In addition, Wyndham et al. (2011) conceptualize a fifth phase that situates contemporary ethnobiology in the context of the global environmental crisis, which we refer to as Phase V. This constitutes a phase of interdisciplinarity and application in areas related to cultural and biological conservation, focusing

Table 1. Phases of ethnobiology (Hunn 2007; Wyndham et al. 2011).

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Ethnobiology I—Documentation and Description—late 1800s through 1950s
Ethnobiology II—Ethnoscience: Cognition—1950s forward
Ethnobiology III—Ethnoecology: TEK and related arenas—1970s forward
Ethnobiology IV—Indigenous Ethnobiology: Power Relations—1980s forward
Ethnobiology V—Interdisciplinarity and Application—2010s forward

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on “the needs of a world coping with rapid ecological change and shifting political economies” (Wyndham et al. 2011:124).

### **Ethnobiology, Conservation Biology, and Political Ecology**

The subject matter of ethnobiology is deeply relevant to solving problems of social and environmental injustice on multiple scales (Maffi 2004). These are problems that may or may not be addressed in conservation biology, a field with a comparatively compact focus. We surmise that ethnobiology and conservation biology indeed have parallel priorities and trajectories, each capable of informing and augmenting the other. Many conservation biologists, like ethnobiologists, seek to provide for the continued evolution of biota and the support of biodiversity (Frankel and Soulé 1981; Meine et al. 2006). However, Wolverton (2013) posits that conservation biology and ethnobiology are inverted versions of each other in terms of scope of mission and scale of audience (Figure 1). If ethnobiology is to grow in its influence on biocultural conservation, it is problematic that the audience of ethnobiology is small in comparison to that of conservation biology. A Google Scholar meta-analysis illustrates this contrast. Figure 2 highlights trends in use of the term ethnobiology and other related fields or sub-fields. Despite the increasing use of a number of these terms, ethnobiology is an order of magnitude lower in its contemporary frequency of use than conservation biology (by this measure). While conservation biology is no panacea for environmental problems, some members of the field have recently broadened foci to engage culturally constituted knowledge systems with varying degrees of success (see summaries in Davidson-Hunt et al. 2012; Lertzman 2009; Rozzi et al. 2006). This direction in conservation biology extends and reflects what ethnobiologists have done for decades—documenting traditional knowledge systems as they exist ecologically in the minds and lives of indigenous peoples worldwide.

During the last two decades the epistemological distance between ethnobiology and conservation biology may have slowly diminished as ethnobiologists have sought to establish meaningful ethical standards for cross-cultural research in traditional ecological knowledge (TEK). Some conservation biologists have similarly asserted a need for systematic, holistic approaches to conservation that include biocultural conservation and political ecology (Stoll-Kleemann et al. 2010). During the 1980s and 1990s, conservation biology began transitioning toward more holistic conservation initiatives. Originally framed within biology and focused on preserving biodiversity, conservation biology is grounded in a utilitarian philosophy rooted firmly in biological science, particularly population genetics (references in Soulé 1987; see a recent reiteration by Soulé 2013). It is

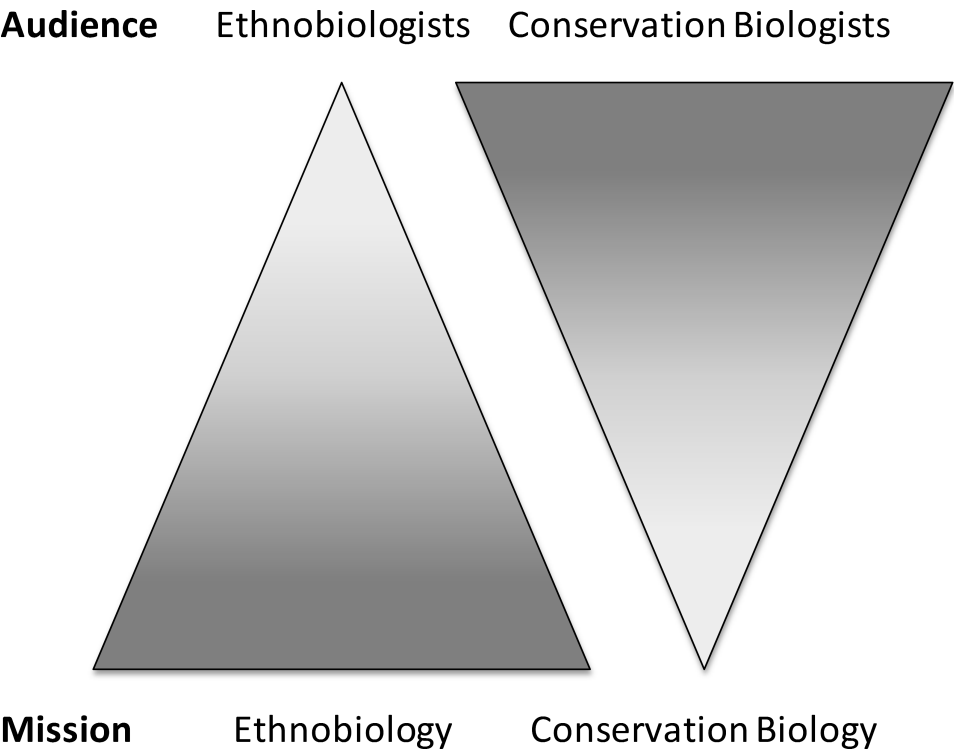


Figure 1. An ordinal scale model of the missions of ethnobiology and conservation biology showing their relationship to audiences (from Wolverton 2013:22, Figure 1). For explanation see text.

referred to as a “mission-driven” field (Meine et al. 2006), and that mission is to prevent loss of biodiversity produced by contemporary human impacts. By the 2000s cross-disciplinary conservation had emerged through purposeful incorporation of social science, including anthropology (Berkes 2007; Colding and Folke 2001; Ostrom 2007). However, much of biological conservation continues to be what Pressey and Tully (1994) refer to as ad hoc conservation based primarily in biology. While ad hoc conservation is not holistic, it does progress expediently in response to shifts in population genetics and ecology (Mills et al. 2012). Thus, there is a continued call for more comprehensive and therefore effective approaches to conservation, including biocultural design (Davidson-Hunt et al. 2012), community-based conservation (Berkes 2007), and community-based participatory research (Davidson-Hunt and O’Flaherty 2007; Mulrennan et al. 2012).

Emerging from, or perhaps developing parallel to, these calls for cross-disciplinary conservation is the “New Conservation” (Kareiva et al. 2011; Marviera 2013; Nordhaus and Shellenberger 2011). The New Conservation movement (NCM) explicitly takes the focus away from designing biological preserves and focuses instead on people-driven conservation incorporating anthropogenic landscapes; however, the implication of NCM is that biodiversity conservation is passé and that biological conservation goals merely reflect

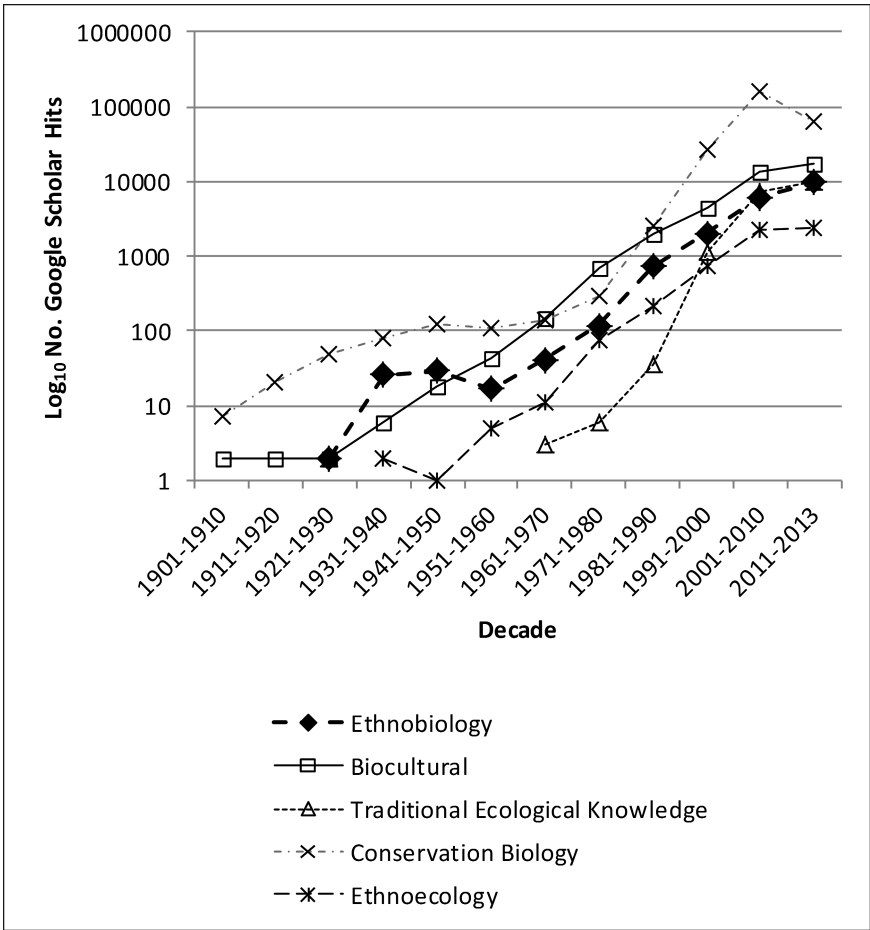


Figure 2. Number of Google Scholar hits on the term “ethnobiology” and related terms over multiple decades, plotted on a logarithmic scale ( $\log_{10}$  Y axis).

nostalgia for the lost “pristine wilderness” that may never have existed in the first place. In response, Soulé (2013) discusses important drawbacks of the NCM for biodiversity conservation; instead of focusing on biodiversity and establishment of reserves, it purportedly shifts the focus to benefiting the highest number of people possible in local communities.

While these points may well appeal to ecological anthropologists, environmental philosophers, and ethnobiologists engaging in biocultural conservation, it is clear also that “benefits” under the NCM are defined largely in terms of Western culture and neoliberal economics. For example, Kareiva et al. (2011:36) invitingly state that conservation should “enhance the health and well-being of both human and non-human natures.” However, the authors (one of whom, Peter Kareiva, is Chief Scientist for The Nature Conservancy) follow this statement with, “instead of scolding capitalism, conservationists should partner with corporations in a science-based effort to integrate the value of nature’s benefits into their operations and cultures.” The NCM seeks to meld

conservation with globalization, development, and neoliberal economics, all of which entails commodification, commercialization, and corporatization of nature (Peet et al. 2011). Those who need to be partnered with, however, are local community members, whose recruitment and involvement remains a challenge for conservationists (Agrawal 1995; Chapin 2004; Stoll-Kleemann et al. 2010). Ethnobiologists who study TEK are aware that what is construed as “beneficial” in terms of resource use and conservation is diverse. For example, many holders of TEK would not recognize two types of “nature” (Anderson 2010; Hunn and Selam 1990). Thus, it is paramount that ethnobiologists increasingly come to the conservation table with TEK and local interests that are likely to be under-represented in these conversations, because many local peoples are disempowered while their cultures are disappearing (Escobar 1998). Such conversations also require that conservation biologists recognize the coupling of cultural and biological diversity and the corresponding importance of cultural conservation in addition to biological conservation (Maffi 2001; Pretty et al. 2009; Rozzi and Poole 2008; Stepp et al. 2005).

Ethnobiologists have long recognized that ethnobiology has a unique role to play in mediating between the extremes of anthropocentric and biodiversity-focused approaches (Lepofsky 2009; Newing 2010; Rao 2002; Saslis-Lagoudakis and Clarke 2013; Stepp et al. 2002; Turner and Berkes 2006; Vandebroek et al. 2011; Wolverton 2013). In order to maximize the field’s impact on audiences in the scholarly, economic, political, and social landscapes of environmental justice, conservation, and political ecology, it is important to ask, *where do ethnobiologists go from here?* The endeavor of ethnobiology has never been more important, and in the context of the recent development of Phase V, the time has come to take stock in what is meant by “an ethnobiological perspective.” More importantly, is there an agreed-upon perspective among ethnobiologists? The answer to the question “what is an ethnobiological perspective?” is critical for shaping the growth of Ethnobiology V and its articulation with biocultural conservation.

### **An Analysis of the Ethnobiological Perspective**

In order to systematically explore the meaning of an “ethnobiological perspective,” we administered a simple survey to ethnobiologists. We present the results of this survey, followed by discussion of the distinctive features of the ethnobiological perspective and a proposed framework for unifying themes of scholarly interest and concern within ethnobiology as a discipline. Data from the survey are analyzed using quantitative and qualitative approaches. Both approaches rely on the assumption that the words people use in descriptions are more salient when they occur frequently and collectively in narratives, discourse, or other textual content (Bernard and Ryan 1998; Nolan and Stepp 2012; Ryan and Bernard 2003). Results of this survey are integrated into our discussion of unifying themes of ethnobiological scholarship and potential new directions for the field.

#### *Sampling*

We approached 61 ethnobiologists who have served in the last decade on the Society of Ethnobiology Board of Directors, served in the past as an editor or editorial board member of one of the Society’s publications, or authored a paper



in one of the Society's journals. Our survey solicited a narrative response of 300 words or less to a single question: "what is an ethnobiological perspective?" In addition, we asked for the following demographic data: gender, years in discipline, field of terminal degree, and primary occupation (e.g., consulting or academic). Thirty-eight ethnobiologists responded: 21 males and 17 females, all from research scholar positions at universities, botanical gardens, research institutes, or museums. In order to compare professional ethnobiologists with diverse levels of experience to those who have only recent exposure to the field, we also surveyed members of the spring semester, 2013 Medical Anthropology class at the University of Arkansas (n=32). This class was taught from the perspective of ethnobiology and ethnomedicine, and students who participated were exposed to primary literature in the field prior to the survey. This comparison allows us to evaluate whether or not there is a degree of consensus as to what constitutes an ethnobiological perspective that grows with experience in the field. In this paper we focus on differences in responses between students and professional ethnobiologists, interpreting the distribution of word content of narrative responses, and the influence of years in the discipline on word content.

### *Quantitative Analyses and Results*

Content analysis was accomplished using the program *Anthropac* 4.95 (Borgatti 1995) incorporating the 63 words most commonly used by ethnobiologists to describe their perspective. This set of words represents those that occurred in at least five responses. The most common words were those such as *culture, human, plant, animal*, and so forth; the next most common words are those we believe convey the hallmarks of variability in the responses. Here we use two inductive multivariate statistical approaches that allow us to map the nearness and distance of survey responses in terms of word content. Multidimensional scaling is an "information visualization" approach that we use to explore similarities and differences in survey responses (see Romney et al. [1972] for a discussion of the theory behind MDS). We use non-metric MDS, which requires fewer statistical assumptions, such as normality in data. NMDS is used to map the distribution of survey responses, such as the differences between an "expert's" and a "non-expert's" knowledge of biological domains (Boster and Johnson 1989; Nolan 2001, 2002).

We portray the content distribution of student versus professional ethnobiologist responses in Figure 3 to the question "what is an ethnobiological perspective?" Along the two content dimensions, those who fall closer to one another shared similar word-use patterns. Students form a ring around professional ethnobiologists, suggesting that there is an ethnobiological perspective that *solidifies* with experience. In this sample, not surprisingly, students are wildly diverse in their responses; professional ethnobiologists submitted narratives that are more uniform and constrained in their word-use patterns.

The contrast between students and professionals prompted us to zoom in on career researchers, because though there is consensus compared to these anthropology students, there is also diversity among professional ethnobiologists. Correspondence analysis, a categorical principal components analysis that



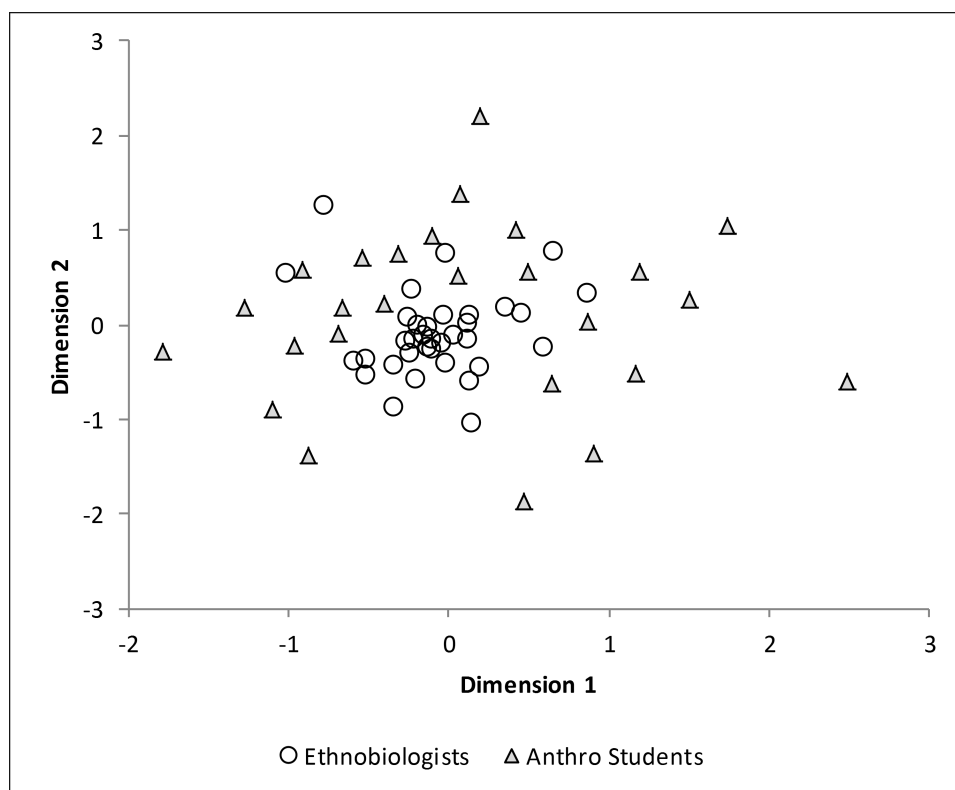


Figure 3. An NMDS (Non-Metric Multidimensional Scaling) plot of student and professional ethnobiologist survey response.

allows one to summarize variability in frequencies of use of words across respondents (Johnson and Griffith 1998; Weller and Romney 1988), was applied to our data. We conducted this part of the study in two ways: 1) across the survey narratives to map the co-occurrence of words; and 2) across the surveys to map the similarities and differences in respondent narratives. *That is, which ethnobiologists tend to fall closer to or more distant from one another in terms of the content of their answers?* Then we looked at independent variables, such as gender, experience, and background, to see who gravitated toward what and who fell near whom.

Figure 4 displays the distribution of word content; we divided the words to be viewed as Figure 4A and 4B because they are difficult to see in one chart. When we add ethnobiologists to this illustration (Figure 5), we can see associations between individual ethnobiologists and the words they tended to use. So the key to assessing whether or not there are areas of consensus among ethnobiologists is determining which words co-occur, and to examine if there are any interesting patterns in the occurrence of the content.

To examine the word distribution more closely, we list visually outlying words in each quadrant of Figure 5 to describe the spatial continua in responses. We then used these as descriptors for each quadrant, and interesting patterns emerged. Ethnobiologists cover quite a continuum from foci on *cognition and*

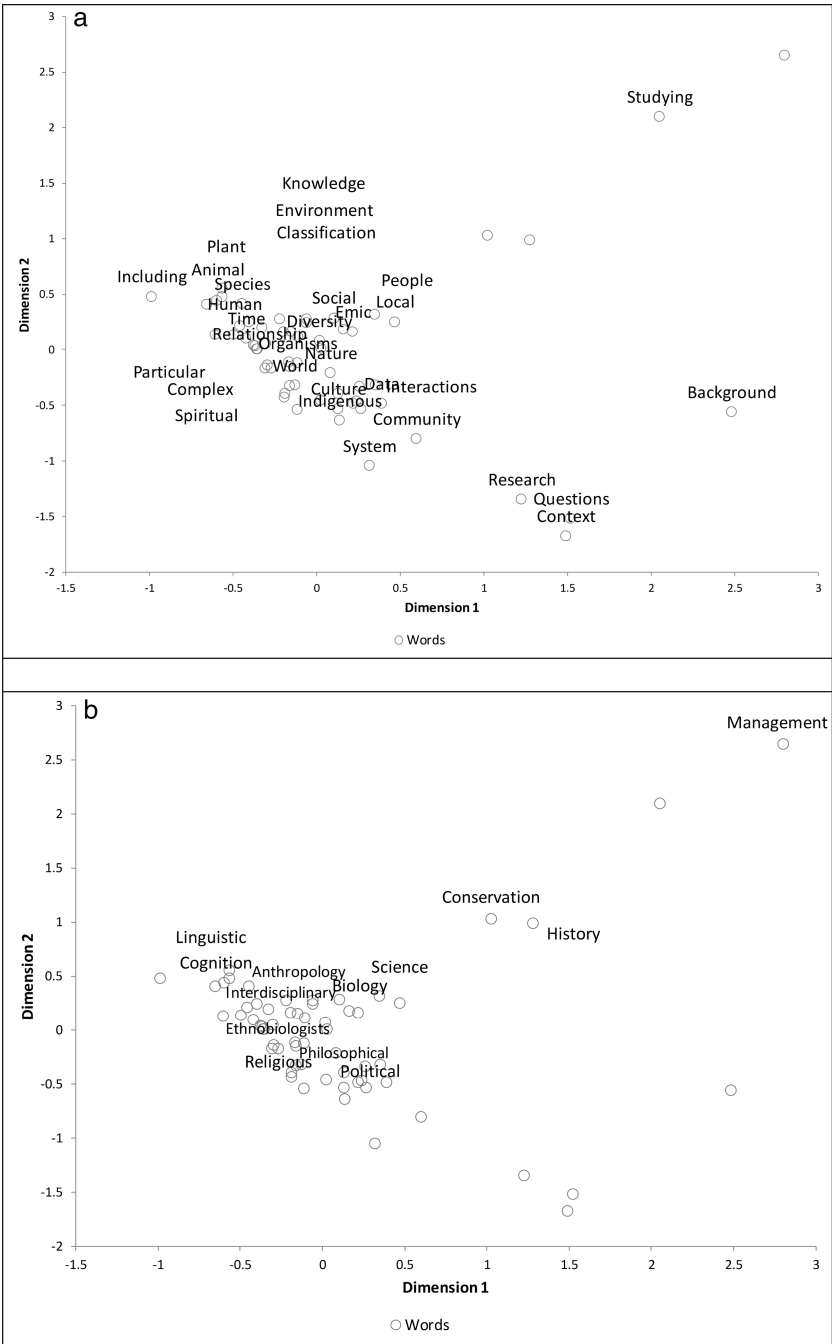


Figure 4. Results of correspondence analysis of words mentioned in survey responses. Words are plotted across two separate graphs to improve visibility. Words that lie closest to each other are most frequently associated in responses.

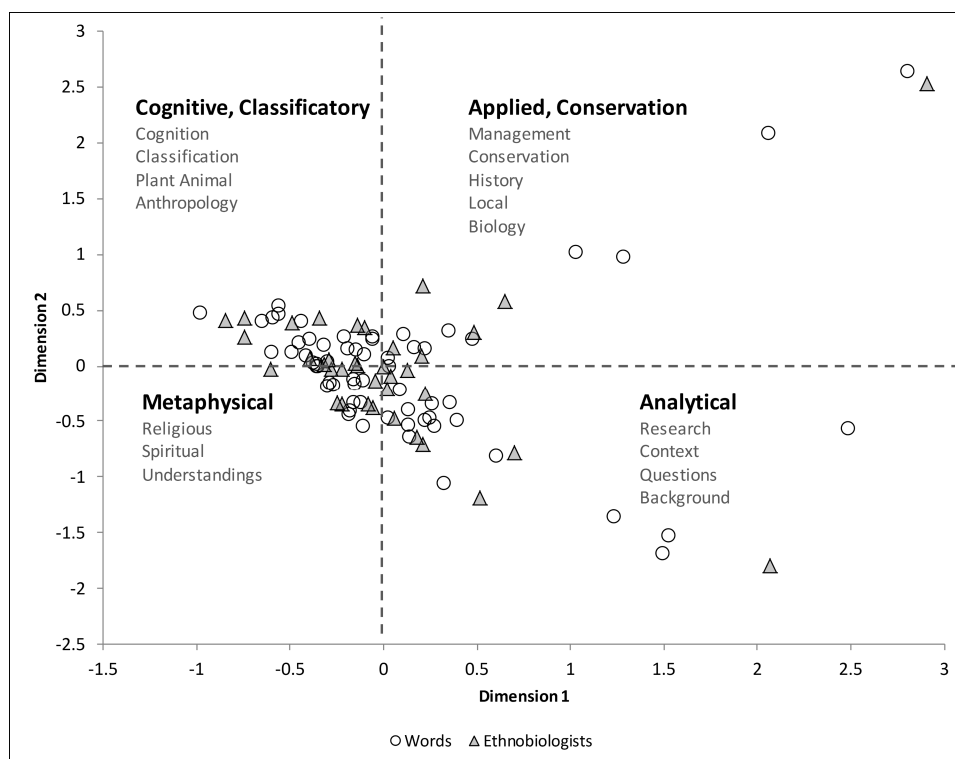


Figure 5. A correspondence analysis plot portraying associations between content of response narratives and individual ethnobiologists. Ethnobiologists (represented by triangles) that cluster together tended to use similar words to describe the ethnobiological perspective (the same words, each represented by a circle, that are situated near them on the graph). Words in bold are the outliers in each quadrant (the words whose data points in the correspondence analysis are farthest from the center). Below these bolded outliers are listed the other words that appear in that quadrant.

*classification* (upper left) spanning to *analytical* (bottom right). Again along a separate continuum ethnobiologists range from *metaphysical* (lower left) to *applied* (upper right); subject matter associated with anthropology tends to be to the left of this graph, and to the right there tends to be subject matter related more closely to biology.

Although these continua represent a static depiction of current members of the field, there is also a temporal dimension of change. Assessing the plot of ethnobiologists here, we identified them by number of decades spent actively in the field. Much like with students versus professionals in our NMDA analysis, there is a clear increase in clustering (agreement or consensus) with time (Figure 6). It is also interesting that the spread tends to move outward with less experience and to the right toward analytical and applied subject matter. This, we believe, indicates a recent push toward Wyndham et al.'s (2011) Ethnobiology V. As much as there appears to be consensus among ethnobiologists with more experience, there may also be new ideas crystallizing in a new generation of ethnobiologists.

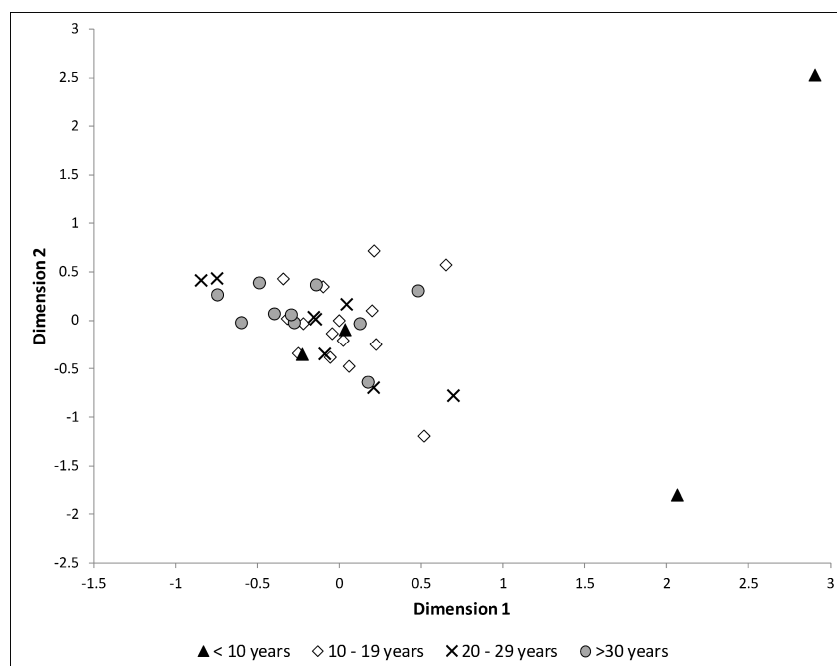


Figure 6. A correspondence analysis plot showing the distribution of ethnobiologists according to the word content of their narrative responses categorized by number of decades in the (inter-)discipline.

### *Qualitative Analysis and Results*

Much of what is mapped conceptually in terms of content is also interesting in terms of discourse and ideology analysis, a method of examining narratives to expose embedded power relations or tensions (Althusser 2001; Foucault 1991). Here we expose how particular utterances or responses, including qualifications or counter-themes embedded in them, are themselves formed out of wider socially shared repertoires, ideologies, discourses, and sociopolitical positions of the actors involved (Ahmed 2010; Antaki et al. 2003; Dixon and Jones 1998; Schwandt 2000). Sociopolitical influence on discourse is based on the assemblage of power relations from where or amongst whom it emanates and diffuses. Certain discourses, based on their power assemblage, become hegemonic, or are normalized as commonsensical. This “commonsense” governs social behavior and legitimizes or delegitimizes, prioritizes or de-prioritizes certain concerns over others. Thus, analysis of an ethnobiological perspective in discourse is a productive exercise for identifying and understanding what is accepted as hegemonic or commonsensical, what tensions exist, and what aspects may be ignored.

According to Althusser (2001), the subordination of the subject takes place through language and authority. In the example that Althusser offers, a policeman hails a passerby on the street, and the passerby turns and recognizes himself as the one who is hailed. In the exchange by which that recognition is accepted, which Althusser labels as interpellation, the discursive production of

the social subject takes place. The interpellation of the subject through the address by the authority presupposes not only that the inculcation of conscience took place, but that conscience, as psychic operation of a regulatory norm, constitutes a social working of power on which interpellation depends but for which it can give no account (Butler 1997).

In this analysis, the scholars (authorities) who have an opinion on what is an ethnobiological perspective replace the policeman. Ethnobiology (the subject), in our analysis, replaces the passerby. Conceiving of the relationship between ethnobiologists and ethnobiology in this manner establishes a dialectic discourse, or an investigation into the epistemological underpinnings of "what is ethnobiology." This dialectical relationship between ethnobiologists (authorities) and ethnobiology (subject) ensures the production of the hegemonic perspective on ethnobiology, and in turn a form of regularization among those who identify as ethnobiologists. In addition, however, discourses change over time and differ across space. The dominant discourses of yesteryears faced challenges and have been transformed, discarded, or replaced. Similarly, different geographies may have different discourses about ethnobiology. In other words, discourses encapsulate contestation, which is productive because it transforms our conceptions, rendering the answer to the question "*what is an ethnobiological perspective*" in a state of constant flux. Here, we examine this dialectical construction of "ethnobiological perspective" by deconstructing two of its aspects, one that draws nourishment from association with science, particularly biology. We then deconstruct the spatial or cross-cultural implications of the ethnobiological perspective. We draw on our discourse and content analyses to propose unifying themes of ethnobiology and areas we think merit further investment by ethnobiologists, particularly in relation to biocultural conservation.

Respondents convey that an ethnobiological perspective is enriched by biology, anthropology, and several other areas of scholarship. Figure 7 is a Venn diagram of numbers of respondents who used terms related to anthropology and biology exclusively in their responses, those respondents who used both, and those who used neither. Roughly 63 percent of the respondents used anthropology and/or biology in their responses, and among them there is a noticeable tension between those who emphasize biology and those who highlight anthropology. Very few respondents used anthropology exclusively ( $n=5$ ), and among those who used anthropology to describe ethnobiology (13 total) most of them also used biology ( $n=8$ ). The opposite is the case for those who used biology to describe ethnobiology (19 total); most of those used biology exclusively ( $n=11$ ), and fewer shared use of the two terms ( $n=8$ ).

This tension between anthropology and biology is also evident in terms of how ethnobiologists with different types of professional preparation used terms emphasizing one field or the other, which may have important implications for doing biocultural conservation research. Professional preparation appears to have greatly influenced whether or not ethnobiologists used anthropology or biology *exclusively* in their narratives; all five of those who used "anthropology" exclusively hold PhDs in Anthropology. For those who emphasize "biology" in their narratives, eight of eleven hold PhDs in Biology or its related subfields. Interestingly, for those who expressed attention to anthropology *and* biology,

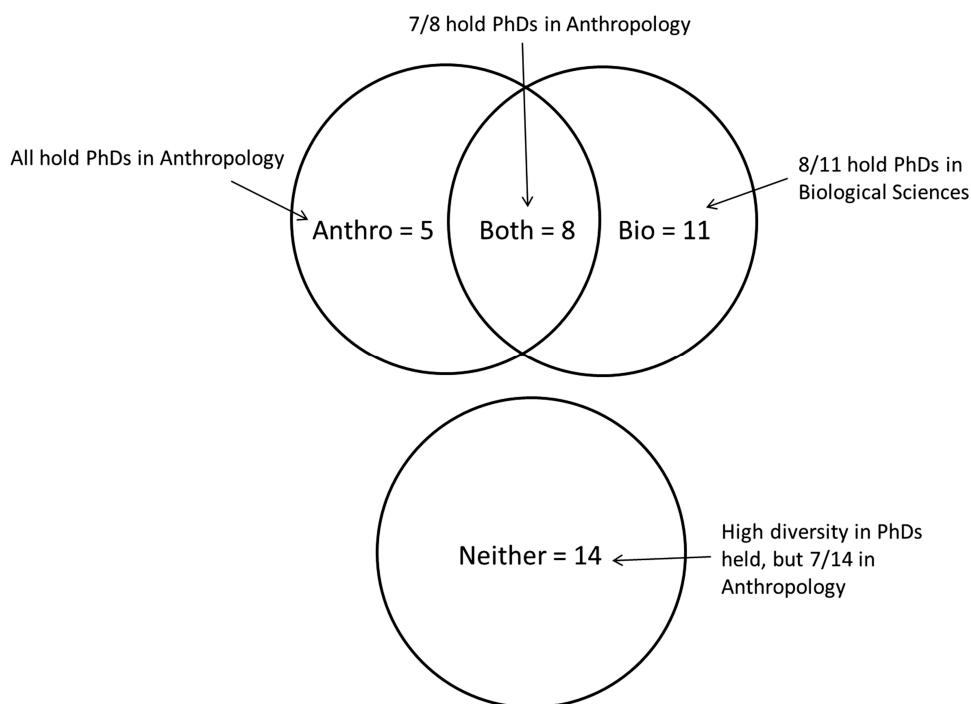


Figure 7. A Venn diagram of the frequencies of respondents who described the ethnobiological perspective using anthropological or biological terms exclusively or who used both.

seven of the eight hold PhDs in Anthropology. For ethnobiologists who used neither, half hold PhDs in Anthropology, and there are a range of other degrees represented, including plant systematics, geography, and South Asian and Himalayan studies. Our results indicate that those trained in biological sciences are less likely to claim that an ethnobiological perspective is anthropological, that those trained in anthropology are more likely to claim that an ethnobiological perspective is either anthropological or a mixture with biology, and that there is a high diversity in preparation of those who did not reference biology or anthropology. Anthropologists tend to claim biology more than biologists claim anthropology, and those with diverse training tend to claim neither. We suspect this pattern represents the hegemonic position of science relative to social science in Western scholarship. This tension is important to acknowledge given power dynamics of integrating perspectives of local and indigenous cultures with mainstream biological conservation; it is important that ethnobiologists recognize there is a similar dynamic within ethnobiology even as we approach biocultural conservation. We return to those who used neither terms in their responses below, but first we consider the narratives of respondents who used anthropology, biology, or both. According to one of the respondents:

*Ethnobiology comprises the study of the content of the Western category of biology (largely animal and plant) in other cultures and historical contexts. For many, it comprises the classification of such natural phenomena, largely*

*arranged as taxonomic hierarchies, which some consider universal, and for some, it extends to use of natural resources.*

Another respondent pointed out that:

*Ethnobiological research tends to lean towards empirically grounded, scientific documentation of human-non-human-relationships.*

These perspectives also emphasize the significance of humans in this understanding of nature/biology. Yet, responses along similar lines also tended to highlight that an ethnobiological perspective is indeed a “scientific” one.

Some responses highlighted that ethnobiology is more of a collaboration between biology and anthropology. One respondent pointed out that:

*The one thing that seems minimally necessary is a wide interdisciplinary vision, in which different cultures and different organisms are important, and thus anthropology, biology, and often other fields must be brought into the picture...there is a range from hard-core biologists who are interested only in crop genetics or physiology to hard-core interpretive anthropologists who look only at aesthetics or philosophy...however, the central core of ethnobiology has generally consisted of **biology-anthropology-biology** (emphasis in original).*

In the emphasized part, biology appears twice, and anthropology once, in the middle (encompassed by biology)—perhaps demonstrating the power of biology in its relationship with anthropology, where the status of biology is higher, as ingrained or accepted in the mind of the respondent. Or is anthropology the core with biology as the periphery?

Several respondents asserted that ethnobiology essentially occurs within the domain of anthropology. One respondent asserted that:

*Ethnobiology is part of anthropology...strongly supplemented by data from biological science.*

Similarly, another respondent stated:

*I conceive of ethnobiology quite broadly, though always as a branch of anthropology, which approaches interconnections between culture and natural things in a variety of ways.*

The tension created by the tug-of-war between the scientist-ethnobiologists and the anthropologist-ethnobiologists (some of whom also assert science), however, is productive for ethnobiology. Not only does this tension contribute towards the multiplicity in perspectives, it also enriches the ethnobiological perspective with distinctly divergent focus—science that focuses on biology and anthropology that focuses on culture.

Irrespective of whether one prioritizes anthropology or biology or the combination of several disciplines/perspectives, the respondents often reiterated that what they were doing was scientific<sup>1</sup> or required scientific generation of data. That tendency is also evident in the definition of ethnobiology as a “scientific study” on the Society of Ethnobiology website and on the Society-sponsored Wikipedia page about ethnobiology. This is not surprising given the



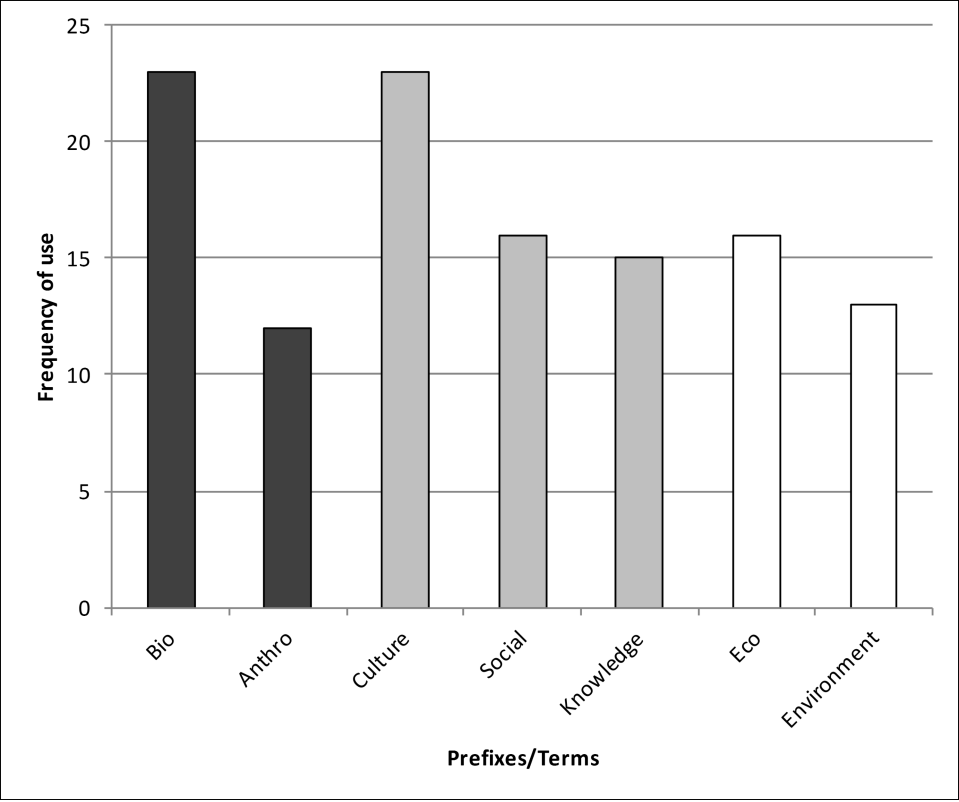


Figure 8. A bar chart of the frequencies of prefixes and terms used to describe the ethnobiological perspective.

historical development of the field as a fusion of botany, zoology, and anthropology and considering the hegemony of science within academia. Science’s power is based in the politics of research funding and its ability to assert objectivity—where what constitutes objective itself is political (Harvey 1974).

Although they embrace science, respondents did not explicitly reject the importance of humanities, arts, and other forms of non-scientific scholarship and creative expression. A large proportion ( $n=14$ , 37%) used neither anthropology nor biology in their descriptions (Figure 7), instead preferring uses of “nature,” “environment,” “culture,” “community,” “landscape” and similar terms. Indeed, as much as ethnobiologists emphasized empiricism, systems, data, and various science-based fields of study, they also recognized the field as encompassing diverse ways of knowing about human-biota interactions (Figure 8). “Culture” is used with frequency similar to that of “biology,” whereas “social” and “knowledge” are used with frequency similar to that of “environment” and the prefix “eco” in our respondents’ descriptions of ethnobiology.

The literature clearly reveals that ethnobiologists embrace science *and* non-science (e.g., Anderson 2013; Lepofsky and Feeney 2013). The results of our

discourse analysis underline this point and suggest that definitions of ethnobiology should be more inclusive, such as “the scholarly study of human-biota interactions in environments within cultures and cross-culturally in the sciences, arts, and humanities.” We surmise that this breadth is an important under-emphasized strength of ethnobiology, which we discuss in more detail below. One lesson from our discourse analysis is that we may need to better align definitions of ethnobiology in accordance with its broad-reaching subject matter.

An unanticipated find in our discourse analysis is the persistence of the notion that an ethnobiological perspective focuses on “other” cultures or communities. This finding is somewhat surprising because anthropology itself has progressed well beyond its colonial past, and Carl Sauer’s (1925[1963], 1950, 1966) cultural ecology that despised the urban and romanticized non-urban (read as cultures of the others or the non-industrialized societies) is now outdated in geography. If evaluated uncritically, the narrative responses might be interpreted to mean that despite these developments, the romance of *the exotic* remains intact in the ethnobiological perspective. However, ethnobiologists can and do study biota-culture relations in urban and “Western” societies (Antweiler 2004; Dombrosky and Wolverton 2014; Nabhan 2013; Nolan 2007; Nolan and Robbins 1999).

As with gravitation toward science, it is not abundantly clear why the exotic is more commonly expressed in these narratives. Indeed, use of terms such as “indigenous,” “traditional,” and “other” as well as descriptions such as “non-Western” do not dominate the narratives; they are sprinkled throughout the many responses to our survey. It is the *absence* of the opposite, *the ethnobiology of Western peoples*—what Nabhan (2013) recently refers to as “autobiology”—that is striking. There are a couple of important reasons to expect that ethnobiologists would focus on other cultures. First, ethnobiologists often do study human-environment interactions (such as TEK) cross-culturally (see a recent review by Fowler and Lepofsky 2011). There has been great emphasis on the value of TEK in conservation, for example, and ethnobiologists are commonly intermediaries of such knowledge (M. Anderson 2005; Saslis-Lagoudakis and Clarke 2013). Second, many classic examples of ethnobiology that professionals are likely to identify with are cross-cultural in scope (e.g., Anderson 1996; Balée 1994; Berlin 1992; Conklin 1954; Ellen 1993; Hunn 1977; Moerman 1998; Rea 1998). That ethnobiologists surveyed here tended to refer to cultures other than their own may also reflect what the International Society of Ethnobiology has been dedicated to promoting: ethical cross-cultural exchanges and boundaries, inevitabilities in the face of globalization and cultural homogenization. Thus, the romance of the exotic may *only appear to be intact in ethnobiology*, but is instead a hallmark of the cross-cultural nature of the field done for reasons of ethical scholarship at times for the purpose of cross-cultural advocacy; as with non-science, the “ethnobiology of us,” “urban ethnobiology,” or “auto-ethnobiology” were not disowned or rejected in these narratives—just overlooked. We argue that in addition to the strong cross-cultural history of ethnobiological research, these represent important avenues for future research. A second important lesson from this analysis for ethnobiologists is the identification of new avenues of research.

## Discussion

The diverse lenses of ethnobiology portrayed in our analysis of the ethnobiological perspective are important for engaging contemporary conservation. Our results indicate that ethnobiologists are able to approach a number of conservation challenges from a diversity of approaches that nonetheless show coherence—a unique “ethnobiological perspective.” That perspective allies itself with Western science but also allows for more humanistic and interpretive methods. It appreciates the distinctiveness of “traditional” societies and their knowledge systems while also recognizing the “ethnobiology of us.” This perception is crucial for engaging the wider public in biocultural conservation efforts. We expand our discussion to incorporate the views of ethnobiologists on the shared themes that make ethnobiology unique and unified. Finally we point out the potential for collaboration with conservation biology.

### Transcending the Western/Non-Western Dichotomy

Ethnobiologists recognize that TEK is a legitimate subject of study in all societies, despite the fact that Western societies tend to be impoverished in this regard. For example, Nabhan (2013) assertively addresses the “imperialistic origins” of ethnobotany and ethnobiology in the late nineteenth century and suggests autobiography as an intriguing counterpoint to ethnobiology of the other, a term that he attributes to the late ethnobiologist and former *Journal of Ethnobiology* editor, William Van Asdall. Nabhan (2013:2) suggests that the prefix “ethno” is “unfortunate” and suggests a preference to study the other. However, “ethno” refers to culture/people, so the “ethnobiology of us” is no less or more ethnobiological than that of the other. Details aside, Nabhan’s point is that we have much to learn about human-biota/environment interactions within any particular society, including Western societies.

One of the things we need to learn is how the Western perspective on nature is colored by experience (or lack thereof), not least because of its implications for environmental policy. For example, environmental philosopher Ricardo Rozzi (1999, 2012; Rozzi et al. 2006) asserts that science decoupled from direct human experience does not lead to a change in values, and values form the ethics that frame choices and decisions (Callicott 1989; Rolston 1988). Rozzi’s premise is that there is a fundamental disconnect in Western society between humans and “nature,” environment, land, the outdoors, whatever one wants to call it (outside). Rozzi assumes that (Western) humans are largely divorced from nature, have forgotten nature, and/or cannot value nature without a fundamental change in experience.

The critique of Western alienation from the natural world goes hand-in-hand with the assumption that Western science reinforces a detached view of nature (see discussions by Callicott 1989; Norton 1991; Rolston 1988). For example, political ecologists recognize that the concept of biodiversity that is central to conservation biology is a construct framed within Western science. Failure to acknowledge this fact contributes to a disjunction between the goals of biodiversity conservation and biocultural conservation. Biocultural conservation acknowledges the role of political ecology (Escobar 1998) and strives to protect

indigenous rights and to infuse policy with TEK. In contrast, conservation biology tries to rescue nature from human influence.

However, it is important to recognize that it is because of Western-trained ecologists, ethnobiologists, and other field researchers in cultural and natural science that connectivity between human minds and nature is widely acknowledged (Anderson 2010; Atran and Medin 2008; Newing 2010). This fact *illustrates* Rozzi's point, that the average Westerner can only transcend the human-nature divide via direct encounter and through experience, something akin to field ecology, field ethnobiology, or something as simple as the hobbies of gardening, seed-saving, bird-watching, or hiking. Ecological anthropologists are keen to protect the cultural heritage of non-Western peoples, but would do well to recognize that Westerners increasingly embody a disarticulated and detached environmental heritage (e.g., Kempton et al. 1995; Milton 2002).

Ethnobiology has the potential to help remedy this disconnection from nature. Rather than condemning members of Western societies as detached, environmentally insensitive inheritors of the Anthropocene, ethnobiologists can help place them back in nature. However, this cannot be accomplished without cross-cultural dialogue—something generally lacking in ad hoc conservation and the New Conservation (see “Ethnobiology, Conservation Biology, and Political Ecology” above). Ethnobiologists have the unique skillsets of being able to work from both ends of the problem; on the one hand, immersion in local cultures provides awareness and understanding of traditional subtle ecologies. On the other hand, familiarity with the constructs of Western society provides an ability to communicate the need for direct encounters with nature. Postmodern deconstruction of Western science tends to underemphasize that though there is a clear global pattern in the distribution of environmental injustice related to the history of colonialism and modern economies, there is also an inverse and equally pervasive pattern of the distribution of environmental awareness. It is the gift of subtle ecologies (*sensu* Hunn 2002:8–9) that TEK of indigenous and local peoples can provide members of Western societies (e.g., the average citizen of the United States); through direct encounter, ethnobiologists and environmental philosophers are working to return that gift through increased cultural and environmental awareness. Such is far distant from neo-imperialistic conservation, but instead represents attempts at reconciliation. To be clear, we are arguing that ethnobiologists have the ability to influence biocultural conservation in positive ways in local contexts related to resource conservation, TEK, and biodiversity. But we are also arguing that ethnobiologists have an equally important and abiding responsibility to turn the dialogue on its head and influence environmental awareness and values in Western societies. Both of these stem from the multifaceted skillsets and perspectives of ethnobiology.

### *Unifying Themes of Ethnobiology*

Our study shows a shared perspective among those who self-identify as ethnobiologists. That perspective spans conceptual continua from the sciences to the arts and humanities, from social science to biology. It includes foci on local cultures and environments in many geographic contexts. Unifying themes are also evident in much of the research that is focused on human-environmental

interactions despite the fact that many scholars do not claim the title “ethnobiologist.” Rather than indicating the lack of a distinctive ethnobiological perspective, we believe that it is so widely distributed across disciplines that many who practice it are unaware of the term. Below we discuss four themes that unify ethnobiology across disciplines.

- 1) *Ethnobiological Ethics*: The International Society of Ethnobiology (ISE) Code of Ethics for cross-cultural research of indigenous, local, and traditional ecological knowledge provides unification of ethnobiology (International Society of Ethnobiology 2006: <http://ethnobiology.net/what-we-do/core-programs/ise-ethics-program/code-of-ethics/>). The lifetime work of Darrel Posey and the development of Ethnobiology IV and its refinement into the ISE Code of Ethics is unique to ethnobiology (see also the Society for Applied Anthropology code of ethics: <http://www.sfaa.net/sfaaethic.html>), though environmental philosophers have embraced similar values (Callicott 1989; Rolston 1988; Rozzi 1999). An engaging summary of the code and its relevance in the context of international law is offered by Hardison and Bannister (2011). Recommendations concerning integration of ethics into ethnobiological research are provided by Gilmore and Eshbaugh (2011). Although we do not describe the details of the Code of Ethics here, we discuss some of its implications. Chapin (2004) illustrates that conservation has largely failed at bridging the political ecological gap between the needs of indigenous peoples and the goals of biodiversity conservation. The Code represents a comprehensive tool for crossing cultures, which is of critical importance for closing the political ecological divide that Chapin characterizes. Most ethnobiologists are aware of the code and what it requires of researchers pursuing data ethnographically. The code extends to archaeological data acquisition as well, particularly in cases where members of contemporary indigenous societies claim connections of cultural and environmental heritage to the archaeological past (Figueroa and Waitt 2008, 2010).

Despite the unifying quality of the Code of Ethics, Hunn (2002:5) points out that literal interpretation of the goals of indigenous ethnobiology (Ethnobiology IV) “sets in opposition indigenous and ‘scientific’ ways of knowing with scholarship judged [to be] inherently exploitative and thus morally suspect.” Such suspicion relates closely to discussion of the Code of Ethics, because it places important limits on use of TEK. Taken to an extreme, however, this suspicion morphs into “postmodernist notions of knowledge as power...,” and Hunn (2002:5) states that at its “logical extreme [it] asserts that to seek to understand other people can be no more than to seek to control and manipulate them.” We agree with Hunn that such a position is “ultimately a paranoid and sociopathic vision of human society.” Indeed, the Code of Ethics can be used to *promote* responsible biocultural conservation when not taken to those extremes.

- 2) *Shared Environmental and Cultural Heritage*: Ethnobiologists are aware of a shared cultural and environmental heritage of humankind. This is apparent in ethnoecology, particularly those studies devoted to guardianship of “cultural memory” (Hufford 1994; Nazarea 1999). Ironically, it is awareness

of human commonalities that provides ethnobiologists with the warrant to learn cross-culturally about TEK. Ethnobiologists are the only scholars who have the potential to engage all forms of cultural diversity in human-environment interactions in spatial and temporal contexts. Borrowing from its connections to anthropology, ethnobiology is holistic. As a result, ethnobiologists are in an enviable position of having research skills and perspectives that are indispensable in holistic conservation.

An example of shared cultural-environmental heritage is the organization of biological knowledge into meaningful frameworks. Universalities in the construction of biological taxa (related “kinds of things”) are believed to have evolved consequentially through human-environmental interactivity (Atran 1990, 1998; Atran and Medin 2008; Brown 1999). All humans recognize biologically diverse forms of plants and animals and classify related kinds of living things in similar ways (Berlin 1992). Linnaean taxonomy represents a Western form of scientific classification (see summaries in Hunn 2011 and Atran and Medin 2008).

- 3) *Interdisciplinary Science and Non-Science*: Ethnobiologists may not explicitly claim non-science in our discourse analysis, but they recognize diverse forms of ethnobiology. Indeed, ethnobiology has recently been defined as a “scientific study,” but this may not be a definition that is sufficiently inclusive. There are many definitions of science, and Anderson (2013) explicates that traditional societies have their own ways of knowing. Within Western societies we conclude that there are examples of humanities and artistic scholarship that qualify as ethnobiology. Take, for example, Gary Nabhan’s (2004) book *Cross-Pollinations: The Marriage of Science and Poetry* (see also Taylor 2013; Veteto 2013). Ethnobiologists recognize that divisions between science and non-science do not exist; rather what exist are micro-cultural boundaries along a continuum between scholars with diverse perspectives (e.g., Pretty et al. 2009). Fortunately, ethnobiologists are versed at crossing cultural boundaries (point 1 above) and have a warrant for doing so (point 2 above).
- 4) *Ecological Understanding*: Ethnobiologists embody ecological understanding (Turner and Berkes 2006:497), which comprises beliefs and practices that relate to values developed through direct encounter within environments. There will always be room in ethnobiology for the pure researcher because understanding human-environmental interactions is interesting, in addition to being relevant to biocultural conservation research. In our opinion, it is difficult to distinguish an “applied ethnobiology” because most ethnobiological scholarship is relevant in contemporary global society. Understanding past subsistence, for example, provides perspectives on sustainable and non-sustainable resource use. What is applied zooarchaeology or archaeobotany if not consideration of the remnants of TEK from the past? More important, however, is the need for curious problem solvers as scholarly researchers who 1) are sensitive to the ethical constraints of cross-cultural research and 2) are environmentally aware “citizens of nature” (sensu Leopold 1949).



There are other foci within ethnobiology that unify the field, but we feel that the strongest ones are represented here. Importantly, these themes provide an umbrella for perspectives adopted by ethnobiologists revealed in our content and discourse analyses. They also relate to the recently framed principles of ethnobiology (Lepofsky and Feeney 2013), biocultural conservation (Stepp et al. 2002; Rozzi et al. 2006), and conservation biology (Lindenmayer and Hunter 2010).

### **Converging Principles and Shared Perspectives: Ethnobiology and Conservation Biology**

Ethnobiology, biocultural conservation, and conservation biology hold common fundamental principles. Rozzi and his colleagues (2006) characterize their biocultural conservation approach in terms of ten strategies (Table 2A), several of which are commonplace in or relate closely to ethnobiology (Table 2B). Of particular importance are “participatory approach,” “environmental education,” and “outdoor education.” By “participatory approach” Rozzi et al. (2006) mean conservation that includes the needs and goals of local peoples. This overlaps in content with several of Lepofsky and Feeney’s (2013; Table 2B) principles of ethnobiology, particularly those that consider the inherent cross-cultural nature of ethnobiology and the need for mutually trusting and respectful relationships. Lindenmayer and Hunter (2010; Table 2C) published a similar set of goals for conservation biology proper; ethnobiology is particularly important in relation to point number three—to *adopt a holistic conservation strategy*—and point number ten—to *consider that human values are diverse*. Each of the three sets of guiding principles, concepts, goals, and strategies in Table 2 addresses how each community of scholars engages political ecology.

In sum, ethnobiologists offer a treasure-trove of experiences that relate to the core principles of biocultural conservation and conservation biology. What ethnobiologists bring to bear are Wyndham’s “spheres of [biocultural] relation” and “lines of [ethnoecological] interaction” from all corners of Earth (Wyndham 2009). Correspondingly, it is not surprising that ethnobiologists are diverse in terms of their perspectives on the discipline; nor are we astonished to discover that our analysis captures a great deal of what ethnobiologists already deem to be true concerning ethnobiology.

### **Conclusion**

Results of our content and discourse analyses demonstrate that ethnobiologists are poised to provide biocultural conservation with a diverse set of relevant experiences. What ethnobiologists understand as scholars are threads of *local subtle ecologies* embedded in the cognition of culture, whether those ecologies are studied via taxonomy or cognition (or both) (see discussion in Anderson 2013). Ethnobiologists also explicitly integrate a temporal perspective (Adams and Smith 2011; Pearsall and Hastorf 2011; Stahl 2011; Wolverton and Lyman 2012; Wolverton et al. 2011). Saslis-Lagoudakis and Clarke (2013) encourage the interdisciplinary framework illustrated in our analysis of the ethnobiological perspective; Nolan and Stepp (2012) articulate the didactic applications this framework provides new generations of ethnobiologists. Wolverton (2013) suggests that the field offers an umbrella for many other forms of scholarly



Table 2. Comparison of principles of biocultural conservation. (2A) (Rozzi et al. 2006); (2B) principles of ethnobiology (Lepofsky and Feeney 2013), and (2C) guiding concepts for conservation biology (Lindenmayer and Hunter 2010).

Table 2A.
Maintain diverse participants in project
1. Inter-institutional cooperation
2. Participatory approach
3. Interdisciplinary approach
4. Networking and international cooperation
Outreach of biocultural practices and results
5. Communication through media
6. Identification of a flagship species
7. Integration of curricula and intercultural education in the outdoors
Sustainable socio-ecological systems
8. Economic sustainability
9. Social and administrative sustainability
10. Research and conceptual sustainability
Table 2B.
1. Ethnobiology is inherently interdisciplinary
2. Ethnobiology is inherently cross-cultural
3. Ethnobiology is founded on mutually respectful, trusting relationships between the ethnobiologist and the descendent communities
4. Ethnobiological knowledge must be situated within culturally specific worldviews
5. Language and metaphor are essential avenues for understanding worldview and cultural systems
6. Ethnobiology recognizes the inextricable connection between indigenous people and their landscapes
7. Ethnobiology recognizes the importance of cultural time
8. Ethnobiological research requires good listening
9. Ethnobiology is often applied research
10. Always try to “give back” to the communities with which you work
Table 2C.
Goals
1. Successful conservation management requires achievement of consensus on explicit goals and perspectives
2. The overall goal of biodiversity management will usually be to maintain or restore biodiversity, not to maximize species richness
Strategies
3. A holistic approach is needed to solve conservation problems
4. Diverse approaches to management can provide diverse environmental conditions and mitigate risk
5. Using nature’s template is important for guiding conservation management, but is not a panacea
6. Focusing on causes, not symptoms, enhances efficacy and efficiency
Constraints and Considerations
7. Every species and ecosystem is unique, to some degree
8. Threshold responses are important, but not ubiquitous
9. Multiple stressors often exert critical effects on species and ecosystems
10. Human values are diverse and dynamic and significantly shape conservation efforts

research. All of these components are relevant in current dialogues about the goals of conservation biology within the New Conservation, traditional approaches to conservation biology, or community-based conservation.

Should conservation biology be a subfield of ethnobiology? Should biocultural conservation be within the domain of ethnobiology? Political ecological boundaries

exist between fields and their practitioners, and some scholars may not be comfortable having their identity as, say, an ethnoecologist or a conservation biologist drawn within and subsumed under another discipline. Alternatively, should ethnobiologists adopt an opposing approach, that of doing biocultural conservation through the lenses of ethnobiology? In that sense, ethnobiology is less of an umbrella seeking to bring other, different environmental researchers into its fold. Rather, results of our analyses highlight that ethnobiology could become the scholarly *soil* for growing engaging values about human relationships with biota. Scholars cleave to their disciplines, so perhaps an approach that does as much local ethnobiological conservation as possible would simply *provide more ethnobiology to the world*. To do so, we should study the ethnobiology of ourselves frequently (*sensu* Nabhan 2013; e.g., references in Lockyer and Veteto 2013); this has the potential to influence environmental values broadly, lastingly, and effectively.

### Notes

<sup>1</sup> Through our discourse analysis, we are not really judging whether the perspective is scientific or not.

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