Cultural Comparisons in Ethnobiological Research

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Abstract A research focus on cultural comparisons in ethnobiology can answer questions about the incidence, distribution, and causes of cultural variation in ethnobiological knowledge. It also provides insight into the rich diversity of ways in which communities interact with and use biological resources to sustain a living. Cross-cultural research has shown that the same biological resources accessible to different cultural groups are often used and valued in different ways and thus occupy specific cultural niches. This research has also been instrumental in showing that even though native communities tend to possess a larger body of knowledge about natural resources than immigrants and people of mixed ancestry who share the same living areas, the former can still acquire plant knowledge from the latter groups. As such, cross-cultural research adds depth and richness to ethnobiological data and contributes to hypothesis testing and theory building in ethnobiological research. In addition, understanding the patterns by which people know and use their biological resources is of central importance to projects that aim to reconcile biological conservation and local development through the identification of species that hold high cultural importance.

Why Cultural Comparisons?

A research focus on cultural comparisons in ethnobiology gives insight into the rich diversity of ways in which communities interact with and use ethnobiological resources to sustain a living. This includes the study of cultural knowledge, beliefs, and practices through observation, participation, and field surveys. Cross-cultural research involves the systematic comparison of "culture to culture and explicitly aims to answer questions about the incidence, distributions, and causes of cultural variation." Olatundun (2009) eloquently states that the goal is not to compare cultures in order to "deny their individual uniqueness," but to better understand what is shared between different cultures. Studying knowledge variation in culturally and/

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or linguistically distinct ethnic groups that live in close proximity and face similar environmental and economic conditions, but have remained relatively isolated from each other, provides an opportunity to investigate how cultural factors shape people's understanding and use of the local flora (Pardo-de-Santayana and Macia 2015). Cross-cultural comparisons in ethnobiology can answer important questions such as, but not limited to:

1. Are the same plant species growing in multiple localities of similar importance to different cultural groups and used in similar ways?
2. What patterns of similarities and complementarities exist in the use of biological resources between cultural groups sharing the same geographic areas and ecosystems?
3. How do immigrant communities use ecosystems that are new to them as compared to native groups? In other words, who knows what about local biodiversity?

Examples of Cross-Cultural Comparisons

One of the pioneering ethnobiological studies on cross-cultural comparisons was the study by Heinrich et al. (1998) on healer's consensus and the relative importance of medicinal plants in four indigenous groups of Mexico (Maya, Nahua, Zapotec, and Mixe) whose surrounding flora is similar but not identical. The species used by these groups varied considerably. Only four of the 50 principal species used to treat gastrointestinal disorders were shared between all groups. For dermatological and respiratory disorders, none of the species were shared.

Vandebroek et al. (2004) asked the question how well two groups of healers living in two distinct ecological regions in Bolivia, the Andes and the Amazon, knew the medicinal plant resources in their living environment. The authors hypothesized that the rich biodiversity of the Amazon would imply the highest degree of plant knowledge. Each group of healers was queried about a set of plants from their living environment. However, Andean healers demonstrated a higher level of knowledge about their medicinal plants than Amazonian healers. The authors inferred from their results that social factors, such as family history of practicing traditional medicine, play an important role in the transmission, and hence continuity, of medicinal plant knowledge.

Van Andel et al. (2014) made a comparison between Afro-Surinamese (Sranantongo and Maroon) and West and Central African vernacular plant names. Their study revealed that 20 % of the Sranantongo and 43 % of the Maroon plant names closely resembled names currently used in diverse African languages for related taxa, represented translations of African names, or directly referred to an Old World origin. Their study thus confirmed the role of African people as active agents of environmental knowledge in the Americas.

De Boer et al. (2012) used the Jaccard similarity coefficient (in short Jaccard index) to calculate pair-wise similarity in medicinal plant knowledge between three

sympatric ethnic groups living in Laos. This index compares the number of shared species (or species uses) in relation to the number of unique species (or species uses) in each group (Chao et al. 2005). The Jaccard index fluctuates between zero (no similarity) and one (maximum similarity). The authors hypothesized that the groups would share a high degree of knowledge about medicinal plants since they lived closely together in the same geographic area, had been challenged by the same external hazards for generations, including diseases and accidents, and commonly exchanged knowledge related to social and practical aspects of life. However, they found a low overall degree of shared plant knowledge, which they attributed to "a process of continual innovation through empirical testing" of new plant-based cures, concluding that "remedies of cultural importance are likely to spread within a community or ethnic group, but only proven effective cures are likely to spread between cultures" (de Boer et al. 2012).

Mustafa et al. (2015) compared the uses of plants as medicines, foods, and handicrafts in three ethnic populations living in the same area in Kosovo and identified small distinct sets of plant knowledge but a large overlap in knowledge about foods and handicrafts, suggestive of a hybrid character. These authors also found that *Chamomilla recutita* (chamomile) was the most highly valued species among Albanians, Bosniaks, Gorani, and Turks surveyed in Kosovo. Quave and Pieroni (2015) reported significant variation in the plant species used for medicinal purposes by the Gorani and Albanians in the Balkans, two culturally and linguistically distinct but neighboring ethnic groups that have remained relatively isolated from each other. There appeared to be more convergence in the food plants used by the two groups. The authors suggested that cultural barriers about wild edible species (as compared to plant medicines) may be more permeable to ensure food security during periods of famine. In addition, Thomas et al. (2008) hypothesized that food plants are partly selected and used in an "immediacy context, whereby *emic* [and thus cultural] perception of efficacy may be of secondary importance." These authors defined food plants as "diversity laggards," because in transects the number of food species increased only moderately with increasing diversity. In contrast, medicinal plants were considered "diversity followers" because the number of medicinal species kept increasing with increasing plant diversity, perhaps as a result of continued cultural experimentation and innovation.

Low Jaccard index values were calculated from other studies, possibly owing to geographic separation of communities. For example, the Laklei and Idate in East Timor live only 10–20 km apart but are separated by a mountain range, which has likely impeded cultural exchange of information (Collins et al. 2006). The limited number of medicinal species shared between these ethnic groups consisted of plants widely used throughout Asia. In Mexico, the linguistically related Zoque Populaca and Lowland Mixe Mayans have not been in contact for many centuries but live in similar ecological environments in the Isthmus of Tehuantepec; they also showed low similarity in medicinal plant knowledge (Leonti et al. 2003). Comparison of knowledge of palm uses between indigenous communities, rubber tappers, and river dwellers in southwest Brazil demonstrated that each community used different palm species of their preference to satisfy the same general needs and purposes

(predominantly food, house construction, technology, and crafts), resulting in low Jaccard indices (Campos and Ehringhaus 2003). Thus, each community made different cultural choices on how to fulfill their needs with palms.

Putative factors that can influence similarity indices include the degree of cultural exchange, acculturation, assimilation, environmental similarity, and language and religious barriers, as well as the (perceived) effectiveness of plant remedies (de Boer et al. 2012). According to Pardo-de-Santayana and Macia (2015), dealing with ill health is a sensitive topic for which advice would only be accepted from knowledgeable relatives or friends belonging to the same ethnic group. In addition, these authors stated that the symbolic component of plant remedies may be an important factor leading to a shared cultural understanding, and thus resulting in the culturally specific use of those healing remedies. Without this cultural understanding, the remedies may not have meaning, and without meaning there is no motivation for their use. Future studies can aim at better understanding the drivers and barriers for sharing plant knowledge.

What Have We Learned from Cross-Cultural Research?

First, cross-cultural research has shown that the same biological resources accessible to different cultural groups are often used and valued in different ways and thus occupy specific cultural niches. This means that in a different cultural context, one species can be replaced by another, depending on variables such as the species' abundance, the technology used to process the species, cultural history of the community, and integration of the culture into the market economy (Campos and Ehringhaus 2003). Sop et al. (2012) list environmental and context-specific sociocultural factors as determinants of diverging plant use patterns, including type of culture (ethnicity), geographic location, degree of intercultural mixing with neighboring groups, and local availability of the targeted species. According to Alcorn (1981), it is imperative to analyze plant use within its own natural, social, and cultural context because changes in people's personal and social lives, as well as variations and changes in the natural environment, can all influence plant use.

Second, cross-cultural research has been instrumental in showing that native communities tend to possess a larger body of knowledge about natural resources than immigrants and people of mixed ancestry (such as caboclos, ribereños, mestizos, creoles) sharing the same living area (Atran et al. 2002; Campos and Ehringhaus 2003; Hoffman 2013). However, traditional knowledge about biological resources is dynamic and continuously adapts through cultural exchanges that promote shared uses. For example, Campos and Ehringhaus (2003) showed that more than one-third of the uses cited by indigenous participants for 17 palm species in the Brazilian Amazon were learned from people of mixed ancestry inhabiting the same region. On the other hand, the dynamic character of traditional knowledge is also derived from ongoing experimentation within the same culture and guided by the availability and accessibility of plants over space and time, cultural perception of plant efficacy,

and sensory perception of smell, taste, and touch (Heinrich et al. 1998; Thomas et al. 2008). Pieroni and Quave (2005) attributed the differences in medicinal plant knowledge between Albanians and native Italians in a southern Italian community to differences in cultural beliefs between both groups, in particular the perceived spiritual origin for most illnesses and the prevalence of ritual magic-healing practices in Albanians. Discordance in overall woody plant knowledge among three ethnic groups in the sub-Sahel of Burkina Faso was explained by differences in culture and local environmental conditions, the latter influencing species distribution and availability (Sop et al. 2012).

Third, the mere existence of a biological resource in a geographic area does not necessarily mean that all cultural groups in the area would use this resource, as is the case, for example, with the palm *Euterpe precatoria* in the Brazilian Amazon (Campos and Ehringhaus 2003). The same observation holds true for ecosystem units. In comparing knowledge of tribal Afro-American people and native indigenous people in the Surinamese tropical forest, the former demonstrated a special relationship with fallow forest, which reflected a combination of cultural, economic, and biological influences. These fallow forests contained softwood species that are good for woodcarving, an important cultural and economic activity in the Afro-American group. In contrast, native indigenous people of the area demonstrated no habitat preference to meet their subsistence needs (Hoffman 2013). As such, cross-cultural comparisons add depth and richness to ethnobiological research.

On a more philosophical note, changes in plant knowledge witnessed in migrant groups open a debate about what constitutes "traditional" knowledge. Knowledge of biological resources picked up by migrants along the route of migration should perhaps be called "local" knowledge because it represents a combination of practical knowledge, ancestral knowledge, and other types of knowledge more formally acquired, for example, from agricultural extension officers (Nesheim et al. 2006).

What Are the Benefits of Cross-Cultural Research?

The value of ethnobiological knowledge has long been recognized, among others for conservation. Understanding the patterns by which people know and use their biological resources is of central importance to rural development projects that try to reconcile improved quality of life with conservation of natural resources. In finding a large overlap in plant knowledge of foods and handicrafts by ethnic groups living in Kosovo, Mustafa et al. (2015) concluded that "cross-cultural studies could be important for proposing culturally sensitive ways of using plant natural resources in future sustainable economic development initiatives."

Careful documentation of the hybrid and dynamic nature of knowledge about biological resources as a result of cultural exchanges is important during the planning and implementation of programs for development and resource management in which the voices of local people can inform decisions on which resources and practices should be prioritized (Campos and Ehringhaus 2003; Sop et al. 2012).

Pardo-de-Santayana and Macia (2015) advocate for studies that can "help to integrate traditional local knowledge with efforts to conserve biocultural diversity… " and "promote culturally appropriate, sustainable development strategies." In their study on vernacular names across Afro-Surinamese and African cultural groups, Van Andel et al. (2014) pointed out that comparing local plant names to study their origin can be a useful outreach instrument in cultural awareness programs aimed at promoting biocultural heritage.

Finally, cross-cultural comparisons of plant knowledge can be useful for the sometimes heated debate on intellectual property rights. Analyzing to what extent biological resources, knowledge, and practices are shared between different cultural groups can pinpoint species and uses that are unique to certain cultures and thus represent an inherent part of their cultural patrimony. Also, understanding that a certain degree of species and uses is shared, some to a large extent, such as the use of *Dysphania ambrosioides* (Amaranthaceae) as a vermifuge, can be of a pacifying nature in this debate. It is a universal trait of human nature, part of what makes us human, to be curious and learn about and exchange information and biological resources in the light of the survival of our species.

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