Using local experts as benchmarks for household local ecological knowledge: Scoring in South African savannas

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Abstract

It is well recognised that local ecological knowledge is an important facet of natural resource management in rural regions of the developing world. However, techniques to assess levels and to integrate it into formal or informal management approaches require further development. In particular, quantitative tools are missing, which would allow more robust analysis of the factors that positively or negatively affect local ecological knowledge and vice versa. This paper reports on a quick assessment approach that provides a quantitative score of generalist local ecological knowledge at the household level. It does so by comparing responses to the knowledge of local people identified as experts within the community. In this way it is both locally constructed and contextualized, and thereby avoids pitfalls of trying to score local ecological knowledge relative to conventional scientific knowledge which frequently cannot account for local constructs. The approach is applied at eight villages throughout the savanna biome in South Africa.

1. Introduction

Whether or not environmental resources are used sustainably depends upon a host of local and wider contextual factors. With respect to the sustainability of rural livelihoods based on extraction of forest products in India, Shankaar et al. (2004) developed a conceptual model in which levels of local ecological knowledge (LEK), participation in markets for resources and livelihood dependency on forest resources were the major attributes. Evaluation of such models requires assessment across a range of sites, and a quantitative or scoring approaching if the relative magnitude of the contextual variables is to be elucidated. However, many contextual variables are not easily quantified. Of interest in this paper is LEK.

Internationally, the level of interest in indigenous knowledge systems has been increasing ([Berkes et al., 2000], [Godoy et al., 2005] and [Chalmers and Fabricius, 2007]). Indigenous communities are frequently among the world's poorest people (Godoy et al., 2005). They account for a major proportion of the population in some countries, hold most of the world's traditional knowledge and have ownership rights to some of the world's most biologically diverse areas ([Berkes et al., 2000] and [Godoy et al., 2005]). The rights of indigenous people are increasingly recognised in international conventions. This has resulted in the constructed representations of certain kinds of knowledge as being local and authentic, and distinct from modern conventional science. In turn, LEK, a term used to describe the knowledge that is held by indigenous cultures regarding their immediate environments, has begun to acquire greater importance ([Ford and Martinez, 2000] and [Leach and Fairhead, 2002]). LEK represents multiple bodies of knowledge, which are the basis for local-level decision-making in natural resource management by rural communities ([Agrawal, 1995], [Berkes et al., 2000] and [Drew, 2005]) and may represent the information necessary for survival ([Drew, 2005] and [Pierotti and Wildcat, 2000]). LEK is shared among users of a resource ([Agrawal, 1995], [Berkes et al., 2000] and [Huntington, 2000]). It is generally deeply socially embedded, as knowledge and beliefs in rural areas are often closely tied to cosmology, local religion and social order (Leach and Fairhead, 2002) and must therefore be seen in its political, cultural and economic contexts (Briggs, 2005).

According to Briggs (2005), viewing indigenous knowledge as a pristine, untainted knowledge system is simplistic. LEK is undoubtedly mediated by external influences. The levels of LEK within a community depend upon a variety of demographic characteristics, including gender, age, kinship relations, ethnicity, position in a social network and distance from natural resources or cities (e.g. Quinlan and Quinlan, 2007). There is also a consistently negative association between LEK and characteristics generally associated with acculturation, like externally designed and imposed schooling and academic skills (Berkes et al., 2000), although there are exceptions (e.g. Quinlan and Quinlan, 2007). Far from being static, LEK is continuously evolving as the needs of rural communities change in response to local and external cues ([Agrawal, 1995], [Ford and Martinez, 2000], [Pierotti and Wildcat, 2000] and [Allison and Badjeck, 2004]). This fluidity is a reflection of the ongoing re-negotiations that occur between people and the environment upon which they survive (Briggs, 2005). It relates to knowledge of species as well as deeper ecological processes and relations.

Researchers generally describe LEK in scientific terms (Huntington, 2000) because there is a pervasive belief that LEK must in some way be related to formal science and for LEK to be accepted, there must be a way to test it scientifically ([Briggs, 2005] and [Gilchrist et al., 2005]). However, using the scientific method to assess the validity of indigenous practices implies a belief in the superiority of conventional science (Agrawal, 1995). According to Agrawal (1995) a number of authors have downplayed the distinctions between LEK and scientific knowledge, but then asserted the need to collect and evaluate a community's level of environmental knowledge using the scientific method. This means that for all the respect accorded to LEK systems, they must first pass a “scientific criterion of validity before being recognised as usable knowledge” (Agrawal, 1995: 430). Agrawal (1995) summarised the three main arguments distinguishing LEK from conventional science as (i) Substantive – there are differences in the characteristics and subject matter of indigenous versus scientific knowledge; (ii) Methodological and epistemological – the two knowledge systems possess different world-views and use different methods to investigate reality, and (iii) Contextual – conventional scientific and local knowledge differ because local knowledge is more deeply rooted in its own context.

It is, however, increasingly appreciated that neither knowledge system is necessarily superior (Briggs, 2005), and that conventional science is just as socially constructed as LEK ([Agrawal, 1995] and [Briggs, 2005]). If all knowledge is socially produced the barriers between scientific and indigenous, and lay and expert knowledge are dissolved and instead a plethora of site-specific practices and partial perspectives in a wide range of social situations are created (Leach and Fairhead, 2002). Both systems are in fact influenced by a myriad of different factors, including each other ([Agrawal, 1995] and [Allison and Badjeck, 2004]). Fundamentally, both LEK and conventional science should be seen as developing and emerging through historically located practices, in specific institutional and social contexts, which subverts any fundamental theoretical divide between them ([Agrawal, 1995] and [Leach and Fairhead, 2002]). Acknowledging this level of similarity and equality requires that conventional science explores and recognizes the validity of alternative explanations (Briggs, 2005).

Within increasing recognition of the potential contributions of LEK there is greater need to derive quantitative estimates or indices of the relative levels to allow examination of relationships between LEK and contextual variables of interest (e.g. Quinlan and Quinlan, 2007). Within this context, we sought to test a simple, quantitative approach to score LEK at several sites as part of a broader study to determine the factors that contribute to sustainable use of Non-Timber Forest Products (NTFPs) ([Shankaar et al., 2004] and [27]). Assessing LEK is difficult because it is heterogeneous and pertains to knowledge of species, ecological processes and change gleaned through direct interaction with the environment (for utilitarian, recreational and traditional/spiritual purposes) as well as interaction with others ([Drew, 2005] and [Reyes-Garcia et al., 2006]). This poses methodological difficulties and is further complicated by the fact that knowledge is not shared equally across all members of a community ([Briggs, 2005], [Drew, 2005] and [Chalmers and Fabricius, 2007]). In fact, LEK is distinctly uneven and often mediated and fragmented in nature (Briggs, 2005), which means that the person who is interviewed may not be the member of the household or group with the highest level of LEK. Consequently, it is important to differentiate expert LEK from generalist LEK ([Davis and Wagner, 2003] and [Chalmers and Fabricius, 2007]).

2. Study sites

Eight villages (Ntilini, Tidbury, Fairburn [Eastern Cape Province], Finale A, Mabins B, Willows, Thorndale and Mogano [Limpopo Province]) were selected (Table 1). They represent a range of rural settlements from small, remote and poorly serviced ones to large, better serviced ones on major secondary routes ([Shackleton et al., 2002a], [Shackleton et al., 2002b], [Dovie et al., 2002], [Twine et al., 2003] and [Shackleton and Shackleton, 2004]). The villages are located within the savanna biome of South Africa, within communal tenure areas and are situated in areas with low mean annual rainfall ranging between 488 mm and 600 mm. Land is allocated into arable and residential plots and residents are allowed free access for grazing and the extraction of NTFPs in the remaining areas (Dovie, 2006).

Table 1. The bio-physical attributes of the study villages.

Village	Province	Latitude and longitude	Vegetation type (Mucina and Rutherford, 2006)	Approximate mean annual rainfall (mm)
Ntilini	Eastern Cape	32° 42.4′ S 26° 36.0′ E	Great Fish Thicket	550
Tidbury	Eastern Cape	32° 38.6′ S 26° 39.5′ E	Great Fish Thicket	550
Fairburn	Eastern Cape	32° 33.6′ S 26° 42.5′ E	Great Fish Thicket	550
Finale A	Limpopo Province	24° 24′ 15″ S 30° 42′ 30″ E	Tzaneen Sour Bushveld	488
Mabins B	Limpopo Province	24° 25′ S 30° 33′ E	Granite Lowveld	488
Willows	Limpopo Province	24° 21′ 30″ S 30° 38′ 30″ E	Granite Lowveld	488
Thorndale	Limpopo Province	24° 39′ S 31° 28′ E	Granite Lowveld	550–600
Mogano	Limpopo Province	24° 02.9′ S 29° 44.8′ E	Polokwane Plateau Bushveld	505

The three Eastern Cape villages are located in the Kat River valley in the Mpofu district of the former Ciskei homeland. Ntilini (approximately 180 households) is located closest to Fort Beaufort in the south, Fairburn (approximately 100 households) is situated closest to Seymour in the north and Tidbury (approximately 40 households) is positioned midway between the two. Employment levels are low, and basic infrastructure is unevenly and inadequately distributed. Ntilini and Fairburn have access to electricity, while Tidbury does not (Shackleton et al., 2002a).

Three villages (Finale A, Mabins B and Willows) are located in the Mametja Traditional Authority in Limpopo Province, which formed part of the homeland area of Lebowa under apartheid. Willows (approximately 1000 households) is a well serviced village on a major secondary route and Finale A (approximately 300 households) is small, remote and poorly serviced. Mabins B (approximately 550 households) is intermediate between the two (Twine et al., 2003). Mabins B and Willows were electrified in the mid-1990s and Finale has no electricity (Twine et al., 2003).

Thorndale (approximately 70 households) is situated in the Bushbuckridge Lowveld in Limpopo Province and is bordered by the Manyeleti Game Reserve to the south. It is a remote village which is cut off from major commercial centers and has limited access to social infrastructure (Dovie et al., 2002). Mogano (approximately 300 households) is situated 32 km southeast of Polokwane in Limpopo Province. This village is fairly well developed and has relatively good employment opportunities and incomes (Shackleton et al., 2002b).

3. Methods

Our assessment of LEK is based on household and individual key-informant (expert) interviews and proxies of individual ecological knowledge. A very specific assessment of LEK was made, focusing on knowledge of the species of trees used for fuelwood and wild fruit as a quantitative index of broader multifaceted LEK at each site. The assessment of household LEK was based primarily on species identification and classification and did not focus a great deal on ecological processes and their relationships with the environment (Berkes et al., 2000).

Several authors have commented or shown that individuals participating in harvesting and marketing of specific NTFPs as their primary means of livelihood show greater LEK and skills pertaining to the species and systems in question ([Godoy et al., 2005] and [Reyes-Garcia et al., 2007]) and this increases with time spent in the trade (Ballard and Huntsinger, 2006). Therefore, people selling local resources (in our case, fuelwood or wild fruits) can be regarded as experts relative to the general population. Consequently, our study does not compare the answers given by households to conventional science, but rather to the answers given by the local in-community experts. The strength of the approach is that it allows one to derive a measure of generalist LEK that is locally constructed and contextualized, but that each locality can be compared to any other provided the same suite of question are employed. The only area for debate relates to how experts are defined or identified (Davis and Wagner, 2003). For example previous studies often used elders (Reyes-Garcia et al., 2006), whereas we use traders who are identified and regarded by the community as highly dependent upon and knowledgeable about the resource.

Previous resource valuation studies indicated that most households in the eight villages used fuelwood and wild fruit ([Dovie et al., 2002], [Shackleton et al., 2002a], [Shackleton et al., 2002b] and [Twine et al., 2003]). To obtain a composite household LEK score per village, 30 randomly selected households were interviewed in each of the eight villages (aside from Tidbury, where there were fewer than 30 respondents at the time of our survey; and after data cleaning a few sites dropped below 30 valid interviews). At each household an adult member (>20 years) was asked a set number of questions regarding key fuelwood and wild fruit tree species in that particular area; by far the majority of the respondents were household heads and middle-aged (approx. 40–60 years old). Because the villages were selected on the basis of previous work, the most widely used and traded fuelwood and wild fruit species in each village were known in advance. As the villages occur in different vegetation types, the key tree species varied from village to village, although the actual questions did not. At least five experts per village were identified using a question posed to the households asking them which member(s) of their village were both involved in the sale of fuelwood and were deemed knowledgeable. These experts were then interviewed using the same set of questions posed to the randomly selected households. Overall 54% of the experts were female and 46% were male. The ratio amongst the household respondents was 68% female to 32% male.

The questions analyzed regarding wild fruit species were: (i) When do the fruits for this particular species ripen?, (ii) When does this particular species flower?, and (iii) What colour are the flowers of this particular species? The questions analyzed regarding fuelwood species were: (iv) Does cutting the stem at the base kill this particular species?, (v) Does this particular species have any specific requirements to grow? If so, what are they? and (vi) What are the other uses of this particular fuelwood species, apart from fuelwood?

A mean index of general household LEK was obtained for each village as the mean proportion of agreement of households with experts for each of the three questions pertaining to wild fruit (Table 2), and each of the three questions on fuelwood (households compared to experts). These two means were then summed and divided by two.

Table 2. The % correspondence between household LEK responses regarding fuelwood and wild fruits relative to those of in-community experts.

Village	Correspondence	Fuelwood				Wild fruits					
		Does cutting at the base of this species kill it?	Does this species have specific requirements to grow?	What other uses of these species do you know?	Mean LEK score	When do fruits ripen?	When does the tree flower?	What colour are the flowers?	Mean LEK score	Village LEK score	Rank
Ntilini (*n* = 30)	Agree	76.7	66.7	19.4	54.3	36.7	26.7	13.3	25.6		6
	Disagree	13.3	30.0			3.3	23.3	43.4	23.3	40.0	
	Don't know	10.0	3.3			60.0	50.0	43.3	51.1		
Tidbury (*n* = 25)	Agree	70.8	16.7	47.9	45.1	4.2	45.8	50.0	33.3		7
	Disagree	20.8	83.3			29.1	20.9	29.2	26.4	39.2	
	Don't know	8.3	0.0			66.7	33.3	20.8	40.3		
Fairburn (*n* = 32)	Agree	73.3	66.7	18.7	52.9	70.0	50.0	40.0	53.3		4
	Disagree	6.7	33.3			30.0	50.0	60.0	46.7	53.1	
	Don't know	20.0	0.0			0.0	0.0	0.0	0.0		
Mabins B (*n* = 34)	Agree	70.0	3.3	50.8	41.4	0.0	10.0	73.3	27.8		
	Disagree	30.0	96.7			100.0	86.7	20.0	68.9	34.6	8
	Don't know	0.0	0.0			0.0	3.3	6.7	3.3		
Finale A (*n* = 31)	Agree	90.0	100.0	32.2	74.1	80.0	73.3	53.3	68.9		
	Disagree	6.7	0.0			3.3	0.0	36.7	13.3	71.5	1
	Don't know	3.3	0.0			16.7	26.7	10.0	17.8		
Willows (*n* = 30)	Agree	53.3	33.3	19.7	35.4	100.0	53.3	80.0	77.8		
	Disagree	36.7	66.7			0.0	26.7	16.7	14.5	56.6	2
	Don't know	10.0	0.0			0.0	20.0	3.3	7.8		
Thorndale (*n* = 29)	Agree	73.3	40.0	26.2	46.4	60.0	50.0	76.7	62.2		
	Disagree	20.0	60.0			26.7	6.7	3.3	12.2	54.3	3
	Don't know	6.7	0.0			13.3	43.3	20.0	25.5		
Mogano (*n* = 28)	Agree	3.3	100.0	22.7	42.0	100.0	23.3	23.3	48.9		
	Disagree	93.3	0.0			0.0	60.0	50.0	36.7	45.5	5
	Don't know	3.3	0.0			0.0	16.7	26.7	14.5		

4. Results

The respondents in the three villages in the Eastern Cape have lower levels of agreement between general households and experts regarding wild fruits, than do villages in Limpopo province (Table 2). The mean ‘Don't Know’ scores are relatively low, with only Ntilini (51.1%) and Tidbury (40.3%) obtaining high scores. High scores indicate that a large proportion of the households interviewed had no knowledge of the species at all, or were unable to answer such specific questions.

Mabins B has the second lowest levels of household LEK with respect to fuelwood (41.4%) (Table 2). Willows has electricity and is situated off a major secondary route (Twine et al., 2003), which translates into the lowest level of fuelwood household LEK (35.4%) of all the villages. Ntilini (54.3%) is ranked second, although it is electrified and is situated close to Fort Beaufort off a major secondary route (Shackleton et al., 2002a).

The ‘Don't Know’ responses for the fuelwood questions are low for all villages, with the highest mean being 10.0% at Fairburn. This indicates that most households had some knowledge about the fuelwood species, even if their answer did not correspond with the experts. The two larger and better serviced Eastern Cape villages (Ntilini and Fairburn) have the two lowest rankings, while the smallest village (Tidbury) has the second highest ranking.

There is no correlation between the mean household LEK of wild fruits and the mean LEK for fuelwood ($r = -0.050$; $p > 0.05$). Consequently, we can treat them as uncorrelated and use an average of the two for a more robust measure of household LEK at the different sites. Generally, the villages in Limpopo Province displayed higher LEK rankings than those in the Eastern Cape; only Mabins B (last) has a low ranking. The villages in the Eastern Cape had low rankings overall (Table 2).

A large proportion of households only collected fuelwood rather than purchased it (ranging from 33.3% in Willows to 100% in Thorndale – Table 3). The proportion of households only collecting wild fruit was correspondingly high (ranging from 46.7% in Fairburn to 100% in Mabins B). This indicates a high level of dependency on these natural resources.

Table 3. How households procure wild fruits and fuelwood.

Village	Fuelwood – three most preferred species[a]				Wild fruit – three most preferred species			
	Buy (%)	Collect (%)	Both buy and collect (%)	Don't use fuelwood (%)	Buy (%)	Collect (%)	Both buy and collect (%)	Don't use wild fruits (%)
Ntilini	43.3	70.0	6.7	0	13.3	60.0	16.7	20.0
Tidbury	8.3	91.7	0.0	0	16.7	79.2	0.0	8.3
Fairburn	23.3	73.3	26.7	0	13.3	46.7	6.7	30.0
Mabins B	3.3	96.7	0.0	0	0.0	100.0	0.0	0
Finale A	0.0	93.3	6.7	0	0.0	96.7	0.0	3.3
Willows	20.0	33.3	46.7	0	0.0	93.3	10.0	0
Thorndale	0.0	100.0	0.0	0	0.0	96.7	0.0	3.3
Mogano	20.0	70.0	30.0	0	3.3	96.7	6.7	0

a The percentages in this table will not necessarily add up to 100%, as it assesses the three most preferred species (fuelwood and wild fruit) for each village. Some households only collect OR buy some species and collect AND buy others.

It was hypothesized that the manner in which households obtain both fuelwood and wild fruit would have some impact on levels of household LEK. The greater the number of households collecting these resources, the higher the composite household LEK score was expected to be. The majority of households in Finale A collect both fuelwood and wild fruit (Table 3) and the village is ranked first overall (Table 2). The majority of households in Thorndale also collect both fuelwood and wild fruit, which translates into a ranking of third. However, no statistically significant correlation was found between the level of household LEK and the percentage of households collecting fuelwood ($r = -0.08$) or wild fruits ($r = 0.26$).

5. Discussion

As knowledge is not shared equally across all members of a community ([Briggs, 2005], [Drew, 2005] and [Chalmers and Fabricius, 2007]) this study relied on local experts to provide the benchmark against which the answers given during household interviews were compared. Assessing LEK this way, instead of comparing answers to conventional scientific knowledge, has been reported previously, albeit not widespread (Reyes-Garcia et al., 2006). It also differs in the manner in which experts were identified. Most often elders have been used, but some studies have that shown that elders do not necessarily have greater LEK on the topics examined ([Davis and Wagner, 2003] and [Dovie et al., 2008]). This study presents a very specific analysis because of the specific questions posed, and consequently the scores cannot be compared to those of other studies. However, the method is clearly robust and transferable, as was achieved at eight different sites in this study. Due to the complex nature of LEK, if more variables were added, the value of composite score would change. However, the selection of appropriate questions is clearly important. Ideally, questions need to be unambiguous, cover broad phenomena that local people could be expected to experience, notice and question, and have clear, discrete answers. In this study we included questions on two different resources and of a range of difficulty (from casual observation to deeper understanding). It is noteworthy that there was no correlation between the levels relating to fuelwood and those relating to fruits, reaffirming the need for a range of questions. Additionally, there need to be sufficient experts available to allow construction of benchmarks.

The results indicate that levels of household LEK may vary considerably depending on the resource. For example, Willows has the highest level of household LEK pertaining to wild fruit species (77.8%) and the lowest level of fuelwood LEK (35.4%). This is counterintuitive, as it would be expected that if villages are highly dependent on fuelwood, levels of fuelwood LEK should be higher. Indeed, Twine et al. (2003) found that consumption of fuelwood was significantly higher in Willows than in either Finale A or Mabins B, while the consumption of wild fruit was significantly lower in Willows than in Mabins B and Finale A. This discrepancy between the levels of fuelwood and wild fruit household LEK may be possibly explained through the manner in which fuelwood is obtained (Table 3). A total of 66.7% of households in Willows buy fuelwood all or most of the time. A total of 33.3% of households in Willows were engaged in only collecting fuelwood. It seems reasonable to hypothesize that when over half of the households in a village are engaged in buying fuelwood, the level of household LEK related to fuelwood species would be correspondingly lower. On the other hand, 93.3% of the households using wild fruits collected their own and did not buy any. Again, it seems reasonable to hypothesize that if 93.3% of the households that consume wild fruit are collecting it, there would be a correspondingly higher level of household LEK related to wild fruit. Overall, Willows is rated as having a high composite level of household LEK and is ranked second of the eight villages. Interestingly it was ranked as the lowest in the study of Dovie et al. (2008) where the score was based on focus groups naming as many trees and their uses as possible. This, once again demonstrates the score is dependent upon the questions posed.

Finale A is a poorly serviced and remote village (Twine et al., 2003) and over 90% of households interviewed were involved in collecting the three most preferred species of both fuelwood and wild fruit. This resulted in consistently high rankings for this village, for both wild fruit and fuelwood, with the highest composite score (71.5%) of all the eight villages. In contrast, Mabins B is ranked consistently poorly in terms of wild fruit and fuelwood despite the fact that over 90% of households interviewed were involved in collecting the three key species of both fuelwood and wild fruit. Thus, self collection of local resources does not always translate into a high composite household LEK score.

The Limpopo Province villages obtained high composite household LEK rankings, with only Mogano (45.5%) and Mabins B (34.6%) obtaining rankings lower than fourth. In the remaining three villages over 90% of the households interviewed were involved in collecting both fuelwood and wild fruit. The exception was Willows, where only 33.3% of households were involved in collecting fuelwood (although over 90% of households in Willows were involved in collecting wild fruit).

Whether households collect or buy the key resources assessed in this study had a varying impact on the composite household LEK score per village. There are clearly other factors at work, potentially including the level of disturbance that harvesting these resources has created in the communal savannas (Shankaar et al., 2004).

It is important to note that while assessing levels of household LEK is in itself difficult, the situation is further complicated by the fact that not all traditional practice and belief systems are ecologically adaptive and sound. This means that it would be ill-advised to view high levels of LEK as something that inevitably leads to good management of resources. For example, Diamond (1993) reported that although New Guinea natives possess detailed knowledge of the species upon which they depended, some of the groups have had (and continue to have) a heavy impact on their native biota. Thus, high levels of LEK do not necessarily always result in ecologically adaptive management strategies (Berkes et al., 2000), but would be facilitative of such. Consequently, development of quantitative indices potentially allows teasing out of the contribution of LEK relative to other factors in promoting sustainable use (Shankaar et al., 2004).

6. Conclusion

LEK is important because it is the basis for decision-making related to natural resources and their management in rural areas (Agrawal, 1995). This paper aims to advance the overall understanding of LEK at both the theoretical and methodological levels. Due to the binary tensions between conventional scientific knowledge and LEK systems, this study avoided describing LEK in scientific terms, or comparing the answers given to scientific knowledge. This was done in recognition that one knowledge system is not necessarily superior to another (Briggs, 2005).

In common with Reyes-Garcia et al. (2007), this study demonstrates that the way ethnobotanical knowledge is defined and measured is important. It is possible to obtain a composite household LEK score (representative of the varying levels of LEK at different sites) when household LEK is proxied with theoretical ethnobotanical knowledge. We appreciate that this is a specific analysis, with a very narrow focus and that LEK is made up of many more facets that were not measured in this study. A more broad-based assessment of LEK would improve the measure of individual household LEK. But it is clear that using local community identified experts as a benchmark will allow derivation of quantitative LEK scores. These may then be used in a relative manner (spatially or temporally) and in subsequent quantitative analyses of relationships between levels of LEK and contextual attributes.

This study found that a large proportion of households in all the villages collect, rather than purchase, fuelwood and wild fruit, which indicates a high level of dependency. However, it was also found that collecting key resources such as fuelwood and wild fruit does not necessarily translate into a high LEK score, because LEK is mediated by a host of other factors.

LEK is still a relatively new to conventional scientific thinking. As the levels of recognition of LEK have improved ([Berkes et al., 2000], [Godoy et al., 2005] and [Ballard and Huntsinger, 2006]), so research aimed at assessing levels of LEK has become more important. This study demonstrates that even within a narrow focus, mean levels of LEK may vary substantially depending on the resource being assessed. LEK is a dynamic, cumulative body of knowledge ([Agrawal, 1995], [Ford and Martinez, 2000], [Pierotti and Wildcat, 2000] and [Allison and Badjeck, 2004]) and ideally LEK measures should evaluate both theoretical and practical levels of knowledge. However, the comparison of the knowledge of general respondents to that of local experts is a useful means of indexing levels of LEK.

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