MESOAMERICA

Global Alliance of Territorial Communities

REPALEAC

Alianza Mesoamericana de Pueblos y Bosques

Articulación de Pueblos Indígenas de Brasil - APIB

COICA Coordinadora de las Organizaciones Indígenas de la Cuenca Amazónica

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1. Introduction and context

The Global Alliance of Territorial Communities (GATC) is a political platform that brings together Indigenous Peoples and Local Communities (IP&LC) to defend Mother Earth for the present and future benefit of all humanity. The GATC guarantees its legitimacy and representativeness through democratic processes, ranging from the community to the multinational level. The Alliance represents 35 million people living in forest territories in 24 countries across Asia, Africa, and Latin America. These communities are defenders of more than 958 million hectares of land. The GATC brings together various organizations, including the Alliance of Indigenous Peoples of the Archipelago (AMAN), the Mesoamerican Alliance of Peoples and Forests (AMPB), the Articulation of Indigenous Peoples of Brazil (APIB), the Coordination of Indigenous Organizations of the Amazon Basin (COICA), and the Network of Indigenous and Local Populations for the Sustainable Management of Forest Ecosystems in Central Africa (REPALEAC). These organizations form a coordination platform to highlight the difficulties faced by Indigenous Peoples and Local Communities and ensure respect for their rights.

As part of a global project, the Global Alliance of Territorial Communities (GATC) is working to identify case studies on traditional forest and food management with Indigenous Peoples and Local Communities in its five regions: Mesoamerica, the Amazon Basin, Brazil, the Congo Basin, and Indonesia. This project focuses on documenting and understanding traditional knowledge and foodways in tropical forests and is part of GATC's initiatives leading up to COP30. It responds to the growing global food and land crisis, which demands alternative foodways to ensure the world receives nutritious food without harming the land, soil, and resources. The core of the project is to identify practices in agriculture, land use, and foodways led by Indigenous Peoples and Local Communities (IP&LC) that can be highlighted as part of policy proposals and messaging during key climate and biodiversity forums. The results of the work carried out will be taken to global forums to serve as advocacy tools, including exhibition at COP29 and COP30, as well as other key forums on food and land use. The results will be presented as a regional policy document and a global report on foodways.

Objectives and scope of the Case Study.

The study aims to achieve the following objectives:

- Document and preserve traditional knowledge and practices.
- Empowering IP&CL by amplifying their voices and stories in key global forums.
- Influence policies and promote sustainable land management practices.

1.1. Methodology for case analysis.

This case study is based on a detailed literature review conducted previously to determine current advances in the study of traditional forest-related food practices among the Bribri-Cabécar peoples of Costa Rica. It also critically examines the processes of change that have occurred in these traditions throughout recent history, and presents a current analysis of the current situation in this field.

Following the literature review, interviews were conducted with leaders of the Bribri-Cabécar Indigenous Network (RIBCA) organization, as well as with individuals knowledgeable about Costa Rican culture and the context (two academics from the University of Costa Rica and two network leaders) to develop a description of the process. The information contained in the interviews was compared with an online review of relevant aspects of the topic. A field visit was planned to complete additional relevant information.

The methodological approach used in both the bibliographic review and the application of the interview and case review instruments were mainly the objective analysis of reality through the application of tools for the analysis of ecological-social processes as well as cultural traditions (based on the descriptive analysis of cultural processes and the appreciation of culture). For the food issue, the analysis tool called "food change" was used, which aims to measure the magnitude and qualitative changes in food traditions and dynamics in communities, analyzing as comparative elements the dynamics of "before" and "after", in this case, the before identified as the historical past of previous generations, and the after compared with certain historical-political-social-cultural processes that occurred at the time the country had access to agricultural production based on the green revolution, contrasting the dynamics of production in previous years, about 50 years before, with the food traditions and dynamics of today. The interviews were audio-recorded on cell phones, the bibliographic review compiled in electronic folders for critical reading, and feedback was obtained from all participants. A base document was first developed that analyzes the entire process of change in the productive dynamics of Indigenous peoples in the Mesoamerican region, combining historical and social-cultural analysis. This document then gave rise to the case studies presented here, which are descriptive and systematize current practices in the study areas.

2. Focus on food change, and the importance of restoring, recovering, strengthening, supporting, and documenting traditional food systems linked to indigenous peoples and forests.

The Mesoamerican region is a region of high biodiversity, rich culture and tradition, and ancestral societies that have faced modernity in resilient and creative ways. These societies have been domesticators and developers of food species dating back more than 7,000 years in these efforts of food, cultural, and technological development. The indigenous Mesoamerican peoples, including the Bribri-Cabécar people , have been for centuries peoples who have created complex and highly developed food systems, based on an integral approach that allows them to provide the community with the necessary food for the complete biological function of the human organisms of its members (a healthy life), while also allowing them to sustainably manage the forest and the food species they rely on for their survival. These traditional systems are based on impressive biological diversity and a complex relationship with surrounding cultural and social elements, which have allowed these societies to survive. That is to say, traditional food systems are not only technological or productive practices that allow the hunger of the societies that implement them to be satisfied, but at the same time they have historically woven a cultural, cosmogonic framework around these practices that also allows them to guide, through this holistic magnitude of coexistence with nature, the other facets of community life and its development , as well as the advancement of an entire spirituality that guides it. These traditional models of indigenous peoples face many crises in the social, economic, and cultural spheres, but mainly two very important juxtaposed challenges and crises: one is the crisis caused by a historical model that has been based on gradually replacing traditional production models and the cultures linked to them, with the establishment of "modern" food models that since the Second World War have insisted on producing mass consumer goods and that, with the discourse of combating hunger, what they have achieved in practical terms is that the global food chains are in the hands of less than a dozen transnational corporations. This model has based its development on a high level of media control to penetrate the food culture of indigenous and mestizo populations, and has used its economic power to align the entire political and social framework in its favor, to the detriment of traditional food practices.

The basis of the introduced food system has been the implementation of monocultures that were sold to communities as "high-yield" and that came to replace biodiversity systems, as well as the use of ultra-processed foods that allowed companies to generate a gigantic consumer market based on the generation of products with a good "taste" generated based on the use of sugars and other sweeteners, as well as high-yield crops such as improved corn and rice that came to replace native varieties, with the aggravating factor that these improved varieties of corn, rice and other species prioritized their improvement to increase the kilograms per hectare produced to the detriment of improvement in their nutritional quality, practically becoming "stomach-filling" food, but punishing the provision of amino acids and other necessary dietary elements that traditional crops and native and creole varieties did provide.

Studies such as that of González Arce (2005) document that in the Bribri area of Costa Rica, at that time, dietary changes from a traditional diet based on rice, bananas, tubers, wild meats, native livestock species, mushrooms and some other by-products extracted from the forest in the form of "quelites", to a diet in which the consumption of cornstarch with sugar was introduced, and some ultra-processed foods linked to the diet of children and adults, caused a

massive appearance of dental caries and other health conditions in the population, such as cardiovascular diseases and others. The other is the climate crisis that is strongly attacking all productive models, in which Capitalist production models of food production and consumption based on monocultures and modern agricultural technologies are more susceptible to crises and vulnerable to climate change, which has led to almost total crop losses. In contrast, traditional systems managed agroecologically and using local inputs have better withstood the onslaught of climate crises, as demonstrated in studies conducted by Holt for Central America. Gimenez (2004) in the region when he effectively demonstrated that diverse systems with traditional/agroecological management better withstood Hurricane Mitch. Based on these premises, it is necessary that decision makers worldwide know this and direct their resources not to further encapsulate traditional productive food systems but rather, support them, for their expansion and development, and generate a process of adaptive scalarity that allows reversing the current dynamic of deterioration, which is not only environmental, but reflects impacts on the living conditions of the indigenous peoples of the region. The industrial model of food production is also one of the main responsible for the large emissions of Greenhouse Gases and therefore its contribution and responsibility is great regarding the causes of climate change, due to its extractive activity and largely dependence on oil.

Separately, in terms of food, there is a great difference between the conception of eating between modern capitalist society and societies made up of traditional or ancestral and indigenous peoples. The desire of current capitalist society is predominantly to see food as a protocol of "filling the stomach", enduring, surviving. While for traditional societies and for modern societies that have included a strong nutritional education in their lives, food, apart from filling and satiating hunger, means, among other things, expressing affection, love, respect, doing business, satisfying hunger and nourishing the body, living together in the family, commemorating life, cultural celebrations, affirming identity (Baas , et al. 1979).

The FAO (Food and Agriculture Organization of the United Nations) itself recognizes in the Wiphala report that: "...The food systems of our indigenous peoples are the result of long and careful observations of the processes and effects of nature. These observations and knowledge have been transmitted through personal and communal processes based on experience. Our food systems are anchored in our indigenous wisdom and traditional knowledge and are low risk, as they are adjusted based on small variations and modifications that can guarantee continuity over time. There is a tendency to seek and favor solutions, consumption and use that are moderate and carefully analyzed. The food systems of our indigenous peoples consist of food generation and production techniques that incorporate mobility and itinerant ways of life, and that combine both rights over natural resources and responsibilities and obligations towards them. The regulation and management of food systems and resources focus on rights and responsibilities that can typically be integrated into individual, family, collective and communal property and access rights over lands and resources. territories in our communities. Furthermore, cultural taboos and prohibitions help regulate consumption by all or certain members of the community, thus ensuring a conservation approach that enables development and addresses change. The result is that the more than 476 million Indigenous Peoples, living in more than 90 countries around the world across seven sociocultural regions, have been able to develop unique territorial management practices over time, capable of both generating food and preserving biodiversity at the same time. (FAO, 2021)

3. Brief overview of the Bribri-Cabécar Peoples.

Bribri-Cabecar peoples are two sister tribes native to Costa Rica and rooted in the Chibcha civilization. They inhabit the southern Pacific region of Costa Rica and the Caribbean region. They have their own language, customs, and culture. They survive in Costa Rica and part of Panama today. Bribri-Cabecar society is organized around matrilineal clans, which are related to the ownership, use, management, and administration of land, as well as to internal local government and cultural, festive, and other community decisions. They are survivors of the Spanish conquest and colonization. In 1979, the Costa Rican government approved the so-called Indigenous Reserves, which allowed them to have a territory recognized by the State. Although this declaration and control over their territories have long been established, the Bribri-Cabecar people currently face numerous threats of invasion by non-indigenous people, whose "occupation" is provoking violent events, such as the murder of leaders in recent years.

Like the other native peoples, in the Bribri-Cabécar cosmogony , there is a main figure that gave rise to society, like the Heart of Heaven and Earth of the Mayans, in the Bribri-Cabécar , Sulàyöm is the center of the earth and the sky, it is the sacred site par excellence, where Sibö `( Sib ú ) brought the sacred corn seeds dits ö `(dits ú) to a place in the mountain range, which the indigenous people call Suràyum (in Bribri , Sulàyöm) and planted them in pairs. From those seeds the Bribris were born , and other brother peoples.

Bribri-Cabécar worldview , the belief is that when a woman becomes pregnant, she comes into contact with Sulá , transforming into the "basket of life" and carrying the "immortal germ of the wìkör ," the spirit of the ancestors. From the beginning of time, this was the sacred place chosen by the gods to be the dynamic center of creation. It is the site where the three cosmic levels meet: the world of the living as a threshold between the world of the dead and that of the gods . (Stone, DZ 1961).

Another expression of the Bribri-Cabécar worldview is expressed by a local leader quoted by Ixchiu , L. (2020) : " ... "We are a matrilineal clan people , our people are made up of clans, Tuadiwak is my clan, there are others such as Uniwak , Dudiwak , Tubolwak , Suladiwak , among others. This clan identity can only be inherited by the mother, you are Bribri if your mother is Bribri . In that sense, long ago the only one who inherited the land was the woman, but unfortunately today this practice does not occur frequently (due to various factors that impose other forms of land ownership on us), in fact, it is part of our struggle to strengthen it day by day. "

The interpretation of the Cosmos in the indigenous world, on the other hand, is very different from the interpretation that may be made by people belonging to other non-indigenous cultures; to understand this, an example suffices: For the Bribri and Cabécare indigenous people , the cosmos is divided into three dimensions: the underworld, the middle world, and the world above. The construction of the Usule (the conical house of the Bribri and Cabécare) is a representation of that cosmos; the rings that this construction carries have a clear purpose, in the sense that it explains the three dimensions of the world according to the worldview of the Bribri and Cabécare indigenous peoples .

Regarding social structure, for indigenous people, the family nucleus is not composed of father, mother, and siblings, but goes beyond that. It also includes domestic and wild animals, plants, and even seeds, which are part of the family, for which they are respected and cared for. Clan organization develops from these elements or bodies, allowing the family to expand without limits. (Clans related to the sun, the moon, animals, plants, seeds, birds, and the

animals of their environment.) There is also a close relationship between the set of belief and knowledge systems and the family structure.

Indigenous peoples are often made up of extended families, whose ties are not exclusively consanguineous but rather established in terms of belonging to a lineage, in which a tutelary god is considered the common ancestor of the group's members. The sacredness of life is not restricted to the space of a particular temple, nor as something distant. Life itself and the elements that make it possible are what give rise to the sacred. This is why water is sacred to Indigenous peoples, for water is life. From the moment of conception, we are enveloped in the spring that covers the womb, and from there we learn that water serves to heal, to cleanse the soul, the spirit, and the body. Indigenous peoples value and respect water as a source of life and as a source of death. It is the central axis of life, and for it we have sacred songs, prayers, stories, and poems. The main references for Indigenous peoples are the concepts, perceptions, values, and inputs generated by their worldview for the maintenance and restoration of their well-being. Thus, illnesses have a natural connotation and are also closely linked to their belief system and values. In this sense, for most indigenous peoples, illness is the result of human imbalance with their immediate environment and spiritual spheres. It is a product of the transgression of moral or social norms (Estrada, T. 2012).

Like all the peoples of Abya Yala , the indigenous peoples of Costa Rica also suffered colonization and the dispossession of their resources under the rule of the Spanish who arrived in those territories. The struggles of the Bribri and Cabécar peoples and other indigenous peoples in resistance against colonization at the dawn of the 15th and 16th centuries were frequent and constant, and this allowed them to avoid extermination and for some of their ways of life to persist to this day. After surviving the colony, at the beginning of the 20th century they suffered the massive ingestion of the Costa Rican banana company, which came to own more than 13,000 hectares, many of them located in indigenous territories, with which the aforementioned peoples continued to suffer a new phase of dispossession and isolation.

4. Related food and cultural traditions in Bribri-Cabécar communities . Case study.

4.1. Characteristics of the selected cases.

Case No. 1Community name: Cabécar de Tayni Indigenous Reserve . Limón, Valle de la Estrella District.
Native People: Cabécar .
Territory area: 17,300 hectares.

It is a region located in the Caribbean region of Costa Rica, Cabecar communities that are currently managing their food and forest systems in a traditional way, with high pressure from external factors due to cattle ranching and the increasing penetration of urbanizing and capitalist dynamics that generate changes in all areas of life.

4.2. The food tradition of the Bribri-Cabécar people.

Through an ancient process, communities have implemented highly sustainable food systems based on plant domestication, their cultivation and use, and artisanal hunting and fishing in the region. The staples of their ancestral diet are herbs from the understory and forest products, combined with corn preparations, tubers, cacao, animals such as chompipes (a type

of snail) and animals hunted in the jungle, as well as fish and other products from the rivers. The colonial period introduced a series of new agricultural elements to the system, such as rice and domestic animals such as pigs, chickens, ducks, and other backyard species. The Cabecar people's food traditions are combined with their ancient history of managing medicinal plants, some from the forest and others cultivated in backyards or wild, which has allowed them to build a social group specialized in counseling and traditional medicine that addresses most of the health problems of its inhabitants—the sacred and respected work of the " Jawa ."

4.3. Obtaining food and its relationship with the forest.

The Cabecar people 's diet includes a variety of byproducts from the forest and transitional forests, as well as from productive areas. These products combine to create a balanced diet that, combined with their physical interaction with the mountains, allows them to live a healthy life. This healthy lifestyle has been disrupted by changes in diet over the years. Leaders consulted mention that people have now opted to buy part of their food in supermarkets or nearby markets and abandon ancestral eating habits. This has led to the emergence of new health problems such as hypertension, type 2 diabetes, and other diseases related to the consumption of processed industrial foods.

4.4. Dietary change in recent history.

Nutritional theorists attribute dietary change to the following causes:

- **Conquest.** In this regard, during the colonial period, the conquistadors brought new species as the period progressed . They practically prohibited the use of native medicine, and largely imposed the Spanish language with the opening of public schools. Later, in a more recent conquest, Mennonite, Pentecostal, and other denominational churches were established in the region. In the study area alone, there are at least six different religious congregations other than the Catholic religion. In the case of evangelical Protestant religions, the cultural and dietary changes associated with these churches are also linked to the fact that these churches consider some traditional indigenous dietary and cultural practices to be paganism, sin, and Satanism. Therefore, families who join these congregations gradually stop exercising their cultural and ancestral rights, even some related to the ways and management of food.

- **Commerce.** The area planted with bananas increased, primarily with the arrival of the banana plantation. Wage labor led families involved in these tasks to prefer purchasing their daily consumption items at the banana plantation's stores or at convenience stores or supermarkets where they could spend their cash. Banana, sweet potato, and rice cultivation also became a major attraction.

- **Technology.** The use of metal in agriculture became common, replacing ancestral tools made of wood and stone. Hunting weapons (bows, arrows, blowguns, rubber slings, etc.) were replaced by firearms. New occupations and wage labor allowed residents to acquire cooking utensils such as iron and aluminum pots and pans, cooking trebes , hand-held metal mills that replaced grinding stones and threshing mortars, as well as battery-powered radios that allowed communities to hear about other ways of life in other parts of the world. This also led to a change in cooking methods, with the introduction of vegetable shortening and processed oils to introduce pork fat into cooking and the substitution of boiling food for frying.

- **Demographic processes and changes, population growth.**

  Linked to the entry of large-scale monoculture projects into the area and the oil project, significant demographic changes occurred, along with a relative population increase that led to new social divisions of food-related tasks, which introduced further changes to the communities' food culture.

- **Social imitation.** This factor, to which the racist imagery in the area contributed, is greatly reinforced by advertising campaigns launched by companies to promote their products and adopted by local indigenous families due to the imitation factor.

All of these elements have been expressed in indigenous communities to produce alienation from the traditional food system and have led to changes in family diets that have regularly hindered the healthy development of their inhabitants.

The impacts of dietary change are multiple, some of which primarily affect children. The concept of the overweight child as a synonym for the healthy child has been introduced. Parents, to meet this social demand for their children to be overweight, implement dietary supplements such as processed fruit compotes and cookies. Among adults and young people, another rapidly changing dynamic has been the rise of obesity in certain sectors. There is a beauty stereotype that being overweight is synonymous with being beautiful, so there is pressure, especially on women, to change their diet to meet the demands of this stereotype .

There are traditional foods that have resisted change, based on the preparation of different types of smoked meats combined with thick soups that are consumed on special occasions.

4.5. Food, tradition, culture and the forest.

Cabecar food system is composed of five categories:

a. Teita : This is a system for producing basic grains, such as corn and rice, using plot management techniques. The land is prepared by clearing and cutting down undergrowth when it is approximately one and a half meters high (previously, slash-and-burn farming was the practice; over time, this practice has been almost eliminated in Cabecar villages). Basic grains are planted in plots located relatively close to the center of the dwellings, on a rotating basis, with the land left to rest for at least a year.

b. saberi : It is the place close to the homes where families produce and manage backyard animals: chickens, ducks , pigs.

c. Sacha: This is the place through which they access to manage forest resources such as firewood, water sources, mountains, the place for religious ceremonies and for the most important ceremonial and cultural moments.

d. Huitie : It is the space near the house that serves as a backyard family garden.

e. Chumukle : is the area where fruit trees, wood, cocoa and other trees for both food and construction use are grown.

As can be seen in the interaction of these five categories, they allow us to identify a complex practice of interactions between all the ecosystems present in the localities. Added to this complex system is the conical dwelling or " jutsini ," whose raised partition forms and the concentric structure of its roof also have an important cosmic connection with the other

components of the Cabecar worldview . This entire worldview is complemented by the vision that the God Sibú created for Cabecar society from the planting of corn in the mountains.

As a matrilineal clan society , the Cabecar organize themselves in this way for everything related to their social, cultural, productive, nutritional, and organizational processes. For the community to function better within the clan, the most skilled families and individuals are chosen for the tasks to be performed, for example, planting, and they are then given leadership. In other words, a leadership selection process is carried out based on their best abilities for specific tasks related to corn production and other productive processes.

Cabecar people have a very important ancestral guide for productive processes based on the lunar phases : Turubará , Turucatur , Turupuria , Turuamaqui . They usually plant three days after the full moon. They consider that the moon in its waning quarter phase is not suitable for planting, with the exception of rice cultivation. They call the preparation process for the assigned tasks within the planting : DIETS . These consist of the people who are tasked with leading the planting processes or certain important tasks such as leaf cutting or harvesting, under the mechanism known there as manovuelta or manocambio, several families plant the corn led by an assigned person. The people who lead the first planting or the placement of the first seeds have some restrictions in their daily lives, for example, a strict diet in their meals with the prohibition of consuming beef, fish, or not touching or looking at dead animals for at least eight days prior to the activity. They regularly rely on the work of a child to plant the first seeds to begin the planting phase of the crops. Each crop has a different dietary pattern; cocoa, for example, has its own dietary system.

The interaction of the inhabitants during activities in the forest requires a different approach to their diet. They typically eat meals in the form of chicken "soups" regularly supplemented with green bananas, cattails, and other local spices.

Families cook using a traditional fire pit placed on the ground and fueled by firewood. They also use a tall fire pit to prepare smaller meals , while the one on the ground is used for larger meals. Regarding mealtimes, most people get up very early, eating lightly at 3 a.m., having breakfast at 9 a.m., and dinner starting at 5 p.m.

Cabécar made around their food traditions are concluded to constitute a sustainable system that allows for a high level of biological diversity in food consumption, while also providing people with the calories, proteins, vitamins, and other essential nutrients for their development, without relying heavily on products introduced through industrial agriculture. This food tradition must be rescued, systematized, supported, and valued.

Some of the food species, both animal and plant, that are still preserved in the Cabécar community are the following:

Common name	Scientific name
monkey tail	Hypolepis repens
Lili	Carludovica subpalmata
Papayita	Jacaratia dolichaula
Ciplina	Chamedorea tepejilote
Platanillo	Heliconia mariae

Soapberry	Phytoloca rivinoids
Shrimp beard	Ritidostylis cartaginensis
White Palmito	Euterpe macrospadix
Black palm heart	
Chonta palm heart	Prestoa acuminata
Pejibaye Heart of Palm	Bactris gasipaes
Palm heart	Heliconaceae
Nettle	Urera Baccifera
Fungus	Pleurotus sp .

Source: Literature review and interviews. 2025.

Case No. 2: Successful Experience of the Kabata Nana Organization.

4.6. Description and qualities of the case.

Kabata Nana. The local government recovered the land. The land was paid for and donated to the people of the territory. It was land intended for livestock farming, which was recovered by the indigenous community. It's a hectare in common, to work on replicating the recovery of cultural practices. The association has 275 members, all women, and has a women-led board of directors. They all have their own land. They started in 2016. It took two years to obtain the status of an organization with legal status. The pandemic helped the process because they focused on it, recovering ancestral planting practices and providing the community with basic foodstuffs that were scarce at the time. The challenge of facing the pandemic was significant. Many crops are planted in the territory : cocoa, bananas, fruits, fruit trees, rice, and corn. Each family plants for their own consumption, and not everything is used, but they always maintain a balance between feeding the family, the forest, and the birds. (Note that this principle is strategically important since it considers providing food not only for families and the soil where it is grown, but also for producing food for the animals that come to the area and interact with the community.) They recovered bartering as a practice after the pandemic. Bartering was an ancestral practice. The pandemic helped recover ancestral cultural practices . The process described is found in Territorio Cabecar and the Progreso community. They belong to the province of Limón and the canton of Talamanca.

Cabécar people living in the Progreso community plant diverse crops. The two classic climatic seasons are known as winter and summer. From January to April, rice, beans, and corn are planted. Culturally, May is not planted because it is considered the month when crop pests explode the most. It rains a lot, there is a lot of sun, but it rains. Planting is done during every moon; during the new moon, they do not plant. Everyone has a lunar phase for planting. During the waxing moon , cassava is planted; during the waning moon, bananas are planted. Pruning is done during the waning moon. Most of the produce is purchased locally. The organization holds fairs, and the produce is sold there every month. The product that has the most intermediaries is the plantain, but it is introduced. There are five traditional planting systems. Witö System . Where the elders have it around their houses, this allows mothers and children to prepare meals. They have the basic ingredients for food. Chumugru System . It's bananas, cocoa, peach palm, fruit trees, and timber. A balanced crop

between what we consume, animals, birds, and people.

Teitú , Teitö , or Bulurú system . Staple grains, beans, rice, corn, and cassava, are planted in combination. Practices such as resting the soil are used. Plot rotations are made, or green manure is planted. Mucuna beans , cannavalia , and guavas are also planted.

Sat Chä : This is the forest, the sacred place where all the medicinal plants used in ceremonies, spiritual baths, and the wood for rural houses are found. It protects water sources. The sachá can be divided into Käbata and Karkía (forest and timber trees), complemented by Kádí eme (related to water sources).

Sa Delí : A system that cares for domestic animals, such as pigs, backyard birds, chompipe , and ducks. It is extensive, and in the forest area, they have food that comes from the forest, for example: quelite, a fern; the palmito also comes from the forest. Conservation of native seeds from the area. Seed barter.

There are processes that have been preserved as something sacred, something that is not exposed to tourism. The organization has a sustainable tourism initiative, based on cultural practices, crafts, and some tourism packages—four tourism packages. These are very initial revenue streams.

4.7. Threats to the Bribri people's food, cultural and forest development process. Cabécar .

The threats looming over the traditional food system and its relationship with the forest can be broken down into three:

a. Threat of further invasion of the corporate and industrial neoliberal diet.

b. Threat of damage to traditional crops due to the effects of climate change.

c. Social pressure resulting from social mobility and accelerated urban planning.

4.8. Proposals from the people.

Wiphala White Paper on Indigenous Peoples' Food Systems, but many others have yet to be recognized or systematized. The concerns that have been translated into proposals by the Cabecar people and the representatives interviewed are as follows:

a. The need for the State to not only recognize traditional food systems on paper but also to recognize, respect, value them socially, and provide technical and financial support.

b. The need for communities to be allowed to live in peace according to the original precepts of their culture.

c. The cessation of violence linked to the defense of lands.

d. The need for the international community to move beyond merely declarative processes and toward concrete measures to protect Indigenous peoples' traditional food systems through regulations, international declarations, and adequate funding for their recovery and expansion, while respecting their dynamics of self-management and governance of common goods and natural resources.

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CASE STUDY: TOTONAC MILPA SYSTEM, VERACRUZ, MEXICO. MAIN FINDINGS

1. **Case description. Totonac Foresters Association, Veracruz, Mexico.**

It is an association of forest producers founded in 2004 by farmers from the indigenous Totonac people. They currently work with combined milpa systems and the production of timber and non-timber forest systems such as pepper, cocoa, and other species linked to this system. The case analyzed is located in a territory where pressure for the implementation of the industrial agriculture system is very strong, as transnational food and agriculture companies promote various expansion strategies in these areas. These strategies are expected to change since the Mexican government has promoted a series of state policies for the recovery of traditional and ancestral production systems over the last three years and implemented a series of laws and policies that are expected to curb imports of genetically modified corn from the United States and at the same time encourage the cultivation of milpa systems with native species.

2. **Brief overview of the Totonac People.**

The Totonac people are an indigenous people from the Gulf of Mexico, locating their origin between 200 and 1520 years AD. Their original territory corresponds to the Gulf of Mexico, constituting a great civilization that inhabited the territories of Veracruz and Puebla mainly. It is, together with the Mexica people, an indigenous people of the 68 indigenous peoples that have inhabited the country since pre-colonial times . It developed a very active society in commerce, agriculture, the arts and the development of the interpretation of natural phenomena through its astronomical observatories and the construction of large cities such as Tajín, Papantla and Cempoala .

3. **The food tradition in Mexico.**

Mexico is home to enormous wealth. It is megadiverse because it contains 10% of the planet's biological diversity; it is megacultural because the ancestral peoples who live here speak a total of 364 languages; and it is megadomesticating because the interaction between natural and cultural wealth gave rise to a third, that of domesticated plants and animals, in a process that began nine thousand years ago and continues to this day. Because it constitutes a legacy of immense value, the sum of all these resources, knowledge, and products is known as biocultural heritage (Argueta, V. 2024).

This immense biological diversity has also led Mexico to possess an infinite and immense wealth of traditional food. Several of its traditional diets have been declared intangible heritage of humanity by international organizations, and in 2023, the Food and Agriculture Organization of the United Nations (FAO) declared one of its milpa systems, the Yucatecan Mayan milpa, a Globally Important Agricultural Heritage System (GIAHS). These milpa systems were chosen for their resilience to climate change, their contributions to food security, biological and cultural diversity, and the conservation of the landscape through the traditional knowledge of their peoples.

Mexican indigenous peoples don't plant corn. They make the milpa, because making the milpa involves more than just planting a grain that will supply them with the carbohydrates, amino acids, and vitamins they need. In terms of cosmogony, the milpa system also entails, from the very moment of its calendrical definition for the blessing of the seeds, the planting, and the different processes and phases in the corn cultivation cycle, a link between society, culture, spirituality, and a vision of life and the world. The milpa, composed of a central

element: corn, interacts with other species such as beans, squash, chili peppers, fruits, and other wild herbs known as "quelites," which together in the diet constitute a complex food system that provides communities with what they need for a healthy life.

4. Food change in Mexico.

With the development of the capitalist economy in the country, Mexican society has also undergone multiple changes in its diet. The arrival of Europeans to their soil brought about important changes with the introduction of poultry, cattle, wheat, sugarcane, and other crops, which the Spanish, in turn, had inherited from their millennia-long interaction with Arab societies. However, an acceleration in dietary change in Mexico began around 1950, a period in which a series of products derived from the industry now known as the "food" industry boomed, with the incorporation of flours, condiments, additives, and supplements into family diets following the implementation of the Green Revolution in the Mexican countryside and the importation of technological production processes from the United States. Mexican society, like much of Mesoamerican society, has undergone significant changes in its dietary dynamics over the years due to these economic and agroindustrial dynamics. Despite the great wealth mentioned in the previous paragraphs, and despite the fact that its indigenous communities and native peoples mainly enjoy a balanced family diet based on corn cultivation, Mexico has rapidly suffered the deterioration of its balanced diet, as these agro-industrial processes have introduced into society the consumption of products with high levels of carbohydrates and sugars.

The dietary change in the region under study also corresponds to the pressures imposed by the consumption dynamics of the large food industry and its advertising strategies, which force families to purchase ultra-processed products , the introduction of which has been accompanied by neoliberal economic measures that have already caused health problems linked to the well-known symptoms of "malnutrition." The Mexican state has attempted to address the problem through various policy instruments, including reforms to the Secretariat for Rural Development (SADER), and the current General Law on Adequate and Sustainable Food, whose regulations are pending approval. More recently, a law prohibiting the importation and planting of genetically modified corn in the country and mandating the recovery of native corn varieties.

Some studies conducted by the Mexican government's SADER (National Agricultural Development Agency) in 2024 yielded some results that support the benefits of the milpa system:

a) Milpa system crops worked with agroecological technology improved their productive yields between 2019 and 2023 from 1.1 to 1.7 ton/ha, the production cost of the ton per hectare decreased in the same period from $(pesos) 9451.00 to 7,138, agroecological practices were expanded from 4 to 15, spaces for bio-input production were expanded from 45 to 718 throughout the country, the volume of bio-inputs produced rose from 36 tons to 1,077, the production of bio-inputs in liters rose from 40,460 to 696,888, community seed banks from 0 to 27 and the quality analyses of the system carried out went from 3 to 147. (SADER, 2024).

b) In terms of nutritional quality, which is very important for the topic at hand, it was determined that agroecologically produced corn from the milpa system outperformed conventional monoculture corn in sugar, protein, total antioxidant activity, phenols, flavonoids, and anthocyanins over the same period (SADER, 2024).

5. Food, tradition, and the forest. The Totonac milpa system and its contribution to humanity and ecosystems. (Case study)

As mentioned at the beginning of the case study, the Totonac people in ancient times installed giant observatories in their territories to thoroughly study the behavior of the cosmos, and they did so by closely linking the daily activities of their populations with the intellectual activity they engaged in. This ancient heritage, which has been embodied in the "MILPA SYSTEM," has been the subject of innovation by the Foresters' Association, as it works with a milpa system that is found in different combinations with beans, chili peppers, squash, and fruit trees. Another central species is allspice, a crop that people have been improving to the point that the generated pepper clones are in the process of becoming more efficient in their production, generating food for people and economic income for their families.

The Totonac milpa system involves the cultivation of corn, vegetables, sweet potatoes, beans, yucca, chilies, tomatoes, zucchini, scallions, onions, and quelites in a temperate climate. The area ranges from 300 to 900 meters above sea level. They also cultivate citrus fruits for commercial production.

The species that now also generate income for the community are allspice, coffee, and cocoa. The Totonac milpa system provides families with, among others, the following variety of food options in their kitchens:

a) Tortillas.

The tortilla is a common food in Mesoamerica made from nixtamalized corn dough , which is cooked in a flat clay or metal container over intense heat (comal), which is then coated on its surface with liquid from quicklime (calcium carbonate). This cooking process produces a thick or thin corn cake, with two layers, which allows the person who consumes it to obtain all the nutritional components of the corn, combined with the source of calcium provided by the lime.

b) Pinole.

It is a drink made from finely ground toasted corn, sometimes mixed with ground corn from other seeds. When prepared by boiling and cooking, it provides many energizing and invigorating elements to the consumer. It is used primarily by families when performing hard agricultural production tasks.

c) Roasted corn.

It's a way of consuming corn, toasting on comals, providing fiber to those who eat it and, when combined with salt, providing a source of food that sustains and provides families with carbohydrates for their daily routine.

Bollos, corn tamales, Totonac cactopaxte , moles, pepiana sauces derived from pumpkin seeds and mixtures of chilies, achiote, and other byproducts of the milpa system, used mainly for Saturday or Sunday meals, or for holidays or family or community celebrations.

The following local varieties of corn, called Creole corn, are known in the area, including the following:

a) Paxet cuxe
b) Cana cuxe

c) Ixtonte cuxe
d) Lajatset
e) Remedy
f) Calender.

Each one with its specific characteristics.

In summary, the system's innovations could include the development of more productive allspice clones, mass selection technologies for corn, soil improvement through bioles , the use of mountain microorganisms, and the incorporation of mowers to reduce herbicide consumption in the region.

5.1. Contributions to biodiversity.

local artisanal plant breeding activities such as mass selection. The mass selection process consists of temporarily managing the maturity of the male flower of corn by pruning it at the time of pollination. This allows the corn from which the male flower (ear) has been pruned to cross its female flower (xylote) with other rows in which the male flower has been left to remain. This allows the next generation of corn to obtain the characteristics of the rows chosen for this purpose. Corn also undergoes a mass selection process to lower the height of the plants, monitoring the leaves of the cob so that they have the following qualities:

- Of large cobs.
- White sheets (folder).
- Thin leaves.
- Elongated leaves.
- Healthy leaves (no insect bites or presence of fungi).

peasant producers have identified a corn byproduct, the husk of the cob. This husk is removed from the cob, properly dried, pressed, and then bundled into bundles of 12 rolls, which are sold for $120 Mexican pesos. In other parts of Mesoamerica, this husk of the corn cob is known as "tuza," or "doubler." The income generated by the pressed husk of the corn cob is complemented by some income that can be generated by other crops in the system. The husk of the cob, then, is considered, within the context of the multi-activity of the milpa system, a post-harvest activity that generates much more income for families than the sale of grain corn itself. Totonac farmers have innovated in the production of corn cob wrappers, creating rudimentary devices to improve the pressing and tying of corn cob wrappers for a more compact, better presentation at market. These corn cob wrappers are used in the Mexican food market as a material for making tamales and cheese wrappers, and in some parts of the country as raw material for handicrafts.

5.2. Contributions to the economy and technological changes linked to climate change.

The sale of corn husks provides the communities with a variety of income, complementing the income from the sale of coffee and pepper. In the interviews conducted for the case study, Totonac producers stated that the sale of corn husks generates family income, allowing them to purchase other products at the market, such as other foods from other farmers' agriculture, such as oil, salt, and sugar. It also allows them to generate basic savings to cover educational expenses for their children, such as adequate clothing for school or other expenses related to family support. The system has undergone several changes over time. The Totonac milpa system has faced various challenges linked to technological change and climate change. With the Green Revolution, the uses and abuses of glyphosate were introduced into Mexican agriculture. The predominant planting of the Totonacs is done at the times called by producers as "temporary" which is the planting that is done taking advantage of the rainy

season, and " tapachole " which is considered as the planting where residual humidity is taken advantage of, but the region is located in an area where the winds, rainfall and soil characteristics allow humidity to be maintained for a long period, allowing for a wide calendar range for planting, regularly from April to June of each year, with the harvest in October or November. One of the impacts of climate change in the region has caused changes in the rainfall pattern, which is why Totonac families have implemented a planting strategy they call "staggered" that is, planting a little when the rains begin, but if after a few weeks the rain goes away, and that first planting is lost, not much is lost, and the rest of the planting is done when they detect that the rainy season has definitely arrived. These climate change survival strategies have been complemented by other innovative strategies that often allow them to achieve surplus production.

The foresters' association has fought to counteract the use of pesticides and sought a transitional solution consisting of weeding with gasoline-powered brush cutters. The shift cannot be said to be a shift toward agroecology, but this technological change has resulted in the elimination of pesticides in the fields, which has reduced the system's pollution levels. As a technological contribution to the agroecological transition, the association has implemented training, production, and distribution of " Bioles ," which have been applied to the system and have improved allspice production, as well as the yields of corn and its associated crops, improving yield per hectare. It has also provided the system with a complex of minerals and nutrients that are transformed into higher-quality nutrients for the crops and a better response from the soil for the germination and growth of the "quelites." Bioles are agroecological preparations normally intended to improve soil fertility and as foliar fertilizers . They are made from local materials, livestock manure available on site, some minerals from the land itself, and a complex of mountain microorganisms from the owners' own plots. This allows them to have a nutritional supplement for plants that is environmentally friendly, very easy to make at home, and that also allows them to provide the soil and the plant with a complex of mineral nutritional elements, as well as a complex of beneficial microorganisms that, when interacting with the system, build sustainable agricultural management spaces for the future. According to those interviewed, a plot of land managed with " bioles " for five years presents very high levels of biodiversity in its space and fertility levels that exceed the benefits obtained with chemical fertilizers, mainly those from physical mixtures, which are greatly lost in the preparation of mixtures and in leaching with the force of the rains. Although " bioles " are products obtained with agroecological transition technologies, the Totonacs in the area use them as an element of temporary soil recovery.

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