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Linguistic And Audio-Video Collections In Ethnobiology

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CHAPTER 15

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INTRODUCTION

Set against the backdrop of parallel extinctions of species and languages, those working in both linguistics and ethnobiology are facing the urgent task of documenting a vast, vanishing knowledge base. Increasingly, this process of documentation is done not predominantly in print media, as it had been for many decades, but using digital audio and video recordings. Once recorded, this body of indigenous knowledge provides many different frameworks for thought and unique forms of expertise, which can offer new perspectives to modern science and should be taken just as seriously. As Hunn (2008) notes, 'The outstanding differences between modern and folk sciences are first of all a consequence of transformations in the scale of scientific enterprise, rather than attributable to any fundamental advance in the quality of human thought.'

Most ethnobiological knowledge is orally transmitted, not written down, and is stored only in human memory. The act of transmission involves speech (typically between native speakers and in an indigenous language), as well as demonstration (e.g. of hunting, gathering, processing, and other technologies). It follows that the most accurate and richest way to document (and conserve) this knowledge would be to preserve acts of transmission digitally by recording speakers talking about what they know about plants and animals. Therefore, ethnobiological studies will yield audio and video resources. These, in turn, can function as a repository of community intellectual property, which may be shared with a wider audience if the community so chooses. Digital (audio and video) recording potentially enhances both the robustness of local transmission and the possibilities for dissemination and conservation of the knowledge base.

Neither linguistics nor ethnobiology researchers can adequately attempt to document the ethnobiological knowledge base alone, or apart from the indigenous communities that are the owners of this knowledge. Thus, it is appropriate to examine how the two domains are interdependent and complementary, and how they can best serve the varied stakeholders. This chapter explores some links between ethnobiology and linguistics, and then outlines current best practices in the domain of linguistic documentation and curating of audio-video materials. We conclude by suggesting ways in which linguistics and ethnobiology can complement one another. This chapter complements Will McClatchey's recent (2011) guide to field methods in ethnobiology and linguistics.

HOW CAN ETHNOBIOLOGISTS BENEFIT FROM COLLABORATION WITH LINGUISTS AND ANTHROPOLOGISTS?

Linguistic anthropology offers scientists a window onto local environmental knowledge, which does not replace but rather supplements knowledge that is scientifically discovered. It does so by seriously

considering the labels indigenous people assign to flora and fauna, as well as their understanding of taxonomic and hierarchical relations among species. Such local knowledge has often been neglected or discounted in the history of science, leading to a false discovery paradigm where 'new species' are claimed to have been 'discovered' by outsiders, when in fact they were well known to the local inhabitants all along (e.g. Ragupathy et al., 2009). Many reports of new species by popular news outlets make little mention of the fact that cultures exist even in remote areas, much less that they may have a deep understanding of their environment.

The tools to record accurately the phonetics, semantics and everyday usage of local biological terms come from linguistics. At the most basic level, they are used for careful phonetic transcription of words and sentences of the target language. In current practice, this typically involves audio and video recordings. What emerges from a careful linguistic documentation is not only labels for species and environmental phenomena, but also entire taxonomies of knowledge and a holistic understanding of how the pieces of an ecosystem fit together. The ethnobiological information content is distributed across a range of linguistic structures ranging from, at the small end of the scale, phonemes and morphemes, to, at the large end of the scale, creation myths, stories and entire epic tales. A language must therefore be encountered holistically, and at all levels of structure and all domains of usage, if we are to fully apprehend the biological knowledge found therein.

Linguistics can make us aware of biases in language. The words chosen to represent a given idea encode a culture's values, and the world view reflected by these values may be imposed on languages other than English when we attempt to document them. World views play a significant role in how people interact with their environment, as Carbaugh (1992) demonstrates in his discussion of 'cultural geography'. Examining the language used by different stakeholders to describe a given space can elucidate 'the ways in which a people symbolise their land, the place it holds in their lives, what they see in it, and seek from it'. The Tofa people of Siberia, for example, have a unit of measure which they call kösh, which indicates the distance a reindeer (with rider) can travel in a day (Harrison, 2007). The actual distance represented by this unit is obviously variable depending on climate, terrain and a host of other variables, yet it provides a coherent unit of measure for the Tofa. Speakers of Hanunóo in the Philippines distinguish six different primary directions (Conklin, 1954), speakers of Bantawa Rai in Nepal encode vertical distance in their paradigms of motion verbs (Hart, 2004), and Ambae speakers in Vanuatu (Hyslop, 1999) encode both island topography and wind direction in their directional verbs. The linguistic system encodes selected environmental factors, and, it follows, the local environment cannot be fully understood without reference to the linguistic system that it is used to describe it. This reflection of culture in language is the point of entry for understanding the dynamic between culture and ecology.

Finally, linguistic research into metaphor helps us understand that our own modes of discourse and inquiry are culturally contingent. Everyday talk provides numerous examples of metaphorical thinking: in English, for example, the future lies in front and the past behind, a time metaphor that seems entirely intuitive to us. But in Tuvan, these are reversed, the past being what lies in front and is therefore visible, while the future lurks behind us, unseen and unexpected. Scientific discourse too, whether in climatology or genetics, is permeated by and dependent upon metaphor, and thus upon the specific repertoire of metaphors provided by a given language (Hartl, 2008). As Larsen (2011) notes: 'The way we speak about the natural world is not a transparent window, because it reflects the culture in which we live and its priorities and values.' Larsen goes on to point out that scientific concepts such as 'biodiversity hot spot', 'fitness', 'genetic drift', 'global warming' and so on are all English-specific metaphors that inform not only our abstract concepts but our ability to

reason about environmental issues. Other languages may employ an entirely different repertoire of environmental metaphors, for example the El Niño/La Niña-Southern Oscillation, a climate pattern whose name has been recently borrowed from Spanish into English, but which was already known in pre-Colombian South America (Caviedes, 2001).

HOW CAN LINGUISTS BENEFIT FROM COLLABORATION WITH BIOLOGISTS?

The linguist's aim is to achieve a full description of a language. To do so, we must record all words for flora and fauna, as well as meteorological and other phenomena. This requires the field linguist to be versed in basic biological or botanical practice. As adaptive systems, languages show lexical diversification for domains that are ecologically relevant. A good example of this is the sea ice taxonomy found in the Yupik language of Alaska. Yupik elders (Oozeva et al., 2004) list 99 terms that describe sea ice, each with a detailed description and drawing. For example, the term nuyileq is described by the Yupik elders as, 'Crushed ice beginning to spread out; dangerous to walk on. The ice is dissolving, but still has not dispersed in water, although it is vulnerable for one to fall through and sink. Sometimes seals can surface on this ice because the water is starting to appear.' Any linguistic description of the Yupik language would be incomplete without this lexical domain. Similarly, any description of the arctic ice ecosystem would be incomplete without the accumulated knowledge and scientific observations of the Yupik elders.

Linguistic data have long been recorded by hand and maintained in print formats such as grammars, dictionaries and parallel texts, but as we move further into the digital age, best practices are evolving. Video and audio recording of linguistic data is now the norm. Our ability to share audio and video files on the internet means that the linguistic and ethnobiological knowledge base is increasingly being shaped by more open, participatory documentation and includes more crowd-sourced content. Next, we outline some of the ways in which linguistic and cultural documentation is enhanced by ethnobiological content and best practices in the emerging digital age.

BEST PRACTICES: ETHNOGRAPHIC STUDIES, TALKING DICTIONARIES, DATABASES, AND YOUTUBE

Traditional ethnography

Ethnography provides a valuable set of tools because it makes us attend to linguistic forms not in isolation (looking only at phonology, phonetics or syntax) but in the holistic cultural context where meaning is created. Eugene Hunn's (2008) attention to the nuances of language and taxonomy is exemplary of this approach. His analysis of Gbëë Zapotec plant names helps him draw conclusions about the conceptual structure that shapes this people's understanding of plants. One unique structure consists of prefixed life-form references that can be hierarchically 'layered' into the name for a single plant. In English, the words for 'tree' and 'flower' are distinct, but if someone refers to a tree, it is understood that, depending on the kind of tree and the time of year, it may or may not have flowers. A tree can be described as 'flowering', but the tree's identity is not determined by this. In Gbëë Zapotec, however, the 'hummingbird flower herb' is referred to differently depending on its state. When in full flower it has a 'flower' prefix, guièe-dzǐng, while a vegetative tree of the same species has an 'herb' prefix, guìzh-dzǐng. Multiple prefixes can also form compounds. Yàg-guièe-yǎl, for example, means 'frangipani flower tree'.

Hunn also compares the Linnean taxonomy with Gbëë Zapotec folk taxonomy. In some domains, the correspondence is very strong; for example, for birds there is a nearly 1:1 match of terminal Linnean taxa to terminal folk taxa. An instance of discrepancy was the over-differentiation of domestic chickens by the Gbëë Zapotec, who distinguish nine types of chicken based on features that are culturally salient in Zapotec but not in English.

Hunn's findings, made possible by his attention to indigenous nomenclature, bring a deeper understanding of Gbëë Zapotec culture within our reach. Moving forward, we will be able to live up to this high standard of cultural documentation by taking advantage of the new technological resources at our disposal.

The recording and documentation of endangered languages requires hours of elicitation and generates immense stores of data. These databases are an important source of ethnobiological information, particularly because the lexicons of many endangered languages are devoted significantly to ethnobiological nomenclature and folk taxonomy. Organising all of these data into a useful resource for ethnobiologists presents many challenges, but in this age of digital and crowd-sourced databases, we are well-equipped to face these challenges.

Cultural significance of nomenclature and taxonomy

Names reflect culture-specific knowledge, and thus the best dictionaries of ethnobotany include plant names in the local language, not just the major contact language or the binomial Linnean name. This makes for not only for a fuller account of the environment but also for a more accurate one. Conklin (1954: 96) documented 1,625 Hanunóo plant names falling into five major categories, which set a very high bar for future ethnobotanical studies. Few languages — or plant nomenclatures —have yet been the object of such careful documentation.

The taxonomies of modern western science are based on organismal morphology and on hypotheses about evolutionary origin. This nomenclature on its own is not the most useful for addressing the concerns of ethnobiology, because the categorisation imposed by these names is rarely relevant to a plant's role in an indigenous community. This role includes not only the practical uses of the plant but also information about the plant's cultivation, its cultural significance and also the people's general perception of nature. The name given to a plant by an indigenous group of people to whom that plant is culturally significant may contain a lot of useful information about this cultural context. Understanding this important context should be one of the main goals of ethnobiological researchers, and it should be considered by anyone involved in pharmacology, conservation or development initiatives.

Publications (print or digital) by indigenous communities express cultural concerns and values, and so they are invaluable resources of ethnobiological knowledge. Lepcha scholar and linguist K. P. Tamsang, the former General Secretary of the Indigenous Lepcha Tribal Association, authored the *Glossary of Lepcha Medicinal Plants* (Tamsang, 2004). In format, it is similar to some of the best ethnobotanical dictionaries. The book contains Lepcha names, their phonetic pronunciations in English, Linnean botanical names, pictures of the plants, and descriptions of how different parts of the plants are prepared and the ailments they treat. It is important to study the ethnobiological knowledge from the indigenous point of view, because the organisation of the information and the placement of emphasis will reflect the indigenous culture. One important feature of the Lepcha glossary of medicinal plants is that it is organised by the Lepcha names, unlike western dictionaries of ethnobotany which tend to be alphabetised by the Linnean name. This organisation is useful for ethnobiological study because it might reveal relationships between uses or features of a plant and its name.

One pattern that has emerged in analyses of plant nomenclature is that plant names sometimes include animal names (e.g. tiger lily or cat tail), but it is rare that an animal name will contain the name for a plant. Stepp's quantitative analysis of plant names with animal loan words (Stepp, 2002: 171–179) showed that plants that were traditionally protected or cultivated by the Tzeltal Maya of Highland Chiapas were significantly less likely to contain animal loanwords. This shows one direct relationship between the name given to a plant and its cultural prominence. More data on these types of relationships will shed light on how ethnobiological nomenclature emerges and develops, and perhaps even suggest universals in human engagement with the environment.

Another important consideration in ethnobiological nomenclature, besides the nature of the names themselves, is who uses the names. Variation in the names given to a single plant is nearly endless. Names vary not only across cultural and linguistic boundaries but also between individuals. It is apparent from the comparison of folk taxonomies that humans' categorisation of the environment depends on its culturally salient features, but what can be learned from ideolectic variation? Collins and Liukkonen (2002) show that intracultural consensus on the name for a plant is related to the usefulness of the plant among the Q'eqchi Mayans. The more useful a plant is, the more likely it is that any two given people will agree on its name.

The study also found that the western notion of 'plant' as a category is entirely etic. Plants were often labelled by the terms for their anatomical parts, but these same terms are also used for animal bodies and even abiotic entities such as mountains. This suggests a more holistic understanding of nature. The Q'eqchi Mayans also often describe wild and cultivated varieties of similar plants by attaching an animal component to the name for the cultivated variety in order to name the wild variety. For example, a type of lily grown in gardens is called klaux, but the weedy variety is called Xklaux k'uch (or hawk klaux). Ethnobiologists seeking to understand how different groups conceive and represent their environment must pay close attention to patterns in linguistic nomenclature and taxonomy because the way people choose to structure information reveals what is important to them.

The findings of these kinds of studies help us understand how groups of indigenous people think about their surroundings, and how their way of thinking enables them to adapt. Stepping beyond our western conception and categorisation of our natural surroundings grants us access to insights about different survival methodologies and how knowledge of them is acquired and shared. Effectively documenting language so that it can be closely examined through different lenses is the first step towards this understanding. The vast majority of the world's languages await basic documentation of their ethnobiological lexica, and still lack even the most rudimentary systematic recording of their words in audio and video digital media.

Online lexica

The lexica of indigenous languages are typically found to contain a significant percentage of ethnobiological terms. These require proper documentation using linguistic techniques, including context-based elicitation (e.g. discussing the plants with the speaker in the local environment). Once these lexemes are collected as transcriptions and audio files, possibly with accompanying photographs and indexed to collected specimens, they can be databased online. Examples of such work include two talking dictionary projects built by one of the co-authors of this chapter (K. David Harrison) for the endangered languages Siletz Dee-ni (Oregon Athanbaskan, USA) and Matukar Panau (Oceanic, Papua New Guinea) (Anderson & Harrison, 2007; Anderson et al., 2010). These databases are also models of how technology can potentially assist in organising ethnobotanical information and making it readily accessible. The dictionaries — products of linguist-community collaboration, funded by the

Living Tongues Institute and National Geographic Society — are searchable in both English and their respective endangered languages, and have audio recordings of native speakers as well as associated images (Figure 1).

It is possible to learn about Matukar ethnobotany by conducting very simple searches in the Matukar talking dictionary. A search for the word 'leaf' generates a few hits pertaining to betel leaves, among other things. Moving forward with the assumption that betel plants are important in Matukar culture, a search for 'betel' yields 29 different entries that offer insights into the cultural significance of the betel nut tree and its uses. Images that are attached to certain entries show Matukar people indicating all the culturally salient parts of the tree. The different entries tell you that the betel nuts grow in bunches on trees. The Matukar people peel them with their teeth and chew them, and they are used for bartering. This is not a great wealth of information because the current scope of the dictionary is somewhat limited. Nevertheless, as more data are collected, maintaining the information in this searchable format will make the dictionary invaluable to people studying ethnobiology. New search algorithms related to different semantic domains will also make it easier to find topical information and to identify patterns.

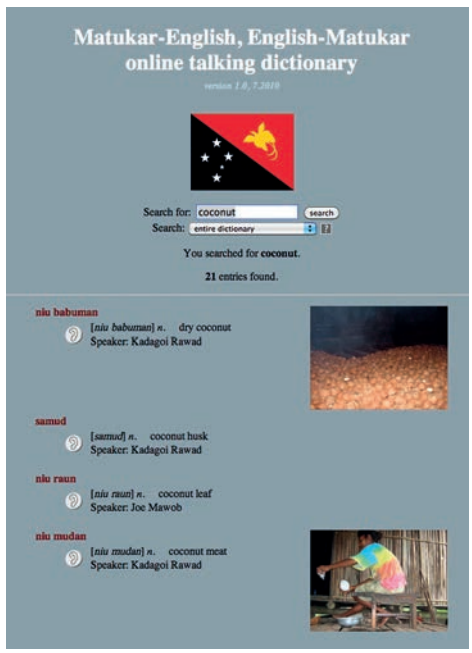

Figure 1. *The Matukar online talking dictionary,* showing four of the twenty-one lexical entries (with accompanying audio files) that appear when searching for 'coconut'. © LIVING TONGUES INSTITUTE FOR ENDANGERED LANGUAGES.

Talking dictionaries represent one possible model for curating audio data. They are durable (so long as the server is maintained), open to community collaboration, sensitive to community intellectual property (data can be password protected) and relatively inexpensive to maintain. They provide a rich, searchable context for the data, accompanied by metadata (e.g. name and location of speaker, dialect), and in some cases, photographs of the named objects.

Scientific databases and crowd-sourced resources

Some audio and video information that is being made available is curated formally, in an attempt to build useful scientific resources, but there is also a robust informal sector, where data are not curated but are contributed and uploaded by volunteers.

FishBase is a good example of the former. In recent years, this database has expanded to include fish names for many indigenous and endangered languages. If the site has data for a language, a user can pull up a list of words for different fishes in that language. These words link to pages containing biological and ecological information about the species, with the western scientific name at the top of the page. In many cases, many different words in a single language link to the same fish page, indicating that the classification system in that language may have a more detailed taxonomy than western science. Inuktitut, for example, has nearly ten different words linking to the 'Atlantic salmon' page. Scientists studying fish would benefit from studying the knowledge contained in languages such as Inuktitut. Adding audio recordings to such a database, modelled after those in talking dictionaries, would make the database an even richer resource, both for scientific analysis and for cultural transmission.

Crowd-sourced data sets continue to emerge, though in some cases they are not yet organised or tagged in any way that would allow a user to filter ethnobiological data. One such example is the website Forvo, which boasts 1,168,024 words with 1,215,742 recorded pronunciations in 281 languages. Largely crowd-sourced, the site allows users to upload their own recordings. Words are minimally tagged, for example, across the entire data set, 2,191 words are tagged as belonging to the category 'zoology'. The focus of this site is, however, on audio recordings of pronunciations not on word definitions, so many words lack translations or definitions, limiting the scientific usefulness of the data set. Still, this kind of initiative exemplifies the crowd-sourced and organically evolving accretion of data that will surely continue to expand, and searchability across these data sets will improve.

CURATING DIGITAL VIDEO AND AUDIO

Linguistics has been revolutionised by the ability to record speech in high-quality audio and video, and to analyse, annotate and share these resources both within the scientific community and among a broader audience. At the same time, digital data introduce new challenges relating to data portability, access and archiving (Simons & Bird, 2003). In response to the urgent need to document endangered languages, major funding initiatives, consortia and archives have been established over the past decade, including The Endangered Languages Archive (ELAR) at the School of Oriental and African Studies (SOAS) of the University of London, Dokumentation bedrohter Sprache, Nijmegen (DoBeS), Resource Network for Linguistic Diversity (RNLD) and the Enduring Voices Project (National Geographic Society).

Yet the collection of new material, by both professional linguists and others, rapidly outpaces the ability of archives to ingest, organise and meta-tag it. As a result, most linguists and many community activists have an impossible backlog of data that they will never adequately explore. New participatory, crowd-sourced and distributed models are needed at both the front end (collection) and back end (archiving). These should be guided by the better availability of data for scientific analysis and community use.

YouTube is rapidly emerging as an important tool for both research and cultural preservation. It is also a good way to curate data. If properly tagged, related data sets will find each other, and will be accessible to the widest possible audience. We can suggest a set of tags to make linguistic-ethnobiological data more cohesive or easier to find. A series of Koro ethnobotany videos are an exemplary model for how indigenous people can use YouTube to contribute directly to the body of ethnobiological knowledge (Figure 2).

Figure 2. Anthony Degio, a speaker of Koro Aka, narrates and demonstrates traditional Koro knowledge about medicinal plants. Video filmed by K. David Harrison in Arunachal Pradesh, India in 2010, and uploaded to YouTube with the permission of the speaker and the Koro community (www.youtube.com/watch?v=yYGKLW-28lY&feature=relmfu).

In these videos (listed in the Appendix), Anthony Degio, a native speaker of the endangered Koro-Aka language in northeast India, shows and describes the practical and medicinal uses of the plants with which he is familiar. He gives both their local name and an approximate translation in English. The ability to have ethnobotanical knowledge shared directly by indigenous peoples with a wider, indeed global, audience is invaluable. When they speak for themselves, not only do indigenous people share unique knowledge but their speech also can attune us to other facets of their culture, like their language attitudes and processes of language endangerment and extinction. This is

evident when Anthony shows the jungle yam, and then explains that the Koro people 'used to say x' to refer to it. It is clear from this kind of description that he is aware of the language shift occurring among his people.

Suggestion engines and other features on YouTube make it an invaluable research tool, as we will demonstrate with the example of sangre de drago or dragon's blood, a tree sap that has many different medicinal uses. A video entitled 'harvesting Sangre de drago (dragon's blood)' was on one of the first few pages of the results of a search for 'ethnobotany' on YouTube. This showed a Waorani man (not named in the video) in the Amazon basin of Ecuador extracting the sap from a tree with a machete. This video was very well-labelled and can be found by people interested in the substance itself, in the Waorani people or in ethnobotany in general. Its title contains the name of the substance in two languages, and its tags include 'ethnobotany', 'anthropology', 'Ecuador', 'Amazon' and 'Waorani'. Suggestions that are associated with the video lead to a documentary-style commentary on the medicinal properties of sangre de drago by a pharmacist being lead through the Amazon by a local naturalist. Another related video, featuring a man in Yemen, talks about how this substance can be used to stop bleeding. In another video, this same man shows how the stem of a different plant can also be used for a similar purpose.

These videos amount to just a few minutes of content but they represent the beginning of the first sangre de drago video archive. As more ethnobotanists, scholars and people with firsthand experience begin to plug in to this network of ethnobiological information sources, the knowledge pool will expand. Nevertheless, as our searches showed, this public curation system is far from perfect. The best way to ensure that this information is accessible in a coherent form is to be explicit and consistent in labelling and tagging videos, and also to consider the full range of people who will have valuable information to contribute. It is important for the tags to include different names for the organisms described in the video, the local language and ethnicity, and the region where they are found, including the continent, country and other regional parameters that are likely to be used as search terms. 'Ethnobotany' and 'ethnobiology' are important tags, but not everybody with valuable information to offer is aware of these fields. Many videos concerning ethnobiology have tags such as 'wild foods', 'alternative medicine', 'natural healing' or 'traditional medicine'. Including tags such as these will link a video to a wider range of resources.

THE FUTURE OF CURATING AND THE ROLE OF INDIGENOUS COMMUNITIES

We wish to emphasise that ethnobiology, like linguistics, cannot be attempted solely by professional scholars or outsiders, but must be thoroughly participatory, community-based, and respectful of the intellectual property rights pertaining to traditional knowledge. Collaborative projects that document languages must respect the intellectual property rights of all stakeholders in addition to informed consent for sharing information. We believe that traditional 'curated' collections, or stores of data controlled by a single researcher or institution, will gradually evolve into something more diffuse, more crowd-sourced and more likely to be uploaded to public access sites such as YouTube. This trend might have both negative and positive effects in terms of data longevity and searchability, but it is the wave of the future in curating audio and video collections. Given the lack of resources to document all of the world's ethnobiological knowledge, and the urgency imposed by the erosion of this knowledge base, we welcome the vast new possibilities offered by the curator-less, crowd-sourced model of data preservation.

Appendix — some ethnobotanical videos on YouTube

Anthony Degio, a native speaker of the endangered Koro-Aka language in northeast India: http://youtu.be/RA-xjzwfpqU, http://youtu.be/yYGKLW-28lY

Sangre de Drago: http://youtu.be/2Chiq9F4lW8, http://youtu.be/2njrYklU5y0, http://youtu.be/jKmaR24qPpk, http://youtu.be/yKhMXdbSp7I

Eating 'piton': http://youtu.be/AwUv4yguE8g

Berry for hunting dogs: http://youtu.be/gf4esj8S0GI

'Uncle Poison' (documentary about a faith healer): http://youtu.be/IC6LDM522mQ

Amanita muscaria: http://youtu.be/sCfQuxSnwyw

Websites

FishBase. http://fishbase.org

Forvo. www.forvo.com

School of Oriental and African Studies. *Endangered Languages Archive*. http://elar.soas.ac.uk

DoBeS: Documentation of Endangered Languages. www.mpi.nl/resources/data/dobes

Matukar–English Online Talking Dictionary. http://matukar.swarthmore.edu

RNLD: Resource Network for Linguistic Diversity. www.rnld.org

National Geographic Society. *Enduring Voices Project*. http://travel.nationalgeographic.co.uk/travel/enduring-voices

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