Ka'ux

Mixe language and biodiversity loss in Oaxaca, Mexico

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Abstract: The community of Tlahuitoltepec, in the Sierra Mixe of Oaxaca, is losing Traditional Ecological Knowledge due to socially driven changes in its natural environment. Mixe is one of the 69 indigenous languages spoken in Oaxaca, and is spoken almost exclusively in Tlahuitoltepec. Using an ethnographic approach, with loosely structured interviews among key members of the community, we analyzed the theory that biodiversity loss is linked to the loss of indigenous languages and traditional ecological knowledge. Our findings show that certain words in Mixe, used to refer to animals that are no longer observed in the community or its surroundings, are not well known by young people. The case of Ka'ux reflects what happens to traditional ecological knowledge and to an indigenous language when biodiversity is lost.

Keywords: indigenous people, Mixe Sierra, Tlahuitoltepec, Traditional Ecological knowledge (TEK)

Worldwide, the number of languages and their linguistic variants are being severely diminished (Harmon & Loh, 2010). Influenced by a variety of global and local factors, people are no longer speaking in their mother tongues and are instead adopting languages spoken by more people. According to the Index of Linguistic Diversity (ILD), the American Indigenous languages had a severe decline in diversity between 1980 and 2005, the largest decline worldwide (Harmon & Loh, 2010). At the same time there is a massive loss of biodiversity happening worldwide (IUCN, 2016); these two events are linked through traditional ecological knowledge (TEK).

Language, particularly indigenous languages, have TEK imbedded within them—that is, the knowledge, practices, and beliefs that human societies have developed with their natural surroundings (Berkes et al., 2000). TEK is shaped through a dynamic process, changing due to natural and social changes in a community (Becker & Ghimire, 2000). The loss of

indigenous languages is a social change that negatively impacts TEK. The rate and severity of this change varies significantly between communities depending on numerous internal and external factors; in several cases, people have shown a resistance to the loss of their native language, as is the case of some Zapotec communities in Oaxaca, Mexico (Saynes-Vásquez et al., 2013). The main concern raised by those conducting recent research about TEK is the process through which indigenous peoples are losing that knowledge (Gómez-Baggethun, Corbera, & Reyes-García, 2013). In a systematic review of the literature on TEK by Tang and Gavin (2016), they identified environmental degradation as one of the key ways through which TEK is lost. This degradation creates a positive feedback loop in which species loss leads to language loss, reducing TEK and degrading indigenous people's abilities to manage their resources sustainably, causing greater species loss and the cycle continues. Research about the links between language and environment has been developed by anthropologists, ethnobiologists and ethno-ecologists (Abram, 1996; Maffi, 2005). Of this body of research, a part was to understand the parallel changes in biological and cultural diversity (e.g., Harmon & Loh, 2010; Maffi, 2005), and, unfortunately, though this link has been established, research that focuses on the effects of biodiversity loss on indigenous languages are very rare.

There is a nascent discipline that can help address this question, namely biocultural diversity, an interdisciplinary area, which links linguistic, cultural and biological diversity. Often, these three diversities are threatened by the same causes, and the loss of diversity has serious health, economic, and social implications for humanity (Díaz, Fargione, Chapin, & Tilman, 2006; Maffi, 2005).

During the United Nations Summit on Sustainable Development in 2015, the Agenda for Sustainable Development was approved, with the document "Transforming Our World: the 2030 Agenda for Sustainable Development". This document was made with the aim of ending poverty, fighting inequality and injustice, and tackling climate change. It is within this agenda that the opportunity is presented for several countries, including Mexico, to advocate and promote the issue of inclusion and equity in a framework of rights for indigenous people. Achieving these goals for indigenous people rests firmly in the preservation and expansion of their TEK and the protection of their languages.

How the research question was born

Through performing biogeographic research on the sacred mountain of Zempoaltépetl (Figure 1), a place of great spiritual and biological impor-

Figure 1 • Zempoaltépetl, view from the way to the top. Photo by A. ARRIAGA-JIMENEZ.

tance for the people of the region, we established a relationship with the nearby indigenous Mixe communities. Before we started our research, we went to the local authorities to ask for permission to summit Zempoaltépetl. They agreed, but first they asked us to go up the mountain with an offering to ask permission of the King Kondoy (Figure 2). The King Kondoy is associated to the Zempoaltépetl by two Mixe beliefs: the first, as in other cultures, that the higher the mountain, the closer it is to God, so they chose Zempoaltépetl, the highest mountain in the region; and the second is the relationship the Mixe established with nature through taking offerings to the summit of the mountain on special occasions for King Kondoy (Figure 3). King Kondoy is a god for the Mixes and one of the most important deities to the Tlahuitoltepec and the surrounding communities. During the duration of our biogeographical study, we stayed in Santa María Tlahuitoltepec, where we had the opportunity to live in the house where a female band rehearsed. It is there where we were struck by the name of the female band named “Ka’ux”, or Green Macaw in English. This led us to our preliminary approach and a wide question: what happens to the indigenous languages, particularly the Mixe language, in face of biodiversity loss? Our objective became to investigate the case of the word Ka’ux, how it was lost, to whom was it lost and why. In this article

Figure 2 • A. Highest point of the Zempotaltépetl with the offerings for Kon-doy; B. Hilaria leading us to the top (2017). Photos by A. ARRIAGA-JIMENEZ.

we seek to answer those questions and follow the reasoning behind the band's name, its meaning (literally and culturally) and its history in this Mixe community.

The article is organized into the following sections: (1) the Mixe language, a brief description of this language and its status in Oaxaca, Mexico; (2) Ka'ux: the naming of a female philharmonic band in a Mixe community, the history of the band's name, as well as the knowledge or lack of this word by some members of the community; (3) the message of

Figure 3 • A. Members of the group Ka'ux and their relatives leaving offerings at the top of the Zempoaltépetl to ask for the good of the group; B. Music and dance at the Zempoaltépetl top after the offerings. Photos by C. PÉREZ-DÍAZ.

“Ka’ux”, here we explain the cultural meaning that this word had in the community and the methodology followed to answer our question; (4) green macaw (*Ara militaris*) biology, description and distribution of this endangered species, and the community knowledge of it; (5) final remarks and conclusions in which we give cases of words not widely used in Mixe, and discuss the implications of our findings vis-à-vis sustainable development in indigenous communities.

The Mixe language

Mexico possesses 69 indigenous languages of which there are 364 linguistic variants; more than seven and a half million people in the country speak an indigenous language, and at least 10% of the population has a mother tongue different from Spanish (INALI, 2008). The state of Oaxaca has the most total number of indigenous speakers and quantity of languages in Mexico (Ferrero & Lasso-Von Lang, 2010; INALI, 2008). Oaxaca has an area of 95,364 km², making it the fifth largest state in Mexico (INEGI, 2012). Due to its complex topography, geology and climatology, it is one of the states with the greatest biodiversity in Mexico, along with Veracruz and Chiapas. The state occupies the first place in species richness of amphibians, reptiles, birds and mammals, and is also recognized for hosting the greatest floristic diversity (Ceballos, Arroyo-Cabrales, Medellín, Medrano González, & Oliva, 2005; González-Pérez, Briones-Salas, & Alfaro, 2004; Lavariega, Martín-Regalado, Monroy-Gamboa, & Briones-Salas, 2017; Villaseñor 2016). In terms of birds, it ranks first nationally with approximately 744 species (Ramírez-Julián, González-García, & Reyes-Macedo, 2011). Oaxaca is also one of the most mountainous states of Mexico, with a great biological and cultural diversity that varies drastically according to its regions (García, Ordóñez, & Briones-Salas, 2004).

Mixe, or Ayuujk, is one of the original languages from Oaxaca, it exists in the northeastern region of Oaxaca, in the Sierra Norte mountain range. According to the classification of the National Institute of Indigenous Languages (INALI: *Instituto Nacional de Lenguas Indígenas*), the Mixe language belongs to the Mixe-Zoque linguistic family, and it has six linguistic variants that are mostly intelligible to each other (2008). The Mixe language is at a non-immediate risk of disappearance (Embriz & Zamora Alarcón, 2012), with a total population of 8,922 speakers. In the Tlahuitoltepec community, the largest community of the Mixes, 97.11% of the population speaks the Mixe language (Embriz & Zamora Alarcón, 2012; INEGI, 2015).

Of all the 364 linguistic variants in Mexico, around 64 are in danger of disappearing (INALI, 2008). Discrimination is the main cause of language

loss, but there are other causes, such as migration, the loss of biodiversity and traditional knowledge (Saynes-Vásquez, 2013; Tamez & Terborg, 2009).

Ka'ux: the naming of a female philharmonic band in a Mixe community

In the community of Santa María Tlahuitoltepec Mixe, in 2013, a philharmonic band composed of 25 women was organized. The next year, the group decided to name the band under certain conditions: it had to be a word from the Mixe language, it had to be a short name, and it had to be related with music. Each one of the 25 members participated in the task, and at the end from all the proposals “Ka’ux” was chosen as the band name. Ka’ux’s literal meaning is “birds that sprout life in the heart”.

Even though Mixe is the first language of all of the women present, this word had never been heard by them before, nor by Leticia Hernández, the member who proposed the name. It was her father who suggested it. Some of the women even thought it was a word in Zapotec, another indigenous language from Oaxaca (C. Perez-Díaz, pers. comm.).

The femenil philharmonic group took up the word “Ka’ux” as the name of their band (Figure 4), first because it is a word that is disappearing, and by naming the group that, they would manage to revive it; and second be-

Figure 4 • Founding members of the female philharmonic group “Ka’ux” in 2015, photo by C. PÉREZ-DÍAZ.

cause these birds are very active, they flock and make a lot of noise, so the members of the band felt like them too (pers. comm. femenil band Ka'ux). After deciding on the band's name, some members asked their parents and grandparents if they knew the animal their name referred to. Among the relatives they interviewed who were younger than 60 years ($n = 30$), only 20% knew the word and the meaning. While the *abuelos* or elders ($n=6$) not only knew the meaning of the word but also remembered seeing this bird in the lowlands of the mountain during their childhood years (Figure 5). The population of macaws in the region has disappeared according to some members of the community. Some *abuelos* have not seen the green macaw for many years; Rafael (77 years old) said "*të ja jëyujk kyutëkënyë, ja ojts njaak ix ku nmutsk aty*" ("It has disappeared. I haven't seen it since I was a little kid"). The people who did know the bird and its name were in agreement on its characteristics, concluding that it was the green macaw. The bird ecology was described as follows: they arrived in flocks of approximately 10 to 20 individuals, were very noisy, and ate the corn crops.

The message from "Ka'ux"

This bird has a special meaning and legends in the Mixe community of Tlahuitoltepec, as it does in other indigenous cultures in Mexico (Navarrijo-

Figure 5 • Isabel (76 years) and Anastacia (81 years) drinking mezcal to the health of each of them, photo by C. PÉREZ-DÍAZ.

Ornelas 2012). People from Santa María Tlahuitoltepec describe this bird as traveling in flocks and forming circles when they flew. These movements were seen mainly when the sun's rays were high, and the birds' shadows could be seen from above. For the ancestors of the Mixes, Ka'ux carried messages to their god, *Kong ëy* (translated as "the good god"). It is believed that when someone in the community had a speech impediment, were mute, or their child had difficulty expressing themselves, these birds could return the speech to them, and that the afflicted would soon be able to talk and communicate well. So, each time these flocks of birds passed by, a little stick was sought in order to touch the mouth of the patient (the person or child afflicted); then they implored to the birds to take the message to *Kong ëy* (mixe God) so they could talk properly. The irony of losing the word and meaning for a bird whose function within the Mixe community is to return language to those who don't have it is not lost on the authors.

Green macaw (*Ara militaris*) biology

In Mexico, the family of psittacids is represented by 22 species (Howell & Webb 1995). Within this family is the green macaw, known as "Ka'ux" in Mixe, a green or bluish green bird with a large with a matte colored beak, which inhabits mainly hills, mountainous terrains, forested areas with canyons, mainly in pine and oak forests at altitudes between 500 and 1,500 meters above sea level (Instituto Nacional de Ecología y Cambio Climático, 2007; CONABIO, 2011). In the Mexican law that identifies and list endangered species (NOM-059- SEMARNAT-2010), this bird is in danger of extinction, and the International Union for Conservation of Nature (IUCN) has it listed as "Vulnerable" (BirdLife International, 2016; IUCN, 2017). Historically, this species occurred in the mountainous regions of the Pacific slope of the states of Oaxaca and Chiapas (Álvarez del Toro, 1980; Binford, 1989). However, there is a consensus among Mexican scholars that the species has been extirpated in many localities of its range of distribution and even in entire regions (INE-SEMARNAP 2000). Identification of this species, for the purpose of this study, was made with the book by Howell & Webb (1995), together with the elders of the community who agreed and were able to match the bird "Ka'ux" with *Ara militaris*. The green macaw ceased to be observed in this region (Zempoaltépetl and its surroundings) approximately 70 years ago. According to some of the elders, among the direct causes that could lead to the disappearance of the green macaw in the surrounding areas of the Zempoaltépetl are population growth and the destruction of forests, and indirectly, because some

settlers stopped the passage of the birds to not lose their crops, since the forests began to be replaced by agricultural fields, the flocks of macaws arrived and totally destroyed the corn (pers. comm. elders of the region). These reasons, identified by a few elders as to why the birds have declined in number, open up other lines of investigation to find out what changed in the community to make people stop the passage of the birds. Who were the settlers in the area planting corn? What connection did those settlers have to the area? And what production processes in the milpa changed to make farmers noticeably more protective of their crops? The authors will continue with this study to answer those questions and determine the causes of the loss of the macaw, using more systematic interviews with a greater number of community members.

Final remarks and conclusions

Along with Ka'ux, there are other birds with names in Mixe that young people do not understand nowadays, such as *kuutsyaat* (*Melanerpes formicivorus*), *äxj* (*Falco peregrinus*), *kuxook* (*Dendrortyx macroura*), *kuuk* (*Columbina inca*) and *tsek wee'* (*Progne chalybea*). These examples of other words that are disappearing were obtained based upon our conversations with some of the elder members of the community (six *abuelos*), and then confirmed with the young people. These birds are not seen any more in the town or in the mountain, therefore the words stop being used.

This is a clear example of how the loss of one species (biodiversity) can lead to the loss of language (species names) and cultural connection (legends). For that reason, it is important to carry out conservation research at both levels, biological and cultural (e.g., linguistics). The *abuelos* of the community are the only ones who remember the names of species that have already disappeared in the region, which means that this loss of species and words could happen in just one generation. Considering that the Mixe has different variations, maybe it is not just one word that is missing, but as many as the different Mixe variants around Zempoaltépetl where this bird species no longer exists. Even if the Ayuujk or Mixe is in a non-immediate risk of disappearance (Embriz & Zamora Alarcón, 2012), it could be losing words at a higher rate than what is believed (pers. comm. *abuelos* of the community).

The names given to flora and fauna by local cultures are part of Traditional Ecological Knowledge. Berlin (1972) suggests that the Ethnobiological vocabulary grinds down when activities most related to the environment lose importance, or as in this case (our study) because of the loss of the taxa itself. Biodiversity loss is happening worldwide, at one of

the highest rates in recorded history (IUCN, 2016). If this is coupled with the loss of ecological knowledge caused by the global changes that affect local societies (Saynes-Vásquez et al., 2013), the probability of losing indigenous languages could increase. More information and more studies are needed to explain this phenomenon more clearly, that is, if language is lost because we lose biodiversity, or vice versa; and the impacts this has on the community and environment.

As of 2018, in Tlahuitoltepec Mixe (Oaxaca), there is a lack of studies related to biodiversity. Therefore, it is necessary to implement strategies that will allow for long-term conservation, as well as to improve the knowledge of the species that inhabit this region.

There are several mechanisms that allow societies to generate, regenerate, transmit and apply knowledge; however, to lose or keep knowledge depends on the ability of the society to transmit it from generation to generation, which contributes to the resilience of the TEK over time (Gómez-Baggethun, Corbera, & Reyes-García, 2013).

The Mixe community has a high percentage of national and international migration; many people leave the community looking for better jobs or different study options. The migration occurs mainly toward Mexico City but also to other states of Mexico and to the United States. Despite their distance, their identity can be strengthened by sharing their uses and customs through long-distance communication (Internet, etc.). However, more than half a century of human displacement has brought about multiple socio-cultural transformations that are now reflected in the culture, in different ways that young people live and expressed, as well as in the language (Aquino-Moreschi & Contreras-Pastrana, 2016; Bautista Martínez & Juárez López, 2016; Vergara-Mendoza, 2015). In some families of this region, there is also a long trajectory of migration, and in certain cases, interethnic marriages; and although migrants tend to maintain a sense of belonging associated with their memories of childhood in the town and by visiting their hometown once or twice a year, some are no longer Ayujuk (Mixe) speakers (Gonzalez Apodaca, 2014). Therefore, in these communities, human migration may also be influencing the loss of language and TEK overall.

The Convention on Biological Diversity determined as one of its indicators for progress (2010 Biodiversity Target) the rate of loss of linguistic diversity and the number of indigenous languages. According to the International Union for Conservation of Nature (IUCN, 2016), indigenous peoples are critical guardians of fragile ecosystems, which maintain their way of life and preserve the biodiversity of sensitive areas. This has been the case since the beginning of the history of mankind, made possible through their techniques of coexistence with nature, or in other words, TEK.

Nowadays, the need to respect the environment as well as the concept of sustainable development are fundamental parts of the ecological, social and economic sustainability of these communities. Their sustainability arose from adjustments that were taken over the course of generations in the way of life of the Mixe people. For this reason, it is important to generate an environmental awareness together with them; the knowledge can only be developed through this amount of time. However, in Mexican society, concepts practiced by indigenous people through TEK are often not considered in political practices, much less in resource management, and there is a colonial mindset that seeks to create policies that intentionally ignore or seek to minimize the serious catastrophes that indigenous peoples, and consequently Mexico, face with regard to the loss of their lands, culture, and biological diversity. To date, biocultural diversity is nearly absent from the sustainable development policies of Mexico. Since, sustainable development is proved to be practiced by indigenous communities through TEK, understanding cultural and biocultural diversity, as well as the importance it represents for indigenous peoples, is of the utmost importance for sustainable development in the state of Oaxaca and for Mexico. Indigenous languages and traditional knowledge, along with the environment of each indigenous community should be at the beginning of every conservation and biodiversity study, as well as incorporated into policies and development planning, at the state and federal levels.

It is important to recognize that although indigenous communities have ancestral knowledge, TEK, and in some cases care for nature, not all the activities they carry out are sustainable. For example, in the case of the macaws, members of the community sometimes caught them to cure ill people, did not let them free immediately and sometimes the birds died, affecting their population (pers. comm. elders of the region). Another example is that previously in the region they used *totomoxtle* (dry corn leaves) to transport food, which could be thrown in the field without polluting, so when plastic was introduced, many people did the same, generating garbage. This is to say that TEK is not a panacea that can re-orient our current trajectory on its own; to move forward sustainably will require elevating the power and voices of indigenous peoples so that, collectively, we can share knowledge and develop strategies to tackle our societal problems.

The authors believe that sustainable development, besides focusing on economic growth, should be oriented toward social, cultural and ethical development. To achieve this integration, it is essential to consider indigenous peoples, not only to learn from them and to maintain their TEK but also to make sure they will continue to be the guardians of the biological and cultural diversity they have in their territories. In order to make real

progresses in conservation and to have an integrated sustainable development, scientists, conservationists, governments and decision makers must overcome the centuries of oppression and colonization against indigenous people and begin to be allies.

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Ka'ux: lengua Mixe y pérdida de biodiversidad en Oaxaca, México

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Resumen: La comunidad de Tlahuitoltepec, en la Sierra Mixe de Oaxaca, pierde conocimiento ecológico tradicional debido a cambios sociales en su ambiente natural. El Mixe es una de las 69 lenguas indígenas habladas en Oaxaca, y es hablado casi exclusivamente en Tlahuitoltepec. Aplicando un enfoque etnográfico, con entrevistas semiestructuradas a miembros clave de la comunidad, analizamos la teoría sobre si la pérdida de biodiversidad se relaciona con la pérdida de lenguas indígenas y conocimiento ecológico tradicional. Nuestros resultados muestran que algunas palabras mixes usadas para nombrar animales que ya no se observan en la comunidad o sus alrededores, no son bien conocidas por la gente joven. El caso de Ka'ux refleja que ocurre con el conocimiento ecológico tradicional y a las lenguas indígenas cuando la biodiversidad desaparece.

Palabras clave: conocimiento ecológico tradicional, pueblos indígenas, Sierra Mixe, Tlahuitoltepec

Ka'ux: Langage mixe et perte de biodiversité à Oaxaca, Mexique

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Résumé : La communauté de Tlahuitoltepec, dans la Sierra mixe d'Oaxaca, perd ses connaissances écologiques traditionnelles en raison de changements sociaux dans son environnement naturel. Le mixe est l'une des soixante-neuf langues indigènes parlées à Oaxaca et elle est parlée presque exclusivement à Tlahuitoltepec. En utilisant une approche ethnographique, avec des entretiens semi-structurés parmi les membres clés de la communauté, nous avons analysé la théorie selon laquelle la biodiversité est liée à la perte des langues autochtones et des connaissances écologiques traditionnelles. Nos résultats montrent que certains mots en mixe utilisés pour désigner des animaux qui ne sont plus observés dans la communauté ou ses environs ne sont pas bien connus des jeunes. Le cas de Ka'ux reflète l'impact de la perte de biodiversité sur les connaissances écologiques traditionnelles et sur une langue autochtone.

Mots-clés : connaissances écologiques traditionnelles (CET), Sierra mixe, peuples autochtones, Tlahuitoltepec

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