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Culture and sustainability: Social and environmental governance of the Union of Cooperatives Tosepan Titataniske in Puebla, Mexico

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Declaration

I, Margie Maria Mijares Gonzalez, declare that this thesis is a result of my research investigations and findings. Sources of information other than my own have been acknowledged and a reference list has been appended. This work has not been previously submitted to any other university for award of any type of academic degree.

Signature……..

Date……

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To all Tosepan community and all indigenous people of Mexico who have given me much more than 60 ECTS in lessons of economics, politics, agronomy, biology, spirituality and love for my country.

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This work is dedicated to my family in Mexico. I told them that I was leaving because I wanted to come back, and I am keeping my promise.

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Kaab… 'I love you' lost sense ever since we met/ Love became into so many different values, attitudes and feelings/ Now love has like a thousand more meanings.

Abstract

This case study explored how the culture of the political actors of the Union of Cooperatives Tosepan Titataniske (Tosepan) in the region of the Northeastern Mountains of Puebla, Mexico, influence their social and environmental governance. Besides, it also assessed the strengths and the limits of such cultural influence to support the sustainability of the organization.

This study applied a qualitative research approach in order to answer the research questions based on the analysis of the collected data from the political ecology and environmental theoretical approaches.

The findings of this research indicated that there is a clear influence from 4 cultural features on Tosepan governance: 1. Identity, 2. Cooperation in community based interaction, 3. Indigenous political systems and 3. Their particular vision of nature. Moreover, the influence from these features has several impacts on the sustainability of the organization.

The political actors' identity with the indigenous movement defines Tosepan goals and explains the permanence of the organization. However, there was not enough data to state its limits on sustainability. Cooperation in community based interaction influence diverse social, political, economic and environmental actions of Tosepan governance in a positive way, and it is the most useful cultural resource to support sustainability. Nevertheless, it encounters fundamental limits in the wider political and economic contexts, which determines the preferences of most of the organization's economic actors (the producers), and this hinders the outcomes of the most important agricultural management programs of Tosepan. Further, the traditional indigenous political system is formally incorporated into Tosepan governance at all levels, it is efficient and democratic, but at the local level of 9 municipalities. It has a limit to growth or expansion with the same level of efficiency into the entire region of 28 municipalities. Finally, the vision of nature of the political actors comes from diverse influences that they have incorporated into a perspective that strengthens biodiversity and conservation. Nevertheless, the dominant economic visions of nature from the local to the global level hinders the intensification of a sustainable agriculture in all producers. Moreover, it represents an uneven force that is currently threatening not only Tosepan's sustainability, but also the entire population and the environment of this Mexican region.

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Acronyms

CCMSS Mexican Civil Council for Sustainable Forestry
CDI National Commission for Indigenous Peoples
CERTIMEX Mexican Certification of Products and Ecological Processes
CNI National Indigenous Congress
COEC Committee of the Ecological Management Program of Cuetzalan
CONABIO National Council for
CONAPO National Council of Population
CONEVAL National Council for the Evaluation of the Social Policy
FAO Food and Agriculture Organization
FLO Fairtrade Labelling Organizations
INEGI National Institute of Statistics, Geography and Informatics
MESMIS Framework for the Evaluation of Natural Resource Management Systems Incorporating Sustainability Indicators
SAGARPA Ministry of Agriculture
SIC Cultural Information System
TOSEPAN Union of Cooperatives Tosepan Titataniske
UNAM National Autonomous University of Mexico

1. Introduction

1.1 Problem statement

Indigenous people in Mexico are the sector of the population with the highest poverty rates of the country (CONAPO, 2012). They are, at the same time, half of the population who is still engaged in agriculture as their main economic activity (CONAPO, 2012), and the owners of around 70% of the remaining forests of the territory (CCMSS in BBC, 2010).

Indigenous agricultural systems have been widely researched and considered as a world heritage that contributes to the practice of a sustainable agriculture (FAO, 2017 and CONABIO, 2017). For example, maize was discovered and domesticated in the center of Mexico 10,000 years ago. Since then, diverse indigenous groups have been selecting and cultivating the grain, and nowadays there are 59 maize varieties that are adapted to the specific geographical and environmental conditions of the entire Mexican territory (O'Leary, 2016). In regards to their forests, they show high levels of conservation, in part, due to the specific way they organize in the communal tenancy of their lands. Forests contribute not only with valuable visual landscapes, but also, they provide fundamental environmental services such as CO2 sequestration, climate regulation and biodiversity conservation, which all necessary to support life on Earth.

However, the socio-economic situation of indigenous people, which is the result of the particular Mexican historical development, have kept them with the incapacity to take full control of their ways to recreate their livelihoods, and thus remain poor and isolated from the rest of the social, political, and economic structures of Mexico.

From the 1990s and onward, many indigenous movements generated in the quest for the recognition of diverse social and environmental rights, such as the defense of their territories, access to basic services, cultural rights, and autonomy over their internal communitarian lives. Although these movements have accomplished little in terms of State compliance to those demands. From this State's attitude they have begun to re-create autonomous governance systems in practice (CNI, 2017), which are dealing with their social and environmental dimensions based on their own goals and cultural visions.

The indigenous movement in Mexico is constantly recreating, both successfully and with deep failures. However, many of the localized movements that have turned into governance systems are notorious, and they have been widely studied from all fields of science at the international level. The indigenous movement in the region of the Northern Mountains of Puebla is notorious since the 1970s and the case study, the Union of Cooperatives Tosepan Titataniske is perhaps the most relevant example.

The current challenges of the indigenous governance systems in Mexico are diverse; they must accomplish social justice and sustainable use of their natural resources in a national and international political and economic contexts where there is still no clear steps or results to eradicate poverty and/or to protect the environment. Regardless of the challenges, these governance systems possess valuable systematized cultural knowledge to manage their societies and their environment. It is important to study those cases that have managed to

last in time in order to explore common patterns in their behaviors and practices, so that they can also contribute to a sustainable rural development in which social justice is included too.

1.2 Research goals and research questions

Research goal 1. To explore how the culture of the political actors of the Union of Cooperatives Tosepan Titataniske (Tosepan) influence their social and environmental governance.

1. What are the most relevant cultural features of the political actors of Tosepan?
2. What characterizes the governance of Tosepan and how is that the cultural features of the political actors influence such governance?
3. What are the programs that deal with the agricultural management of Tosepan, and how do the cultural features of the political actors influence these programs?

Research goal 2. To assess how Tosepan's political actors' culture supports their social and environmental governance towards sustainability.

4. What are the strengths and limitations of the influence of the cultural features of the Tosepan's political actors on their governance in order to support the sustainability of the organization?

2. Background of the case study

2.1 Indigenous movements in Mexico

Mexico is a multicultural country where 68 different indigenous groups live. In total they are close to 10 million people, and they represent 10% of the Mexican population (SIC, 2017). Each group has their own language and culture, resulting in diverse ways of interaction with their social and environmental dimensions.

Map. 1 Indigenous regions in Mexico

Source: CDI, 2015.

Indigenous peoples are small-scale farmers that before the colonization of Mexico were able to create their livelihoods through subsistence agricultural systems based on diverse biological resources. During those times, there were specific governance systems where land was entirely shared as communal property. Families were pretty much isolated working in their plots, and only gathered for religious occasions with the entire community. Government officials, priests and artisans were the only people living in the so called ‘cities’ of the empires (Menegus, 1999).

When the colonial period started in 1521, the Spanish rule gathered all indigenous groups into municipalities, in order to spread Catholic evangelism and ensure political control. As a result, many communities lost their agricultural lands in these often violent displacements (Menegus, 1999). Even though the Kingdom of Spain recognized the 'Indians’ original right to land', it was still massively taken from them through different corrupt procedures approved by the same Spanish kings (Menegus, 1999).

The massive dispossession occurred especially in lands with the most valuable natural resources for the agro-mining interests of the Spanish colonizers. Communities that resisted the domination were internally displaced all over the country into the more inaccessible areas, where the colonizers had no economic interest.

Another critical reason for the concentration of lands under the Spanish rule was the extreme mortality of the indigenous population that caused land abandonment all over the country. From 1521 to the beginning of the 1600s, the indigenous population descended by 90% (Menegus, 1999). Only few lands were actually kept through possession titles granted by the colonial powers.

After the Mexican independence in 1827, when the Spanish rule left, the new national governments had no consideration regarding the restitution of lands, or the grant of some kind of internal autonomy to the remaining indigenous groups. Instead, the newly independent country entered into the historical period known as 'la Reforma' or the reformation (1856-1861), when the Mexican government finally managed to take away the political power from the Catholic church and its possessions. An agrarian reform was made as a consequence of this process.

This particular agrarian reform was made with the intention to develop Mexico's capitalist economic system, so the new land availability only benefited the already rich agricultural owners with European heritage. Lands passed from the church, to be concentrated again into what is called 'latifundios' or 'haciendas', that were immense extensions of commercial agricultural lands owned by one person or a family known as 'terratenientes'. The owners used to especially employ indigenous people that in practice were virtually slaves, always in debt[1] to the owners, unable to leave the latifundios due to their debts.

According to Carlos Machain (1982), the agrarian reform expressed in the Mexican law about *the nationalization of the church possessions* (1857) affected the indigenous tenancy of lands, regardless of its supposed protection in article 8. In many court cases would judges always grant land rights to rich owners, arguing the need to use 'unproductive' lands for the greater benefit of the nation, disregarding the indigenous communal tenancy and subsistence agricultural production.

Without any lands to reproduce their livelihoods, and employed in the new type of commercial agriculture almost as slaves, the conditions during the first century of the Mexican independence continued to be extremely difficult for indigenous people. This situation created the drive to join the fight in the Mexican revolution of 1910 for a new agrarian reform. They were mostly led by Emiliano Zapata in one of the main revolutionary fronts in the southern part of Mexico. Although Zapata originally fought for his own community's land rights, later on he

[1] The owners of the latifundios developed a system of stores called 'tiendas de raya' for their agricultural workers. These stores were created so that the workers could buy all kinds of basic products, as well as alcohol. The prices in the stores were always too high for the salary of the workers, so they would always be in debt, and having to work in order to pay for such debts. If the workers ran away, they would often be pursued and even killed.

became a part of a wider and more radical movement for land distribution among all landless peasants.

In the end, the Mexican Revolution was won by the most conservative front of big landowners. Nevertheless, a new agrarian reform was made where a legal innovation from the revolutionary Constitution of 1917 was the state's restitution and protection[2] of communal tenancies named 'ejido' and 'social property'. Nowadays it is possible to find this type of communal property in 52%[3] of the national territory (Congress of the Union, 2015). But in spite of that, this was not specifically aimed at the restitution of indigenous lands or to grant them any political autonomy[4].

Although ejidos in the southern part of Mexico are constituted mainly by indigenous peoples, also in many central and northern states they represent less than 1% or even 0% of the communal owners (Robles Berlanga, 2000). After the Revolution, many indigenous peoples registered the small private property of their land in fear of losing them again.

During the four decades after the Mexican Revolution (1927- 1970s), the nationalistic and centralized governments supported commercial agriculture intensification with the desire to finance a new industrialization in the country. This nationalistic project was still fundamentally opposed not only to the cultural visions of the indigenous groups, but also to their economic preferences and possibilities of production.

Thus, the indigenous groups remained the most marginalized actors of the rural sector. This led to several conflicts that ended up producing a wave of extrajudicial procedures from the State[5] to end their protests, such as espionage, 'desapariciones' [kidnappings], and even killings of indigenous leaders and activists during the 1970s. This happened especially in southern Mexico, where the biggest indigenous populations are found (Sub commander Marcos[6] in Calonico, 2001).

Towards the 1980s the international neoliberal era reached Mexico. The negotiation and final signature in 1992 of the *North American Free Trade Agreement* (NAFTA) intensified[7] the negative consequences of the previous nationalistic agricultural policies for indigenous

[2] Before 1992 all social property belonged to the Mexican State and it was not possible to privatize it (Warman, 2003).

[3] At the national level only 50% of communal owners state that their main incomes come from agriculture.

[4] The indigenous groups that have remained through the centuries do have traditional authorities, but they are not recognized by any state authority to self- govern. All indigenous peoples are officially ruled by the Mexican state laws.

[5] Executed by the army and federal security agencies.

[6] The sub commander Marcos is a non-indigenous military and ideological leader of the Zapatista movement (EZLN). He was the public actor of this movement in state negotiations and press releases until 2013, when he publicly retired.

[7] There were specific new regulations about the possibility to privatize communal lands again, and the fact that they could not compete with the agricultural production from the U.S., they were left being more impaired to integrate in a free agricultural market that now included U.S and Canada.

people. This context finally generated the conditions for the civil war declaration in January of 1994 by the 'Ejército Zapatista de Liberacion Nacional' (EZLN) or Zapatista Army of National Liberation. An indigenous group of different ethnicities of Mayan heritage (Tzotziles, Tzeltales, Tojolabales and Zapoteco) from 33 different municipalities within the southern state of Chiapas.

The main requests from the EZLN were the protection of land rights, internal political autonomy, cultural rights, and effective security from the State to the indigenous and the poorest social groups of the country. This included improvement of salaries, food security, provision of basic services and education. In other words, a holistic request for an equitable development for all indigenous peoples in the country.

The Mexican State was influenced by the pressure of the international community and took a more peaceful approach that ended with the negotiation of the peace accords of *San Andres* (1996). However, tension continued regardless of the accords, and the social movement did not turn down its weapons due to the State's non-compliance to legislate about indigenous and poor people's rights, as requested during the negotiation process.

Even though this historical event could not accomplish a comprehensive legislation regarding the development of all indigenous peoples, the algid context provided an analytical space to rethink the possibilities of development without the state's support. Together with the EZLN, many different indigenous localized movements across Mexico that originated for similar reasons to those of EZLN, managed to evolve from their specific conflicts into the creation of renewed governance system based on their cultural backgrounds.

In 1996, after the San Andres accords, the EZLN called for the creation of the National Indigenous Congress (CNI). Several communities from almost all indigenous groups in Mexico came to discuss their possibilities of development. First, relied on the State from 1996 to 2001, and then, by their own means from 2006 and onward (CNI, 2017).

In Annex II I present some examples of localized indigenous movements across Mexico that have turned into renewed governance systems and have managed to take command of their social and environmental dimensions. Each case has its own specificities, but they do represent a new stage of autonomous development of indigenous peoples of Mexico, that nevertheless, has constant challenges in their quest to integrate into the dominant social structures of Mexico.

2.2 Nahuas and Totonacas of the Northern Mountains of Puebla, Mexico.

The actors of the case study are composed by two indigenous groups: Nahuas and Totonacas from the region of the Northern Mountains of Puebla, in Puebla state. This region has 68 municipalities and 1.6 million inhabitants, which approximately 720,000 are indigenous peoples from the ethnicities Nahua (54%), Totonaca (44%), and Otomi (2%) (Serrano Carreto, 2006).

Although the state of Puebla divides this region into the Northern Mountains and the Northeastern Mountains according to its own demographic criteria. The federal government of

Mexico recognizes the Northern Mountains of Puebla as one of the 25 indigenous regions of the country due to its high concentrations of indigenous population (Serrano Carreto, 2006).

Map 2. The region of the Northern Mountains of Puebla, Mexico

Source: Own elaboration

The original or pre-colonial establishment of Nahuas and Totonacas in the region occurred at different times, but in both cases was due to their imperial expansions. The area was considered by them as a strategic military location; the passage from the coastal area of the Gulf of Mexico to the actual center of the country.

From 300 BCE to 700 AD, Totonaca ancestors came from the imperialistic city of Teotihuacan[8] in central Mexico (COEC, 2010). Although they came from the geographical center of the country, these first colonizers spoke Totonaco as a heritage from the ancient Olmec civilization, who were Mayan descendants that established along the southeast coast of the Gulf of Mexico. When the Teotihuacan empire fell in 700 AD, Totonaca influence remained in the area, as the Northern Mountains of Puebla actually borders on the east side with the original 'Totonacapan' region.

The Nahua people, who are the newest indigenous inhabitants of the mountains, came from the Aztec or Mexica Empire (1200 AD to 1521 AD) in the center of the country. Their late military establishment was not peaceful. In the 1400s AD Mexicas displaced the Totonacas towards the east coast, and the Totonacapan became a tributary province subdued to the Aztec empire. Totonacas even allied with the Spaniards in the conquest of Mexico in 1521 to get rid of Mexica domination, although later on, this alliance turned against them.

Totonaca and Nahuas communities kept a strong 'ethnical border' since the Mexica domination of the mountains in the 1400s AD and throughout the three centuries of the colonial

[8] Although is still not possible to state which specific indigenous group ruled Teotihuacan at the time of its foundation, the strongest supposition from historians and anthropologists is that they were either Nahua, Totonaca or Otomi. What it is possible to conclude is that it was a city where different ethnicities used to live.

domination (Masferrer, 2006). The 'ethnical border' was able to operate because during the Aztec empire, Totonacas only paid economic tributes and were not forced to follow Nahua cultural or political systems. Then, during the Spanish rule they had neither the interest, nor efficient ways to control the mountains, and the region remained isolated from the Spanish[9], allowing both indigenous groups to maintain their separate social structures and territories.

However, when the reformation period[10] of the newly independent country began (1856-1861), the region's unique privilege situation of isolation radically changed for all the indigenous populations. The executions of land dispossession of communal properties favored the development of a new agricultural bourgeoisie, and at the same time the political control from the regional governments strengthened. These situations led to opening of the 'ethnical borders' [11](Masferrer, 2006), when the two indigenous groups could then identify and relate to each other's oppression.

Furthermore, during the reformation period coffee and sugarcane crops were introduced into the country for the first time. These crops reached the micro-region of the Northeastern Mountains of Puebla, which are the lowest and medium altitude lands where it is possible to cultivate such profitable crops. Since then, the economic dynamic of these areas turned into the production of coffee and sugarcane by Nahua and Totonaca farmers, in exchange for basic and manufactured goods from the regional agrarian bourgeoisie (Meza in UAM, 2013).

During the post-revolutionary times (1917-1960s), the national land-redistribution did not reach the Northern Mountains of Puebla. Instead, the old agrarian bourgeoisie and the new ex-revolutionary officials got to keep and concentrate the lands, as well as maintain a strong political and economic influence in the area (Meza in UAM, 2013 and Rappo, 2006). Most of the indigenous peoples were displaced to the smallest and more remote localities of the region. Nahua, Totonacas, and some Otomi registered their small private properties to protect them from future dispossessions[12]. Currently, ejido or social property is almost nonexistent in the area (Perez Fornies, 2011).

The persistent economic and political oppression held by the post-revolutionary agrarian bourgeoisie and the regional governments, led to the organization of the Independent Peasant Union UCI in 1970. The Union demanded a new distribution of lands and a stronger state support for the small-scale farmers of the region (Rappo, 2006). However, this movement

[9]The opposite process happened to the Totonaca people from the Totonacapan region close to the Gulf of Mexico. Here they were violently displaced and almost exterminated by the Spanish in order to take possession of the lands and its natural resources.

[10] Described in section 5.1 about the historical development of indigenous peoples in Mexico.

[11] Processes such as the adoption from Totonacas of the Nahua language at a higher rate, and even the 'mestizaje' or mixing between ethnicities happened with more frequency until the late 1800s (Masferrer, 2007).

[12] Which kept happening during post-revolutionary times because the agrarian bourgeoisie was the only money lender of the indigenous farmers and when they could not pay, they would keep the lands of the farmers (Aguilar Ayon in ICSH, 2016).

finished violently by judicial and extrajudicial[13] methods from the local and regional authorities, just as the similar ones mentioned in the previous section of the chapter (Martinez Borrego, 1991).

During the 1970s, the indigenous communities of the area experienced a deep economic crisis. The prices that the agrarian bourgeoisie paid for the coffee and sugarcane production reached the lowest level in decades, while the prices of the basic products controlled by the agrarian bourgeoisie itself increased (Perez Fornies, 2011).

The governmental response to this crisis was the Zacapoaxtla plan in 1974. The plan was based on the advice by agronomists hired from the Postgraduate Agricultural Colleague to increase the farmer's agricultural productivity and their access to rural subsidies[14]. Bert Kreitlow (in Romero Aldemaro, et. al., 2005) suggests that the Zacapoaxtla plan carried specific governmental goals, including making small-scale farmers enter into the 'green revolution' dynamics by introducing synthetic fertilizers that could be bought from the state company FERTIMEX and their hybrid seeds, as well as to get a better political alliance and control of indigenous farmers in the region with the implementation of the plan.

During the first two years, the hired agronomists realized that the main issues of the small-scale farmers were not necessarily about increasing their production, since they struggled more with the low income of their products (raw coffee beans and sugarcane), and as a consequence of this, severe food shortages (Aguilar Ayon in Reseñas ICSyH, 2016). According to different research done on the topic (Bartra et al, 2004. Bert Kreitlow in Romero Aldemaro, et. al. 2005 and Pérez Fornies, 2011), the group of agronomists gradually split from the governmental control and played a decisive role for the autonomous organization of small-scale farmers in the area.

After two years of meetings, in 1976 Nahua and Totonaca small scale farmers from almost 30 different communities of the region together with the agronomists' advice from the Zacapoaxtla plan, started the project of consumers' cooperative stores in order to fight the monopoly of the agrarian bourgeoisie over the food supply (Perez Fornies, 2011). Initially, they only managed the distribution of processed sugar, one of the basic foods[15] of the indigenous farmers. But later, also distributed other basic products gradually. The number of supply stores increased in the region from 12 in 1978, to 32 stores in 1980 with more than 12 basic products available for sale (Perez Fornies, 2011). It was through this project, focused on food supply, that indigenous organization started in the region since then.

When the indigenous farmers experienced the advantages from organizing, they also started plans for the joint commercialization of coffee and pepper to fight the agrarian bourgeoisie commercial mediation. At this point there was no specific organization regarding a wider

[13] In this case, some 'civil organizations' supported by the government interests violently confronted the UCI as a counter attack strategy.

[14] It is important to recall that the economic policy of that time was the support of the intensification of commercial agriculture to finance a new industrialization.

[15] Sugar became a basic good because it was cheap and highly caloric to give enough energy to the farmers to work in the plots all day.

socioeconomic and environmental project, or a complex governance system to operate as an association. But as this organization developed, the Union of Small Producers of the Mountains (UPM) was established in 1977, but it was not legally registered so the farmers could ask for rural credits or trade their products outside of the area as a corporation (Bartra et al, 2004).

The UPM represented an important counterbalance as a political and economic force in front of the partnership between the regional bourgeoisie and the local governments (Martinez Borrego, 1991). In this period, the former power dynamics of the area started to shift more evenly to the benefit of the indigenous small scale farmers due to its organization.

However, not all the indigenous movements of the region managed to stay together in the UPM. Different agricultural and touristic cooperatives were created as separate associations across the region (Rappo, 2006). Nevertheless, they all had the same goals to support the livelihoods of the members in a more viable and equitable way than the previous dynamics. The notorious split came from those organizations that decided to join forces with the government interests, instead of joining the more independent movements, such as the one that finally became Tosepan (Martinez Borrego, 1991).

From the 1980s and on, indigenous organization had a stronger political and economic influence to steer the different social and environmental issues relevant to them. This occurred especially in the municipality of Cuetzalan and the surrounding coffee and pepper productive areas of the northeastern side of the region.

One of the most relevant examples of this new political and economic influence of indigenous organization was the governmental approval of the *Local Ecological Management Program of Cuetzalan* in 2010. This was developed by Cuetzalan citizens, of which 70% are Nahuas, in cooperation with the Autonomous University of Puebla. It works as a guide for the kind of environmental policy the citizens desire for their municipality, which is centered around small scale farming, ‘micro industry’ and ecotourism as main economic activities or forms of ‘land use’. The management program also has a special focus on topics such as the management of urban waste, and the access to water for Cuetzalan population.

2.3 The case study: Union of Cooperatives Tosepan Titatansike in the Northeastern Mountains of Puebla, Mexico

In 1980 the UPM was dissolved and some of its producers organized into the Regional Agricultural Cooperatives Tosepan Titataniske. Its legal establishment was made in the municipality of Cuetzalan, and the initial number of members was 3680 indigenous producers from 5 municipalities and 35 different localities from the Northeastern Mountains of Puebla (Tosepan in Martinez Borrego, 1991).

Map. 3 Northeastern Mountains of Puebla

Source: Own elaboration.

Although membership has always been open to any person, and nowadays there are different ways of being associated to Tosepan, all the political actors of the organization together with most of the economic actors, identify themselves with indigenous background, either Nahua or Totonaca.

The main goals of the organization that have remained until now are: The improvement of the quality of life of the members and the development of the region with the Yeknemilis or good life according to their indigenous values. Yeknemilis refers to the continuous balance between all social activities, including the relationship with nature, in order to create the state of a good life for each person. The organization has a particular social and environmental governance system where the political actors of Tosepan organize the rest of the members towards the accomplishment of such goals.

Tosepan activities initially focused on the management of some consumer cooperatives for the regional food supply. They managed to break the regional agrarian bourgeoisie's commercial monopoly not only on the food, but also on agricultural trade[16] by making commercial partnerships with some producers organizations' in other states that supported and advised them on how to export their production to get better prices for it.

In the following years after their positive achievements, more social and environmental actions added up in order to support its goals. Different cooperatives and associations were created as a result of their expansion: A trade cooperative that nowadays commercializes both

[16] Following Tosepan records in Martinez Borrego (1991), the volume of traded coffee increased from 100 tons in 1981, to 610 tons in 1984, reaching an average of 700 tons in recent years, which represents around 10% of the traded coffee in the region (Octavio Zamora, pers. comm.). In addition, since the 1980s the coffee and pepper prices paid by Tosepan were always slightly higher (5-10%) than any middleman of the region.

conventional and certified organic agricultural production (1997); a microfinance bank available to all people in the region (1998); economic projects focused on women (1998); eco-tourism services (2001); an organic production cooperative (2001); a technical assistance center (2002); and more recently, health services (2009) among other minor and contextual projects explained in more detail in chapters 6 and 7.

The organization changed its name in 2008 to the Union of Cooperatives Tosepan Titataniske as a result of the expansion. Nowadays the Union of Cooperatives offer different services to around 35,000 people in 29 municipalities that are mostly located in the northeastern side of the region of the Northern Mountains of Puebla.

2.4 Characterization of the environment of the Northeastern Mountains of Puebla

The region of the Northern Mountains of Puebla is a part of a wider mountain system named 'Sierra Madre Oriental', which is 1,300 kilometers long and has an average altitude of 2,200 meters above the sea level. The Sierra Madre Oriental starts in the north-eastern side of the country, in the border with the United States, and continues down south until it meets the Neovolcanic Axis in central Mexico. The Northern Mountains of Puebla are localized towards the end of the mountain system. The total area of the portion considered as the Northeastern Mountains is 2509 km2 within Puebla state (Puebla patrimonial, 2011).

The Sierra Madre Oriental presents different types of mountain forests and sometimes even jungle, depending on the specific altitude and location where they are found. The ecosystem that corresponds to the particular area of study is the mesophilic or cloud forest, which has the most integrated distribution towards the far north of the region, where it is possible to find up to 10% of the biodiversity in the country (CONABIO, 2010). However, as these forests get to the center and south of the region of study, it is only possible to find fragments or 'patches' coexisting with agro ecosystems, secondary vegetation and grasslands (CONABIO, 2010).

Most of the vegetation of the mesophilic forests consists of evergreen trees: Pines and oaks, or 'acalocote' and 'auat' in Nahua language, among diverse plants and flowers, such as the Mexican magnolia (COEC, 2010 and CONABIO 2010). These forests constitutes the habitat of more than 572 species of vertebrates and an as yet undetermined number of invertebrates (COEC, 2010).

As a part of the global intertropical zone, the predominant climate of the region is classified as *(A) Cf*, which describes a semi warm and humid temperate with rain all year, especially during the summer. The average temperature goes from 18 ° C during the cold months and 22 ° C during the warmest (COEC, 2010 and Gonzalez, 2014). Here it is important to add that there are particular microclimates within the previously mentioned temperature average, this depends on the variation of altitude and the particular vegetation of each location within the region.

Overall, the topography is rugged along the Northeastern Mountains of Puebla. The highest altitudes are between 1000m and 2000m above the sea level, and in some cases they present

90° slopes. However, the physical characteristics of the soil in the lowest and medium altitudes that go from 300m to 1000m above the sea level, actually makes those areas very suitable for agriculture.

The region presents 12 different types of soils of which around 70% it is made up of 4 groups: regosol, phaeozem, cambisol and andosol. The other 30% are different 8 types with minor extensions (Varguez-Urbano et. al., 2015). As to the predominant 4 groups of soils, except for the regosol[17] that requires extra watering when used in agriculture, the rest have properties that makes them fertile and adequate for cultivation. However, it is important to add that compared to any soil that is closer to the sea level, soils in any mountain region are more prone to erosion due to their degree of inclination (Varguez-Urbano et. al., 2015).

Further, the region is rich in water resources:

> *The recorded levels of rainfall makes the region one of the wettest sites in Mexico and perhaps the planet: 4.200 mm annually on average. The water is received mainly in a meteoric form, through all the systems that are formed in the Caribbean, the Gulf of Mexico and the North of the continent, and they all find a brake in the Sierra Madre Oriental on its way to the South and the West of the country. The existing vegetation is closely linked to these climatic processes, the plant populations allow the retention of humidity, the creation of important superficial runoffs, the emergence of springs and water reservoirs, and infiltration to subsurface and underground strata (COEC, 2010; p.6).*

According to COEC (2010), the volume growth of human corporal waste, together with other types of discharges such as bleachers, cleaners and insecticides into the water streams, are not only altering the flora and fauna, but also the composition of the water is being negatively modified with the residues of these substances.

As I mentioned before, the far north side of the Sierra Madre Oriental has a more conserved mesophilic forest. The particular case of the Northeastern Mountains of Puebla is that there are only fragments of it. Galvan (in Evangelista Oliva e.t al., 2010) analyzed the situation of the forest cover in each of the municipalities of the region, and found that depending on the case, it is possible to find from only 0.1% to 9.12% of its original vegetal cover. In the case of the municipality of Cuetzalan, for example, COEC registered that the mesophilic forest is present in 14% of its total surface, when it used to be in 50% of its territory 150 years ago (COEC, 2010).

[17] Regosol is a newly formed soil compared to the other types. It has a thin layer in the surface followed by the actual rocks that originated the soil. There is a scientific consensus that this type of soil should be left under forest cover, but nevertheless, it is still possible to cultivate in it with the right methods to protect it from soil erosion (Gonzalez, 2014).

Out of the total surface area of the region, 62% is converted to agricultural lands, 5% to grasslands, 23% is secondary vegetation[18], 10% original mesophilic forest, and only 0.35% accounts as urban land use (CONABIO, 2010 and Evangelista Oliva et al, 2010). Even though the land use is primary agricultural, different public, academic and civil studies indicate that the deforestation in the region is mainly due to animal husbandry, road construction, and logging for commercial and subsistence purposes. The agricultural land use is always considered as a secondary cause of the deforestation (COEC, 2010 and CONABIO 2010).

These previous two institutions that I mention and quote in the upper paragraph also point out that the process of deforestation intensified towards the end of the 1970s and onward.

In regards to the predominant landscape of the region, the agro-ecosystem, here are the crop varieties that are currently cultivated: Maize represents approximately 50% of the total cultivated area, coffee accounts for 24%, fruits 13,2%, different grains 4%, pepper 2.3%, forages 1,9%, and other crops 4.6% (INEGI in Perez Fornies, 2011). Coffee and pepper, as opposed to the rest of the crops, are only cultivated in the lower (300m to 600m) and middle (from 601m to 1000m) altitude areas. This is due to the specific climate requirements to get the proper yields in the harvests (Gomez Gonzalez, 2004).

To finalize the characterization of the environment of the region, I will add that in 2011 private mining companies discovered shale gas and oil reserves. In 2012 they managed to get the concessions from the federal government of close to 180,000 hectares of land to extract such natural resources in addition to unlimited access to water. These concessions represent 18% of the territory of the Northeastern Mountains of Puebla (Aguilar Ayon in Reseñas ICSyH, 2016). The extractive projects are currently paused since 2013 due to the legal actions of the organized civil society of the region, who are mainly indigenous.

[18] Perez Fornies (2011) claims that those are lands that the farmers abandoned due to the lack of economic resources to keep producing.

3. Theory and literature review

Knowledge in scientific fields is based on theories, and theories are a set of formal statements or a system of ideas that is suggested to explain a fact or an event, or more generally: An elaborate explanation of reality (Bryman, 2012).

The formulation of my research questions was made with the intention to contribute to the fields of political ecology and environmental governance. Hence, the interpretation and analysis of the collected data is based on the two theoretical approaches. In the following two sections of this chapter I will conceptualize these two theories, and explain how I applied them to the case study of the *Union of Cooperatives Tosepan Titataniske,* from now on Tosepan, in order to gain understanding or resolution to the research questions of this project.

3.1 Political ecology

Political ecology is a theoretical approach that aims to understand the power relations between humans regarding nature, and has been developed since the 1970's[19] mainly by anthropologists, geographers and ecologists. Although many perspectives and concepts are used within the field by different authors, what is always constant is the critical approach in order to question the past and current structures (cultural, political and economic) that define the access, use and valorization of any component of nature considered useful in order to reproduce human life on Earth.

Political ecology also looks for a comprehensive understanding of the relationship between man and nature, and that is why biological sciences are also considered fundamental for both the analysis of the effects of human action towards nature, and to understand nature's own rhythms and processes and how these influences human action. Therefore, interdiscipline[20] is often the method applied to the study of the complex socio-environmental relations under this theoretical approach.

According to Enrique Leff, the convergence and integration of different disciplines in the study field of political ecology makes it necessary for the "[...] articulation of natural and social sciences in order to create a new environmental rationality [...]; the ecological need to be understood in biological terms, but in complex relation with cultural and economic practices" (Leff in Escobar, 1999; 15).

[19] The American anthropologist Eric Wolf used for the first time the concept in 1972 in his paper *Ownership and Political Ecology* (Delgado, 2013).

[20] The methodology of interdiscipline is applied to what it is known as 'complex problems', which include a wide diversity of factors that have to be studied from different disciplines. In order to understand such problems, a process of differentiation and analysis of each of the factors has to be made, and then, the integration through the correlation of the multiple factors is what provides a comprehensive explanation of the complexity (Garcia, 2011).

Due to its interdisciplinary and critical vision, I applied the political ecology theoretical approach for a comprehensive understanding and analysis of the cultural features of the political actors of Tosepan and how these influence their governance.

Political ecology study field takes place at different historical times, bio- physical spaces, and dimensions of social life. Nevertheless, most of the Hispanic and Latin American authors of the approach are focused on their own territorial contexts, analyzing local conflicts derived from the colonization[21] of nature, and the uneven social and environmental consequences where this (neo) colonization takes place.

The Colombian anthropologist Arturo Escobar builds up a critical understanding of political ecology mostly through the analysis of local communities, especially indigenous, in the region of Latin America. The actors and geographical location of my case study have the same contextual specificities. That is why Escobar's ideas about the characterization of social and environmental dynamics were taken into consideration for the statement of the research questions, and hence, they were also the guide of specific topics or explanatory variables to approach during the data collection process, and finally applied for the qualitative analysis or interpretation of the findings of the research, together with the environmental governance approach.

For Arturo Escobar, political ecology is 'the study of the manifold articulations of history and biology and the cultural mediations through which such articulations are necessarily established' (Escobar, 1999; 3). In a more detailed explanation, it is:

> *The examination of the manifold practices through which the biophysical has been incorporated into history, and in which the biophysical and the historical are implicated with each other […] Each articulation has its own history and specificity, and is related to modes of perception and experience determine by social, political, economic and knowledge relations, and characterized by modes of use of space, ecological conditions and the like.*
>
> *It will be the task of political ecology to outline and characterize these processes of articulation, and its goal to suggest potential articulations realizable today and conducive to more just and sustainable social and ecological relations (Escobar, 1999; 3-4).*

In his vision of political ecology, Escobar implements the concept of *regimes of nature*, hat refers to the shape of how the biophysical is seen or incorporated into different social perspectives or constructions. He classifies, with the support of different authors within the theoretical approach, the distinct social perspectives of nature into three regimes: 1.The organic nature, which is the one corresponding to the local conceptions of nature, 2. the capitalist nature and 3. The techno-nature.

[21] When colonization is mentioned in Latin American studies, it mostly refers to the wide political, economic and cultural domination made by western powers towards the region, which started with the European colonization in the XVI century, and transformed after the independence of the colonies in the XIX century into a neo-colonization made by both private and public actors, especially by trans and international extractive companies supported by European and north American governments (Cueva, 2004).

Although these three types are not intended to give a unique and closed view of the characterization of the different conceptions of nature, the following three categories and its mutual relationships were useful to understand, describe, and analyze the cultural features of the political actors of the case study, and how these features influence their governance.

Organic nature

Organic nature regimes are usually found amongst indigenous and rural communities in developing countries[22]. Every case has its own cultural specificities that creates a unique vision or understanding of nature[23]. Nevertheless, 'the most well established feature of these type of regimes is that they do not rely on a nature - society dichotomy'; meaning that they do not make separations between the two dimensions, but rather, they make differentiations of the biophysical, the human, and even the spiritual, which in the end are all connected or linked into what they conceive as their reality (Escobar, 1999).

An organic nature regime is

> *[...] a specific way of categorization of social and biological entities. [...] It may also contain mechanisms for maintaining good order and balance in the biophysical, human and spiritual circuits, or a circular view of biological and socio economic life, ultimately grounded in Providence, Gods or Goddesses or how all beings in the universe are 'raised' or 'nurtured', a living unity with no separation between humans and nature, individual and community (Escobar, 1999; 7-8).*

In organic regimes of nature, Escobar refers to culture as the 'mediation' that defines the relationship between man and nature. Culture in this case, as a concept that encapsulates a comprehensive way of making sense of the social, spiritual and environmental dimensions. Which as I mentioned before, these dimensions are categorized, but not separated from each other (Escobar, 1999 and 2000).

For Victor Manuel Toledo (2008), biocultural memory is the term he uses when he refers to the historical ability of indigenous groups to understand their particular environment and themselves as individuals, but also as part of a community. It is based on this ability from their biocultural memory, that they have developed and still practice complex knowledge systems[24] that can go from the agro ecological and geographical, to the religious aspect.

[22] 'Developing countries' is employed in Escobar's paper to refer to the degree of development of their capitalist systems.

[23] Escobar explains that 'nature' is a modern category that does not exists in most non-western societies, that is why he also talks about the 'biophysical' to refer to what is conceived as all living beings and the processes to maintain life on Earth.

[24] In the book *The biocultural memory,* Victor Manuel Toledo not only presents the theory of biocultural knowledge, but also dedicates one chapter to present different study cases around the globe about traditional societies' agro-ecological knowledge systems and their contributions to sustainability.

Accordingly, rural and/or indigenous societies give meaning to reality in a different way than western societies, who tend to separate or fragment the characterization of reality into different and unrelated pieces or fields of knowledge. That is why the western conceptualization of nature as something external to society, is not useful for the understanding of organic regimes of nature. Escobar (2000) proposes that these regimes should be study through the anthropology of local knowledge, that refers to the study of the particular way subjects and societies gain understanding of the social and environmental dynamics through its specific spatial and cultural contexts.

Through the anthropology of local knowledge, the analysis of the particular perceptions of reality is done by recognizing that the knowledge generated in order to understand the world is a construct, i.e creations from human beliefs.

Based on the conceptualization of this regime and its focus on culture to study and analyze communities at the local level, I developed the concept 'cultural features' of the political actors of Tosepan to design my research questions. In order to narrow down the study of the most relevant characteristics that influence Tosepan governance and the programs that deal with agricultural management of the producers.

Continuing with Escobar's characterization of organic regimes of nature, communities identified with this regime show a particular attachment to their territory, because for them, territory is not only the biophysical base in which they reproduce their life, but moreover, territory is the space from which the world is conceived and understood, a place with its own culture and identity (Escobar, 2000).

For the previous reason, one of the main features of the political ecology of the localities or communities, especially in Latin America but generally in the global south, is that most of their current conflicts that from an external point of view seem strictly environmental (for example, the access to land), are often a more complex struggle for the State's recognition of four fundamental rights: territory, identity, political autonomy, and their own vision of development (Escobar, 2000).

Hector Diaz Polanco mentions that that the struggles of the local and indigenous communities for self- determination in their territories aims for a type of autonomy[25] that does not mean separatism or isolation from the State. It rather refers to a struggle for their right to reproduce their own culture and values, their internal norms, and the specific modes of operation for the interactions with their environment (Diaz Polanco, 2003).

When organic regimes of nature are studied, it is found that they possess elements that break with the anachronic general perception of traditional communities, such as they are closed or isolated, and that they reject external technologies and influences; '[...] local models are in contact with and influenced by modern models of nature and economy, [and therefore] [...] the

[25] According to Hector Diaz Polanco, the existence of autonomy for indigenous groups contains two conditions: a) A wide State permittivity towards indigenous own costumes and traditions, and b) Their right to have a regime that establishes a self-government in which the communities can choose their authorities (who are part of the community), can exercise legally attributed powers, and possess minimum powers to legislate on their internal life (Diaz Polanco, 2003).

documentation of the ensembles of meanings/uses should be situated in the larger context of power and articulation with other nature regimes and global forces more generally' (Escobar, 1999; 10).

The organic regime of nature predominates in the political actors of the case study of Tosepan, which are indigenous small farmers from the region of the Northern Mountains of Puebla, in Mexico. However, in order to elaborate a comprehensive characterization and analysis of their cultural features, it is important to include the influences, interactions and articulations of the actors' main regime of nature with the other two regimes that I will explain next.

Capitalistic Nature

This dominant conception of nature started its development in the 18th century in central Europe, where it began to be possible to control and predict nature for economic/productive purposes on a larger scale.

The development of capitalism required the development of different forms of appropriation and management of natural resources based on 'expert knowledge' that was not concerned with taking care of the nature's rhythms and the ability to reproduce continuously. Since the goal of this economic system is to produce goods in order to reproduce wealth for the owners of the means of production. Hence, the consideration of a wider relationship between man and nature was reduced to merely the economic one. Since then, the mediation between man and nature became the capital or the reproduction of wealth, and that is the main characteristic of this regime of nature (Escobar, 1999).

The development of capitalism at the international level brought an historical change of perspective among many individuals and most of the societies around the world; from the pre-existent more integrated or organic vision, to one that reduced nature to a particular productive resource. From that time and on, and especially among western societies, nature was perceived as something external and controllable by humans. Especially with the intensification of urbanization that nature started to be perceived as 'something' that us outside of the cities since then (Escobar, 1999).

Although today it is possible to find within this nature regime of exploitation new discourses such as sustainable development and biodiversity conservation (Escobar, 1999). For many critical authors within the political ecology and ecological economics approaches, those concepts conserve the idea of accumulation and commodification of nature to keep reproducing the capitalist system and its social and environmental externalities. However, these new approaches to nature are starting to recognize the anthropogenic role on environmental processes such as extinction, pollution and climate change. Processes that intensified due to the almost destructive appropriation and transformation of nature of the economic system. Currently, most States and international organizations are negotiating and mobilizing resources to find solutions to environmental issues within the capitalist regime of nature.

Techno-nature

The techno- nature is closely related to the capitalist nature's goals because it is mostly aimed at the production and the commodification of nature. That is why in most cases it is possible to correlate technology and the dynamics of the accumulation of capital at the expense of nature (Delgado, 2013). However, in this regime it is technology and science the mediation between man and nature (Escobar, 1999).

In its more recent stage, 'nature has been seen as a product of the social, with the idea that everything is under control and that the biological, including human nature, becomes to a great extent a question of design' (Escobar, 1999; 11). Genetically modified organisms, as well as the clonation methods, are clear examples of how often techno-nature regimes have little or no ethical considerations about the social and environmental implications of the 'production of nature' from different technologies and fields of science.

Nevertheless, Escobar acknowledges that the generation and development of technologies can also bring alternatives that can build 'new significations and articulations' for each of the regimes towards the development of sustainable socio-environmental models. And this positive turn has already happened, various examples of localized social movements and how they were able to use technologies in order to accomplish their socio- environmental goals. Hence, there is in fact a wide range of solutions that technologies and science can contribute to improve and harmonize relations between man and nature.

Hybrid nature

Regarding all the previous characterizations, it is important to mention that these three regimes of nature:

> *"[...] do not represent a linear sequence or series of stages in the history of social nature [...] they coexist and overlap [...] moreover, they co-produce each other; like cultures and identity, they are relational. What matters is examining their mutual articulations and contradictions, the way in which they have control of the social and the biological (Escobar, 1999; 5).*

In describing the relations and coexistence of the different nature regimes, Escobar develops the concept of hybrid natures, which is the process of crossing the boundaries between regimes and being able to '[...] use both local and transnational cultural resources in order to create [...] unique collective identities at the local level' (Escobar, 1999; 13), which can accomplish social and environmental sustainability, just as he states as the main task of political ecology.

This case study will examine the different material and immaterial influences and articulations between Tosepan main nature regime and the other regimes, in order to gain a more comprehensive understanding of the cultural features of the political actors.

3.2 Environmental governance

The second analytical approach employed in this research is the environmental governance theory, which I will also describe and explain how it applies to the case study.

The term governance is understood in political science as the decisions and actions made in order to conduct people and resources towards specific goals. According to Jan Kooiman, governance is:

> *The purposeful effort to steer, control or manage sectors or facets of society in certain directions (Jan Kooiman in Evans J.P 2012; 11).*

In the political science classical approach, the State's government is the only actor entitled to govern territory and population. However, in the past decades, the decentralization of the responsibilities of the State, with the idea[26] of giving more independence to economic and civil actors over their own activities, made the practice of governing recognized also among non-State actors. Non State actors are usually called stakeholders, and they can be: non-governmental organizations (NGOs), private companies, and the civil society at the general level (Evans J.P, 2012).

Furthermore, the concept of governance not only refers to a political practice. It is also an analytical tool used within social sciences and interdisciplinary research in order to understand the practice itself. In my case, governance is mostly used as a methodological framework for identifying the actors and their institutions or their rules of interaction, and political ecology is the complement that offers the elaborate explanations to the why and how these political processes takes place (Evans J.P, 2012).

Going further in the conceptualization and employment of this analytical approach, environmental governance refers to the specific way natural resources are managed, both for its use and/or protection, in a given socio-environmental system. 'The element of authority in those systems (steering, controlling and managing) determine which actors get access to the natural resources, and under which rules' (Vatn, 2015; 133). Thus, in order to understand and analyze environmental governance systems is also fundamental the identification of actors, their institutions and power structures.

There are a number of identified environmental governance systems that exist at different dimensions of social life (Evans, 2012 and Lemos and Agrawal, 2006):

- From the local: That are non-governmental organizations within a specific place. These organizations can be recognized by State powers, or can be independently run systems between the members of a community.
- To the public (or State): That refers to all the different levels of a government -local, regional and national- using legally binding laws, public policies, regulations, agencies, etc. for the management of the environment.

[26] Due to the intensification and predominance of the economic ideology of neoliberalism in the United States and the U.K. that started in the end of the 1970's.

- The private: That are all the activities perform on the environment by private economic actors at any scale, and;
- The global level: Which can be a combination of both governmental and non-governmental organizations from different nationalities that cooperate for a common environmental goal, which can be expressed either on an International Treaty (when it involves states), or agreed regulations upon the partners.

Regarding these different dimensions of governance, it is important to mention that environmental issues are in the end global concerns, so all the levels where governance occur are interconnected; from the public to the private, the local, national to finally reach the global (Evans, 2012). However, it is usually the State that is on the top of the decision making about the access and use of natural resources at any of the previously mentioned dimensions (Evans, 2012 and Lemos and Agrawal, 2006).

The governance system type and further framework for the analysis that is applied for the case study of Tosepan in the Northern Mountains of Puebla, Mexico, is both the social and environmental governance at the local level made by a communal recognized organization. A communal organization in the environmental aspect, not only refers to an organization with a communal property regime, both Vatn (2015) and Ostrom[27](1999) points out that the property regime may be private, and the communal environmental management refers to a common natural resource that individuals share. That is the case of Tosepan, individual small scale farming in private property, but with the communal management of their production, and in some cases, their agricultural systems.

In this regard, the cooperative is also a type of communal organization, where all its members 'have the common ownership of human made capital or natural resources; [...] hence, cooperatives exists at both consumers and producers levels' (Vatn, 2015;146). Tosepan case study is a union of both consumers and producers cooperatives, as I will explain in the findings of this research.

I would like to emphasize that Tosepan is an organization that deals with both social and environmental dimensions. That is why in research question number 2. I analyse the governance at the general level, and in research question number 3. I focus on the environmental aspect of the specific programs that deal with agricultural management.

In continuation of the characterization of environmental governance systems for its analysis, according to Arild Vatn (Vatn, 2015) there are three types of institutions that facilitates the social interactions for the management of natural resources: 1. The rules governing the economic process, 2. the rules governing the political process and 3. the institutions of the civil society. In the following table I summarize his characterization of these institutions, but I focus on the specificities of the local and communal systems for the relevance to the case study:

[27] Ostrom refers to common pool resources (CPRs) in a given socio ecological system as shared units of land, but also any other natural resource that may be commonly shared.

Table 1. Institutions of environmental governance

Institution	Features
1. Rules governing the economic process (or resource regimes).	**1. Rules of access** to the natural resources: *These rules are known as property and use rights, and they are recognized by the State, customary law and/or other relevant norms and conventions.* The types of access to the natural resources are either private, public (State owned), common (that belongs to a specific community), or open access. Property* and use rights grants: *a) Access* to the physical property, *b) Withdrawal* or the right to obtain the products of a resource, *c) Management: The* use and transformation of the resource, *d) Exclusion:* The right to determine who has access to the resources and; *e) Alienation:* The right to sell or lease. * Just the owners possess all the rights. **2. Rules of interaction.** *Within and between actors for the coordination with respect to the use of resources and the products produced thereof [...]* The most common rules of interaction are: *a) Trade:* Exchange of goods and services, 'typically against a payment', *b) Command:* the power to decide over the use of resources, *c) Community based interaction*:* The rules of the daily relations between individuals or groups within a community and d) *No rules*, that means that there are no commonly defined ways to interact. *One important aspect of community based interaction is that cooperation is the dominant value in social relations, since the main aim of the interaction is to organize the management of natural resources, as well as other activities, with the goal to reproduce the livelihoods of all the members of a community. However, this does not mean that there is absence of conflict in such interactions.
2. Rules governing the political process	Constitutions and/or collective choice rules for decision making at all levels of social life.
3. The Institutions of civil society	*Social values and norms that are turned into conventions [...] about what is seen as appropriate interaction between fellow citizens'. Civil rights such as free speech, free association*, among others that could be officially coded in State constitutions and laws.

Note: Sentences and concepts in cursive font are quotations from the author.
Source: Arild Vatn (Vatn, 2015; 134-144).

Regarding the environmental governance actors, Vatn (2015) classifies them into three groups. However, one actor can be catalogued into two or more groups according to their concessions and actions, just as described in the following table:

Table 2. Actors of environmental governance

Actors	Features and their institutions
1. Economic actors:	**-Features:** *Those holding the rights to the natural resources*. They can be divided into: *a) Producers* (of good and services). Production can be made in private property (large commercial scale or at a household level), public (State), and in common property (land and/or a natural resource that communities may share), and; *b) Consumers or users of the produced products* (goods or services). They are not necessarily purchasers. **-Their institutions are:** Resource regimes and the rules of interaction of the economic process.
2. Political actors:	**-Features:** *Those defining the resource regimes and the rules for the political process*. They exercise power through political systems, ideally: Representative, with divisions of power, and developed mechanisms for accountability and transparency. **-Their Institutions are:** The rules governing the political process (constitutions, policy, collective choice rules) and resource regimes.
3. Civil Society actors:	**-Features:** *Those ensuring legitimacy of political actions [...] and defining the normative basis for society.* **-Their institutions are:** civil rights and social values such as freedom of speech, association, participation, etc.

Note: Sentences and concepts in cursive font are quotations from the author.
Source: Arild Vatn (Vatn, 2015; 143-151)

The Sustainability of governance systems

Environmental governance systems have different goals, rules, strategies and practices for the management of natural resources, and they do so with different degrees of sustainability.

Sustainability have different meanings, depending on the political, economic, academic or civil actor who describes the concept. I understand sustainability as both individual and social strategies and practices that are aimed at accomplishing equal distribution and efficient use of natural resources, in order to create social and environmental welfare, as well as the possibility to reproduce such welfare for the future generations.

My previous conceptualization of sustainability is based on Escobar's idea for the need to develop alternatives that conduct to more just and sustainable social and ecological relations (Escobar, 1999).

The sustainability assessment of my final research question number 4 will be based on the previous understanding of sustainability. Furthermore, in this last question or topic of analysis, there are also several authors, not necessarily from political ecology, that are interested on how social structures or rules within society influence the sustainability of environmental governance systems. Therefore, in addition to political ecology, I also analyzed my findings

based on previous research of Elinor Ostrom[28] in the field of environmental governance. She focused on finding patterns or tendencies (not rules) in local and communal environmental governance systems that can support a sustainable use of natural resources.

First of all, she found that:

> *Most of the theory and practice of successful management involves resources that are effectively managed by small or relatively large groups living within a single country, which involves nested institutions at a varying scales (Ostrom, 1999; 278).*

Further on, the following conditions or principles of social interaction that are most likely to stimulate a more sustainable natural resource use in local governance systems, were taken into consideration for the qualitative analysis (Ostrom in Vatn, 2015; 298):

1. Definition of clear group boundaries.
2. Match rules governing use of common goods to local needs and conditions.
3. Ensure that those affected by the rules can participate in modifying the rules.
4. Make sure the rule-making rights of community members are respected by outside authorities.
5. Develop a system, carried out by community members, for monitoring members' behavior.
6. Use graduated sanctions for rule violators.
7. Provide accessible, low-cost means for dispute resolution.
8. Build responsibility for governing the common resource in nested tiers from the lowest level up to the entire interconnected system.

In addition, Ostrom and Cox et al. (2013) worked in the generalization of 8 similar core design principles, but this time they aimed at all types of social groups or organizations that desire to achieve common goals. Where 4 of these principles are new in comparison to the 8 previously mentioned, and also played an important role for the analysis:

1. Strong group identity and understanding of purpose.
2. Fair distribution of costs and benefits.
3. Authority to self-govern.
4. Appropriate relations with other groups.

Other patterns or conditions that affect the outcomes of local environmental governance towards sustainability in "Revisiting the commons: local lessons for global challenges" (Ostrom, 1999; 278-282) were also taken into consideration:

[28] Elinor Ostrom was a political and economic scientist specialized in the study of socio -ecological governance systems, especially at the communal level. She analyzed a wide variety of cases around the world in order to find common patterns of social organization that supported a sustainable use of natural resources. Ostrom and the authors using her methodology of assessment of socio-ecological governance systems have a large database of studies at the global level, see: https://ostromworkshop.indiana.edu/library/database

Attributes of the resource systems affects the benefits and costs that the users perceive:

> *[...] For users to see major benefits, resource conditions must not had deteriorated to such an extent that the resource is useless, nor can the resource be so little used the few advantages result from organizing.*

Level of dependency:

> *Users who depend on a resource for the major portion of their livelihoods, and who have some autonomy to make their own access and harvesting rules, are more likely than others to perceive benefits from their own restrictions.*

Type of Behavior: Cooperation, self-interest, and the *free riders*[29] are types of behavior that influence the organizational skills and functionality of communal management systems. For cooperation to be the dominant behavior:

> [...] *Individuals must overcome their tendency to evaluate their own benefits and costs more intensely than the total benefits and costs for a group [...] Further, users must be interested in the sustainability of the particular resource so that expected joint benefits will outweigh current costs.*

Broader social settings:

> *Whether people are able to self-organize and manage Common Pool Resources also depends on the broader social setting within which they work. National governments can help or hinder local self-organization [...]. The broader economic settings also affects the level and distribution of gains and costs of organizing the management of common pool resources.*

Cultural diversity:

> *Increasing cultural diversification offers increased hope for diversity of ways in which people have organized locally around CPRs […] and that diverse new ways will continue to evolve at the local level. However, cultural diversity can decrease the likelihood of finding shared interests and understandings.*

Finally, regarding the concrete analysis of the contents and outcomes of the programs that deal with the agricultural management of Tosepan, I also considered the *Framework for the Evaluation of Natural Resource Management Systems Incorporating Sustainability Indicators* (MESMIS[30]). The Framework coincides not only with Ostrom's previous work, but also with the goals and strategies of Tosepan because it is especially designed to analyze communal systems at the local or village level.

[29] It refers to people that act according to the context for his/her best interest.

[30] For more information in English: http://www.mesmis.unam.mx/

MESMIS offered a structure for the characterization of the particular environment of the case study, and 9 indicators that were used as a guide to look for sustainable practices:

> a) Productivity, b) efficiency, c) conservation, d) diversity, e) cost/benefit distribution, f) participation of the members of the system, g) change and innovation capacity, h) self-sufficiency and h) organization.

By granting an evaluation of 'low', 'medium' and 'high' to each of the 9 indicators based on the collected data about agricultural management, it was possible to contribute to the strengths and limitations of the outcomes of such programs towards supporting the sustainability of Tosepan.

4. Research design

This project employs the qualitative research method that collects and analyses data from individuals and societies in order to understand the ways they interpret their material and immaterial worlds (Bryman, 2012).

However, research designs are not closed; sometimes is necessary to combine some tools of different methods, when there is a need to include both interpretations and facts to respond to a particular research question, especially when it comes from an interdisciplinary field such as environmental studies. This research also collected and analyzed many quantitative facts or data in order to characterize the environment of the case study, to evaluate some of the outcomes of Tosepan governance, especially in the economic aspect, as well as for the characterization and analysis of the programs that deal with agricultural management.

4.1 Data collection methods

There were two levels of sampling. The first level consisted of the sampling of the context (area and/or social group), and the second level was the sampling of the units of analysis within the chosen context.

In regards with the contextual level, my personal interests to focus on the analysis of a particular local environmental governance system led to the selection of the case study of the Union of Cooperatives Tosepan Titataniske in the Northern Mountains of Puebla, Mexico, which I also knew from a previous class excursion during my bachelor degree.

Once I defined my research questions, the second level of sampling consisted on choosing the units of analysis within the case study that could function as the representation of the population and the environment under study. This second sampling approach was purposive, since it was a strategic and predefined selection of units of analysis, so those individuals or text based sources that were sampled were relevant to answer the research questions (Bryman, 2012).

Besides the purposive approach, once the data collection process started, and even during the analysis and writing of my findings, I kept finding non-predefined samples as new units of analysis, as they also contributed to answer the research questions (Bryman, 2012). Thus, the snowball sampling strategy was also utilized through the entire research process.

The following table presents the final overview of the size and characteristics of the total sample:

Table 3. Overview of the size of the sample

Overview of the size of the sample, total units: 81	
Text based, total: 68	**Interaction based, total: 13**
Primary sources: 1. Text- archived public discourses of Tosepan members (1). 2. Video- archived interviews, documentaries and conferences of Tosepan members (5). 3. Tosepan articles, texts (8). 4. Official characterizations of the environment of the region of the Northern Mountains of Puebla (2). **Secondary sources:** 1. Scientific articles about Tosepan and/or the region of the Northern Mountains of Puebla (21). 2. Books and chapters about Tosepan and/or the region (20) 3. PhD theses about Tosepan and/or the Region of the Northern Mountains of Puebla (3). 4. Master's theses about Tosepan and/or the Region (3). 5. Media and NGOs articles about Tosepan and/or the Region (5).	**Semi-structured interviews:** 1. Tosepan administrative council (1). 2. Tosepan active member (1). 3. Tosepan trade cooperative (2). 4. Tosepan Ecotourism (1). 5. Tosepan honey processing plant (1). 6. Tosepan health cooperative (1). 7. External adviser of Tosepan (1). **Observations:** 1. Guided tour of Tosepan coffee and pepper processing plant (1) 2. Guided tour of Tosepan honey processing plant (1) 3. Guided tour of Tosepan plant nursery (1)* 4. Guided tour Tosepan eco-touristic installations (1) 5. Guided tour Tosepan elementary school (1)* *These observations were made as part of an excursion from the class of Political Economy at the National Autonomous University of Mexico in March of 2010.

Regarding the **text based primary sources**, they were authored and stored as text documents by members of *Tosepan*, except for the official characterizations of the environment who are authored and stored by public agencies and one civil/academic organization recognized by the government. In addition, all the video archives are produced by external authors[31], but here members from Tosepan talk about their own perspectives and experiences in the organization, as well as other important topics for the research.

[31] Except for the Institutional video of Tosepan (2011) produced by Tosepan and published on their YouTube channel, URL: https://www.youtube.com/watch?v=OpNIfrP1_Lk

The **secondary text based sources** consisted of only written texts from external authors about a wide diversity of topics concerning *Tosepan* and other social and environmental aspects of the area of study of the Northern Mountains of Puebla, in Mexico. Both academic and non-governmental (NGOs and media) material was gathered on the data collection process and then analyzed. This type of data was taken into consideration with the acknowledgement that it contained the perspectives and scientific approaches of external authors. However, in my perspective it was useful and trustworthy to consider these sources for the analysis of the cultural features of the social group, economic aspects of Tosepan governance, the programs that deal with agricultural management, as well as diverse environmental aspects of the region.

The **interaction based data collection** was made between 19.12.16 and 22.01.1. in Mexico City and the municipality of Cuetzalan in the region of the Northern Mountains of Puebla, Mexico. Within this type of strategy I carried out 8 **semi-structured interviews** in Spanish language, which provided me with the most relevant findings of this research, as they showed the specific cultural features of Tosepan political actors through the way they explained their governance, especially at the political level. But also showed more detailed information about the economic strategies of the organization, and the diversity of programs that deal with agricultural management beyond their commercial production.

7 out of 8 of my interviews were made based on written guides, which were previously designed to approach the specific topics that could answer the research questions. Only one interview was made accidentally, when I runned into an active partner inside Tosepan administration building and I asked her about informants that could give me information on 'environmental conservation' or 'environmental protection programs' of Tosepan. She did not understand the concept 'environmental' as I meant, and instead, she started talking about the regional issue of the defense of the territory[32] and the current role of the organization in it, to try to explain me how Tosepan took care of the environment. She gave me very important information for my analysis, but I was not prepared and I did not use any guide nor recording device during our talk. It was later on that I wrote down the most relevant aspects of it, and I kept the pamphlet of COEC that she gave me with key information about the issue.

The rest of the collected data from 7 semi-structured interviews was recorded and stored by my own recording device (mobile phone) in Spanish language, and then translated and transcribed also by me into English language in an electronic word document, which I saved in my personal computer.

Once the interviews were being made in the field, I made some changes to adapt to the circumstances. Almost all interviewees started to talk about Tosepan history and its present work before answering to any of my questions. This preference of the interviewees was helpful

[32]The role of Tosepan in the Committee of the Ecological territorial management program of Cuetzalan (COEC) is mentioned several at the end of the background section 2.2 and the governance section 6.1 under 'internal interactions'.

during the data analysis because many topics that they mentioned on their introductions were related to the topics of my data collection strategy in order to answer my research questions.

During the interview, the wording of some of the questions of my guides had to change to be clearer with the interviewees. Sometimes the order of the questions changed too, according to the rhythm and context of the talk. Additionally, several questions that were not in the guide were asked in order to follow up and compliment the interviewees' replies. Finally and most importantly, the focus and attention was placed on those specific subjects and issues that the interviewees thought were more important and relevant in order to explain and understand their own reality (Bryman, 2012). That is how most of the relevant findings were tracked.

All of the interviews were made to individuals belonging to Tosepan political actors, with different positions and roles within the organization. Only one interview was made to an external adviser of *Tosepan*, who is a professor and researcher from the National Autonomous University of Mexico (UNAM).

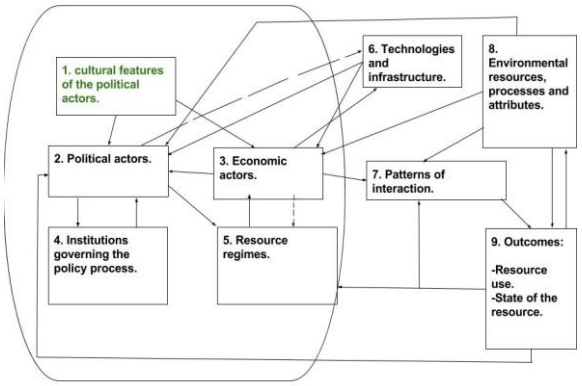
Finally, some of the interviewees that had positions within a specific cooperative offered me a guided tour of their particular operative installations. I included these **observations** of the organization's infrastructure to compare them to the collected data from the interviews and all text based sources. Especially collected data regarding the programs that deal with agricultural management, the level of technological development of the organization, and the economic strategies and outcomes of the organization. The observations were written down on a notepad and photo documented with my own digital camera.

4.2 Data analysis

Regarding the conversion of the collected data into concrete findings to answer the research questions of the case study, the framework for analyzing environmental governance systems (EGS) proposed by Arild Vatn (2015) was useful to make a methodical thematic analysis of the several factors or variables of 1. Cultural features of the political actors, 2. Tosepan governance 3. The programs that deal with agricultural management, and 4. Assessment of strengths and limitations to support the sustainability of Tosepan.

Below is presented the conceptual/mental map for analyzing environmental governance systems from Arild Vatn (2015) that was especially adapted to support the answers to this project's research questions:

Image 1. Framework for analyzing environmental governance systems



Source: Vatn, 2015; 154.

1. Cultural features of the political actors: In the original framework this actor or category of analysis is called 'civil society', and it identifies its values, social norms, institutions, actions and interactions in order to explore how they influence the environmental governance system from the bottom. I suppressed that category and re-defined it as the *cultural features of the political actors,* because is more related to the specificities of the case study and its research questions. I also placed this category on top of the actors and its institutions because the focus is on exploring those cultural features in order to understand how they influence Tosepan governance and its agricultural management programs. However, first I researched and analyzed previous information about Tosepan governance, to then find out which cultural features and how they influenced the governance.

2. Political actors: They were identified, characterized and analyzed (goals, actions, and their internal and external interactions).

3. Economic actors: They were identified, characterized and analyzed (their preferences and actions).

4. Institutions governing the policy process: They were identified, characterized and analyzed (their internal constitutions and collective choice rules).

5. Resource regimes: They were identified, characterized and analyzed (the institutions governing access to resources and the interactions between economic actors, in addition to some of its more relevant outcomes in regards to sustainability).

6. Technology and infrastructure: The influence of technology is analyzed in the cultural features of the political actors and how it influences Tosepan governance and its specific technological state in the programs that deal with agricultural management.

7. Patterns of interaction: They were identified at two levels, one, the interactions within

the political and economic actors in the governance system, and two, the interactions of all actors with nature or in the programs that deal with agricultural management.

8. Environmental resources, processes and attributes: The biophysical characterization of the environment in the Northern Mountains of Puebla, Mexico was made with a focus on the agricultural system of Tosepan producers. This was placed in the background section in order to support the analysis of the programs that deal with the agricultural management of the organization.

9. Environmental outcomes: In this particular research, the outcomes of the environmental governance were focused on the analysis of the specific programs that deal with agricultural management of Tosepan.

Finally, after working on each category, the final step was to analyze the strengths and limitations of the influence of the cultural features of the political actors in the governance, including the programs that deal with agricultural management, in order to support the sustainability of Tosepan.

4.3 Limitations and future opportunities for the research

There were important limitations to this research project. First, the size of the sample in regards to all forms of interaction based data collection was supposed to be wider. Due to health and security reasons it was necessary to leave the municipality of Cuetzalan before planned, and that is why the time of the fieldwork was reduced from two to only one month.

I required more time in the field in order to collect a bigger sample of participants to the interviews that could provide data about the perspectives of those active members (the political actors) that have decided to remain as conventional producers and not join the organic program, which is presented in section 6.1 in **'internal interactions**…' and section 6.2 under **'preferences of the economic actors'**. As well as more detailed and updated data about the current management practices of the conventional producers presented in section 7.4. Also, and very importantly, to make observations of the social dynamics of the local and general assemblies of Tosepan, which are an important part that characterizes the governance in section 6.1.

Nonetheless, after my fieldwork and the later literature review, I concluded that there were enough text based primary and secondary sources to continue with my research. Especially a video-archived conference offered by one permanent external adviser of Tosepan named "Past, present and future of cooperatives" from 2016, various academic/scientific articles, books and book chapters, and two relevant PhD theses. All of the previous sources, together with my interaction-based collected data, encouraged me to continue and finalize this research and my Master's degree at NMBU.

For the previous reasons, a great part of the analyzed data in the findings comes from text-based primary and secondary sources, and this had to limitations: In the first place, that such sources used their own methodological approaches to generate their findings, which are not

mine, so it was a challenge to account for its full trustworthiness and reliability, especially in the economic data. Two, some of the most valuable sources are not updated to the year 2017, which was the time of my fieldwork, and I am sure this impacted some of the conclusions I made about the programs that deal with agricultural management of Tosepan. These two past issues are acknowledged through the entire research in the size and characteristics of the sample (table 3.), in the references of my findings chapters, as well as in some of the footnotes of the text, where I emphasize this issue.

Concerning the future opportunities for these limitations: More time to perform a wider data collection in the field, together with proper health conditions and security precautions, could bring a bigger sample of data to analyze in order to complement the findings of the research, to confirm the reliability of the statements and conclusions that I made, as well as to possibly discover new social dynamics and/or different environmental outcomes that were not discovered or considered before.

4.4 Ethics

This Master's thesis project followed the ethical guidelines of scientific research from the Norwegian University of Life Sciences regarding the respect of the human dignity and integrity (physical, mental, social, economic), both on informants and/or subjects of study, and on archive or text based data utilized for the case study (NMBU, 2015). The principle of 'do not harm' due to side effects, interpretations, the managing sensitive information, and the publishing of results, was always considered in every step of the research until the final publication of the text

In addition, during the interviews the rules on informed consent were followed by always stating the purpose of the interviews to the interviewees. And also and very important, the ethical value of honesty for the acknowledgement of sources and the principle of no fabrication or falsification and/or distortion of data was followed during this research.

5. Cultural features of the political actors of Tosepan

The political actors of Tosepan are either Nahua or Totonaca from the Northern Mountains of Puebla. The cultural development of both indigenous groups is highly complex, and its comprehension requires a study on its own. Moreover, there are also some external actors and ideas that have influenced the culture of the political actors, and they will also be analyzed. This chapter presents the most relevant cultural features that influence the governance (chapter 6) and the specific programs that deal with the agricultural management of the producers (chapter 7).

5.1 Identity

As I explained in more detail in the background section 2.2, due to the particularities of the Nahua rule over Totonaca communities during pre-colonial times, the two groups kept an 'ethnical border' for many centuries until the end of the colonial period (Masferrer, 2006). The relationship between the two groups started to transform until the national reformation period[33] in the 1860s and onwards, when they became close and cooperative, since both indigenous groups had to readapt to the new oppressive conditions from the new national governments and its economic elites.

It was until the 1970s, when a cohesive regional indigenous movement consolidated in order to face the negative influence of the historical alliance between the agricultural bourgeoisie and the local governments against all indigenous peoples. This movement looked for agrarian claims and social support from the State without any ethnical differentiation.

Since the 1970s the two ethnic groups consolidated a decisive alliance between them, regardless of the diverse ways in which they are organized and distributed. Nowadays the specifics of this cohesion or identification of both indigenous groups under the indigenous movement is very present. In each of the region's 68 municipalities of the Northern Mountains of Puebla it is possible to find majorities either Nahua or Totonaca. But beyond their population's demographic distributions, there are also different types of productive, cultural, religious and activist organizations, with only Nahua or Totonaca membership, but also with members from both ethnicities, such as Tosepan (Masferrer, 2006. Fornies, 2011 and Beaucage and Duran, 2017).

Both Nahuas and Totonacas in such organizations identify with the indigenous movement at the general level[34], although recognizing each other's ethnical and cultural differences. This alliance has helped them to accomplish common goals, such as the defense of their territories, the recreation of their livelihoods, and even in the conservation of their own specific cultures (Beaucage and Duran, 2017 and Fornies, 2011).

[33] A more detailed explanation of this historical period and its consequences at the national and regional level is found in sections 2.1 and 2.2.

[34] Detailed explanation of the indigenous movement at the end of Background chapter section 2.1.

Tosepan is the biggest and most influential indigenous organization of the region in all possible dimensions. From literature review of primary and secondary sources, and my own interviews, Tosepan political actors always claim the predominant indigenous origin or identity of the organization, and always mention 'Nahua and Totonaca' as the ethnical backgrounds, even though Nahua presence is predominant in numbers, since Tosepan is based in Cuetzalan, a municipality with Nahua majority.

Not only the 1,600 political actors are the ones with these ethnicities, from a total of 35,000 people that get services from any of Tosepan cooperatives, around 80% have the previously referred indigenous backgrounds (Albores, 2016).

To conclude this section, it is possible to state that the political actors of Tosepan identified with the visions and goals of the indigenous movement, as I am going to explain in the following sections and in chapter 6. However, this strong sense of indigenous identity has never stopped them from adopting and adapting external ideas and practices. In the next three sections I will also analyze the external influences that have merged throughout the centuries, creating a particular vision and understanding of life in the political actors.

5.2 Cooperation in community based interaction

The deep understanding that cooperation is the key value in social relations in order to reproduce life is especially found in community based interaction at the global level (Vatn, 2015). In Mexico, it is common to find that members of indigenous communities have been taught by their cultures to think and perceive themselves, first as a part of the community, and then as individuals.

At the national level, the most relevant expression of this type of interaction is the communal or shared tenancy of the land between the community members. For the case of the political actors of Tosepan, this type of property is nonexistent due to the historical reasons mentioned in the background section 2.2. However, my research showed a clear predominance of cooperation as the main attitude or behavior between the political actors of Tosepan, as a direct heritage of the cultural systems of both Nahua and Totonaca indigenous groups.

The anthropologist Ignacio Romero Vargas (in Lemus de la Mora, 2007) called a 'collective brain' to the ability of indigenous communities of the region of the Northern Mountains of Puebla, to shift from each individuals personal will into a collective will, during the decision making processes of their communal socio-political structures.

In accordance with the previous observation from Romero Vargas, a foundational political actors from Tosepan declared that the reason behind the organization's ability to accomplish its goals and face different challenges, comes from the exercise of thinking and analyzing together as a group: 'Tosepan Titataniske means to work together, to converse together, and to analyze together' (Luis Marquez in Tosepan, 201, pers. transl.).

In an interview with the current president of the organization, she expressed that Tosepan was born with 'communal goals' from the beginning, as the organization's first experience was to regulate sugar prices 'for the benefit of all the indigenous peoples in the region', being sugar

one of their basic foods. She concluded that the strength generated by the union of the members helped to accomplish their very first task (Paulina Garrido, pers. comm. and pers. transl.[35]).

> *Our experience is that the union makes the strength, and that is why the cooperative movement started and developed here in the region. So, under that logic, we believed it was convenient to consolidate and strengthen those ties within the different programs or cooperatives (Paulina Garrido, pers. comm.)*

In addition to the identification of these particular thinking processes among the political actors, there are also general traditional practices among Nahua and Totonaca communities that show that cooperation is in fact the predominant character in their social relations. For example, 'Faena' and 'mano-vuelta' in Nahua tradition, and 'lamahatlak' in Totonaca, are different variants of voluntary work, either for the benefit of the entire community ('faena'), or between privates for the benefit of persons or families ('mano-vuelta' and 'lamahatlak'). These practices are entirely based on reciprocity, so the beneficiaries will contribute with their own work when is needed.

The Totonaca agronomist Jose Espinoza Perez (2017) mentions the importance of the 'lamahatlak' for Totonaca agriculture. Here, not only does the nuclear family work on their plot during the different tasks of the agricultural cycle. But also distant relatives, neighbours, and friends support each other in a voluntary and reciprocal way through 'lamahatlak'. Espinoza Perez concluded that this voluntary work between privates is fundamental for the reproduction of the Totonaca agricultural system.

One example of this dynamic use inside Tosepan, was the coffee and pepper processing plants construction in the 1980s. Back then, the members bought a shared land of almost 4000 m2 with their own personal contributions, and built the processing plants with the voluntary work or 'faenas' of all the members (Martinez Borrego, 1991 and Perez Fornies, 2011).

During the interview with the president of Tosepan, I made a question about which was the main monetary income of Tosepan from all its productive projects. The interviewee emphasized that the biggest value of the organization was not the monetary income, but the voluntary work and members material donations that kept most of Tosepan projects functioning (Paulina Garrido, pers. comm.). She gave different examples for each cooperative, and sometimes it was difficult to understand the difference between the specific case of Tosepan and everyday life in an indigenous community. A follow up question to her elaborate answer was 'so, would you say that the main wealth of the organization are the contributions from the members?', to what she replied with an example that was actually not from Tosepan:

> *Yes, support from each other. Mano-vuelta, and not so much 'I help you for a value of 100 pesos and you help me for the same value'.*

[35] All my personal communications or interviews were in Spanish language and they were translated to English and transcribed by me.

> *For example, in one community what happened is that the [municipal] authority of the auxiliary board said: 'you know what? The municipality building hasn't being renewed in 100 years, what can we do?' So they agreed to (sic.) and called the community, and asked them what could they bring each? Such as construction materials. Who are the ones working? All of us, who are the ones feeding the workers? All of us, and we all contribute not expecting for anything in return, we all benefit from this, and in some moment the benefit will be more social: peace, improvement of the looks of the town, it's more about keeping traditions and values of the people (Paulina Garrido, pers. comm.).*

In different interviews, a commercial manager from the trade cooperative and one manager from the health cooperative, both mentioned that Tosepan was always working with low incomes to barely cover the operational costs of the programs. Both interviewees perceived that the cooperation between the members was more important than the monetary income in order to fulfill Tosepan goals (Octavio Zamora and Daniela Ruano, pers. comm.).

The strong sense of community and cooperation has developed through centuries before the Spanish colonization. However, it has also been influenced by both the Spanish and Mexican dominations, which caused a deeper need of support among the indigenous peoples, especially due to their economic marginalization, it became fundamental to develop stronger solidarity networks in order to survive.

The collected data from literature review showed two other traditions that are practiced by Nahuas and Totonacas, and that have kept cooperation as the main type of social relation: Compadrazgo [godfatherhood] and cofradías[36]. They are concepts originally created in Europe by the Catholic Church, but merged with the indigenous cultures when the religion was imposed in America. Compadrazgo is the relationship created between the godfather, the child and the child's parents through baptism, or in the case of marriages, the relationship between the godfathers and the couple. Compadrazgo is an even closer relationship within the indigenous community, where people go 'from friend to family' through the celebration of the religious acts (Masferrer, 2006).

On the other hand, the ethnic cofradías are religious associations of indigenous members from the catholic church that organize the believers in their communities. The organization's most relevant job is to grant the annual mayordomía [stewardship] to a family or a person to become in charge of organizing and financing the holy annual celebrations of the particular saint that protects the community or village, according to their creed.

The article "An anthropological perspective of compadrazgo" (Mendoza Ontiveros, 2010) outlines the importance of these two types of social relationships of compadrazgo and cofradías for the social cohesion of indigenous communities:

> *[...] both institutions involve their members in a large group that assists in their economic, social and religious needs; both help each other in disease, visit to bring*

[36] Congregation or brotherhood that some catholic devotees form, with the competent authorization, to exercise in works of charity (Royal Spanish Academy, 2017).

> *food and take care of themselves; both foster morality by recognizing mutual obligations and patterns of action; both facilitate law and order; both give spiritual help, especially in death; and both reinforce social solidarity through prescribed rites on religious occasions and in life-cycle crises (Foster in Mendoza Ontiveros, 2010, n.p.).*

The influence and role of compadrazgo is also a particular finding in Masferrer (2006) work, who studied Totonaca identity in the Northern Mountains of Puebla in each of its municipalities. He concludes that Tosepan has been able to endure, in part, due to these informal (meaning that the practices are outside of Tosepan formal institutions) social relations based on spiritual commitments between the members. However, Michala Bernkopfová (2014) perceives the role of the church and its institutions as integrative forces among the indigenous groups of the region after the colonization process. But nevertheless, considers compadrazgo inside Tosepan as a negative feature that only benefits the political actors of the organization. This issue is further explained in section 6.1 in the political actors' interactions and section 6.2 in economic actors.

Beaucage and Duran[37] (2017) portray a positive perspective regarding the importance of cofradías and the mayordomías in the indigenous groups. In a section titled "The fight and the party: the assemblies", they mean that these religious institutions were one of the main foundations for the later indigenous movement of the region, especially for the defense of their territories. Due to the close social ties and organizational skills that were practiced through the centuries in these associations. They further mention Tosepan as an example of the current importance of these practices among the indigenous communities in the area:

> *In Cuetzalan (Nahua zone), the Tosepan Titataniske first gained strength by expressing the economic needs of the peasants. Since 2012, they organize a party for Saint Isidro, the 'patron saint of the cooperative', this consolidates a collective identity similar to that expressed in community festivals. Each of the six cooperatives of Tosepan acts as a 'mayordomo' and receives the statue of the saint and invites hundreds of members to the party* (Beaucage and Duran et al, 2017, n.p.).

Regardless of the clear and predominant cooperation sense in Tosepan political actors, it is not the only type of relationship that exists. Every collectivity is formed by individuals with different views, and there are disagreements. In the case of Tosepan, there are legit personal and local interests that have confronted the leaders of the organization and its pads of action (Martinez Borrego, 1991). The most relevant ways in which they have dealt with such conflicts is presented in the section 6.1 in the internal interactions of the political actors.

5.3 Indigenous political systems

The political systems of Nahuas and Totonacas is included as a cultural feature because unlike all the other Mexican citizens, indigenous groups managed to keep and follow their traditional notions of power and their political institutions inside their communal social

[37] Leonardo Duran has been a permanent external adviser for Tosepan for many years in charge of organic production and other educational programs.

structures. In this case study I consider their political systems as an element of their culture that characterizes them, and the way in which they relate with each other, but also with nature.

This feature is deeply related to the previous section, and was only revealed during the interview with the president of the organization. That the political process of Tosepan governance resembles the political systems of both indigenous groups, where community members participate in a popular or communal assembly, led by a directive board, to discuss and vote in consensus the course of action of the different issues within the community (Paulina Garrido, pers. comm.).

Here it is important to emphasize that all members of a community, either Nahua or Totonaca, have the right and obligation to join the popular assembly in order to discuss and solve any issue that concerns the community. In Cuetzalan area, for example, the Nahua communal assembly is known as 'nechicol' which means everybody meets (Lemus de la Mora, 2007).

Regarding the directive or leadership positions of the directive boards in such horizontal political systems, the president explained that the traditional way to choose indigenous authorities is by the general consensus of the members in a communal assembly: 'The candidates are proposed by the assembly, never by themselves, and they are chosen based on their leadership profiles' (Paulina Garrido in Mijares, pers. comm.). Meaning with 'leadership profiles' that they must have held previous communal positions and be known among the community for their work:

> *Here as Maseuales [Nahua] we have the topille[38], that is getting to know the communal work of the people, it is a social service, and they gradually pass the tests that they can get some responsibilities for the communal benefit… (Paulina Garrido in Mijares, pers. comm.)*

The president own case is interesting. She is the first woman leader of the organization, and she and her family are known among the communities for being the leaders of different indigenous organizations in the region (Paulina Garrido in Canal Encuentro, 2017).

In order to continue with the analysis of this topic, it is important to mention the historical transformations of the current political systems of the Nahua and Totonaca groups. Before the Spanish colony, indigenous groups in Mexico had more imperialistic and vertical structures. They were able to expand their influence to other territories, and had political actors or leaderships that played the role of both religious and royal authorities, and had their own armies.

The last aztec State named 'Altepetl', exerted its dominion over a territorial area divided into 'calpulli' [communities], which nevertheless, had the 'autonomy to exercise its own government, the use of the land and the ways of working it, as well as the handling of the religious cult' (Florescano, 1999; 172). In addition, the community or calpulli had specific chiefs

[38] *Topille* is a word in Nahua that means cheriff, and it is the lowest position of the indigenous authorities. Topilles are usually very young and unmarried man, and they are a type of policeman that takes care of the public buildings, such as the town church, as well as the public order in the community (Lemus de la Mora, 2007).

chosen by lineage, but still needed the consensus of the communal assembly for decision making, as well as the free service of the authorities as a fundamental aspect for their legitimacy (Diaz in Lemus de la Mora, 2007).

When the Aztec 'Altepetl' was dismantled by Spain, they never recognized the indigenous group's political autonomy, even at the local level. They were instead submitted to the political structures of the colony. In a similar way that nowadays the Mexican State does not recognize indigenous political autonomy. The only political unity that can govern at the local level is the municipality and its authorities, which have to be elected according to the Mexican laws, and that may or may not have indigenous background (CDI, 2017)[39].

In this situation, the current concrete reality of Nahua and Totonacas' political systems is that they are a combination of recognized and unrecognized institutions. The recognized institutions at the lowest level of the municipality hierarchy are the auxiliary boards, which are the micro governments of the 'localities' or communities, where most of the indigenous population is concentrated. These boards are formed by a president, a group of 'regidores' [ministers] of health, education, etc., a judge, a treasurer, and some policemen. However, the positions to the auxiliary boards are granted by the municipal president or mayor, not by the communities themselves, as it is supposed to be according to the tradition. The positions are sometimes taken by indigenous people, but this is not a rule, the decisions totally depends on the mayor that it is elected every three years according to the electoral legislation of Mexico.

Regarding the unrecognized institutions, the consensus in the communal assembly is actually the highest political authority of the Nahua and Totonaca political systems. Ironically, it is not recognized by the Mexican State[40] and is ruled by tradition. In those localities where the auxiliary board members are indigenous, or respecting the traditional communities' political systems, the authorities act as mediators and assistants for decision making process of the communal assemblies: 'The authorities of the board have the backing of the collective determination' (Lemus de la Mora, 2007; 60). There are not official places to perform assemblies, so they are usually held in public places such as schools.

To exemplify an ideal case where both the auxiliary board and the communal assembly are harmonized, one former auxiliary board president in Cuetzalan municipality described his job as: 'The role of 'tequihua' [governor] is to coordinate, not to command […]'. The former president also mentioned that the governor both participates in the assemblies and works for its community as any other member (Nicolas in Lemus de la Mora, 2007; 62).

[39] According to the mexican Commission for the Development of Indigenous Peoples, both Nahua and Totonaca traditional authorities from the Northern Mountains of Puebla are either in charge of the town religious celebrations (cofradías), or they are the directive boards for the management of the land in the ejidos, acknowledging that this type of communal land property is almost nonexistent in the region, an asseveration that does not describe the reality of the indigenous groups.

[40] The federal electoral court resolved in a sentence in 2010 that the communal assembly can elect the members to the auxiliary boards, only if the state allows this customary procedure in its own state electoral laws. That is the only recognition that the communal assembly could have from the Mexican State, but is not the case in Puebla state.

Although a complete analysis of the indigenous political systems in the region is not the main subject of this research, its understanding is fundamental in order to grasp Tosepan governance in the next chapter.

5.4 Vision of nature

After having presented specific cultural features of the political actors that deal with their social dimension, this last section fully operationalize the theory of nature regimes from Arturo Escobar (1999)[41], and aims to show their particular perspective and relationship with nature. This vision of nature is strongly based on the cultural or organic nature regime of the political actors, but has also external influences and connections from the other two regimes of capitalist nature and techno-nature.

Organic nature

During the data collection process I made important findings about the permanence of both Nahua and Totonaca organic visions of nature in the entire region, and as a consequence of that, also in the political actors of Tosepan.

The way the universe is understood is highly complex in all indigenous cultures, each one has its own specific ways of explaining nature and how it relates to the social and the spiritual. For both Nahua and Totonaca, all dimensions are deeply connected in thought and practice. Nature, which includes human beings, exists and reproduces thanks to spiritual divinities that are at the same time associated to the natural elements. It is the responsibility of man to honor and take care of nature and its spirits, in order to maintain the balance between these different dimensions in which the universe is composed.

This strong relationship between the natural and the spiritual is fully expressed in the annual celebrations of the catholic 'holy week', and each community's saint patron or holy guard day. The festivities are a mix of catholic and indigenous notions and rites that play a fundamental role in their lives. They consider that the practice of such celebrations ensures a good agricultural cycle, and the protection of their communities from disgrace or any other negative event related to nature.

The religious festivities take different shapes in every single community of the region, and they are the most important social event (Beaucage and Duran 2017. CDI, 2017 and Masferrer, 2007). As mentioned in section 5.2, the cofradías are the town's religious associations in charge of the rites and festivities, and the mayordomía is the special responsibility granted to a different family or person every year to be in charge of the financing and organization of the communal celebration.

In Totonaca culture:

[41] All of the regimes are defined in the theory section 2.1.

> *The cult to the Sun, the great Totonaca God, is assimilated to Christ and his main celebration that takes place during the [catholic] holy week, which is also associated to the season of the cult to the 'Lord of the Maize, the owner of the flesh', an aspect of the Sun God (Masferrer, 2006;120).*

In the same way, in Nahua tradition, is the sun the main celestial divinity, considered the father who concedes life, also associated with Christ during the religious festivities. The land is considered the mother who is the main source of life. Maize is the most sacred plant that requires care and protection through different and more individual ritual practices, and is metaphorically compared to the man's life (CDI, 2017). In describing the everyday life of Nahua people during the Aztec empire, Patrick Johansson from the Institute of Historical Research at National University of Mexico mentioned:

> *There were rituals with prayers: they sowed words, as well as seeds. Everything was full of spirituality [...] if the indian (sic.) went to the forest for firewood or wood, he asked permission; in an act of respect he only took what he needed for the day. Even though the Macehual [Nahua] food was very varied. They did not accumulate (Johansson, 2013, n.p.).*

In a similar vision to Johansson, the spokesperson of a discourse on behalf of Tosepan during an international reunion with agrarian organizations, she talked about the importance of the Nahua and Totonaca cultures permanence in the region, and pointed out:

> *That is why when we plant and care for our animals, we ask the mother earth and the sun father to provide for us to have good crops. We do not sow with the idea of obtaining economic profits, we sow to reproduce with dignity our life and the life of the others (Albores, 2015; 2. Pers. transl.).*

Regarding this strong spiritual commitment surrounding both cultures, the main task of the humans is to keep the universal balance in the natural and spiritual dimensions. It is remarkable how both ethnicities have taken the divine obligation to protect their territories, which in pre-colonial times was by producing only the necessary in order to live and don't affect nature. But today, this commitment has extended to protect the territory from the introduction of large extractive projects that want to establish in the region[42].

According to Duran and Beaucage (2017), during the struggles for the territory in the 21st century, both Nahua and Totonaca communities have gone through at least 15 conflicts. The indigenous organization of the region have won all battles against private and public partnerships that planned to extract natural resources of the area (mainly water and minerals). A short extract of the epilogue from the chronology outlines how all these environmental conflicts have been experienced from the spiritual perspective of the the indigenous groups:

> *On November 19th, 2016, in response to the call for organization from 'Altepe Tajpianij'[43], a camp was installed on the place where it was planned to build the*

[42] More information in the background 2.2, and the 'external interactions of the political actors' in section 6.1.

[43] In English means Guardians of the Territory, it is a civil association of the region.

substation of the high voltage line that would cross a great part of Cuetzalan municipality. The decision to camp peacefully in the site was taken to protest against the will of the municipal authorities to [illegally] authorize its construction [...].

On December 10th, the International Mother Earth Day, those who camped did the most symbolic action that exists for the Macehual [Nahua] people: they planted maize on the site. A spring seasonal maize called 'tonalmil', or 'maize from the sun'. From now on, in addition to the 'vigilantes' who take turns at the camp place, the guardian spirits of the maize will protect this plantation until its harvest in August, and will also protect the land, consecrated by the sowing ritual. On that occasion it was recalled that more than 200 years ago, the ancestors 'maseualmej' [Nahua] did the same to defend their communal lands that a landowner wanted to take away from them. They planted a large 'milpa' in Xocoyolo community. The struggle was hard on that occasion, as in many others, but in the end the 'maseualmej' kept their territory (Duran and Beaucage, 2017, n.p. Pers. transl.).

In the previously mentioned discourse on behalf of Tosepan during an international reunion with agrarian organizations, the same spokesperson also talked about the defense of the territory in the Northern Mountains of Puebla:

I would like to share with you that in Tosepan we declared 2015 to be the year of the defense of life and territory, because our great home, the Northeastern Sierra [Mountains] of Puebla, is strongly threatened. The federal government has granted concessions to large transnational corporations to exploit the minerals stored in the subsoil and to destroy the rivers with the construction of hydroelectric plants.

[...] we believe that we must take the strength out of our spirit as guardians of the territory that we are. We want to continue living in the land that our ancestors inherited from us, since through our sense of belonging and permanence we take care of our indigenous identity. Thus, we will face these threats, and our guide will be the love and the respect. The great challenge we have as small producers is to defend the peasant economy and our way of relating to the mother earth and the sun father. Our ancestors have told us that we are part of nature, that we arise from it, that while we live our mother earth and father sun, provide the food we need, and that when we die, we will return to nature and become land. Therefore, we cannot harm nature or harm our mother earth, and we cannot allow that other people do it.

[...] THE TERRITORY IS SACRED AND WITH OUR LIVES WE WILL DEFEND IT! (Albores, 2015; 2-3. pers. transl.).

Besides the spiritual components from Nahua and Totonaca cultures in their relationship with nature, their traditional ways to relate with nature at the economic level are indeed a set of subsistence strategies, based on the their agricultural systems, that are meant to accumulate only what is necessary for the food security and other basic needs for families in the community.

However, I will point out that the economic dynamics of the indigenous groups has changed throughout history. Before the colonization period such productive systems were functioning

to the fullest. Even during the last Aztec domination, where different material tributes from the subdue communities contributed to the economic accumulation of the elites of the empire. Especially in Tenochtitlan city, where clothing, daily use objects and some food were distributed among the royalty, the bureaucracy and the military elites. The rest of food contributions were kept by the empire to prevent famine and other emergencies, and to feed both the Aztec (Nahuas) and its subdued populations (Berdan, 1976).

But even with such hierarchical political and economic system of the last pre-colonial Aztec empire, the rest of Nahua and Totonaca inhabitants based their livelihoods on domestic agricultural systems constituted by nuclear families in the following shapes:

- The Totonaca tornamel or 'tacuxtu': The main characteristic is the production in one plot of maize, beans, chilies and other regional vegetables in two agricultural cycles per year, spring and winter. After a couple of cycles, the land stops being used and enters into a resting period to restore its fertility and vegetation. This system is dependent on rain water, as it doesn't have any artificial irrigation strategies (Chenaut, 2010). The vanilla plant is endemic from the Totonacapan region, and it used to be collected in the forests.

- The Nahua 'milpa': Is also a polyculture system with two agricultural cycles, with maize, beans and chilies as the main crops. The naturally grown grasses, some fruits, seeds from endemic trees, and even the maize fungus named 'huitlacoche' are all edible products, and have a controlled production today (CONABIO, 2017).

In both systems, the process of literally burning down the whole area 'roza, tumba y quema' is still very common in order to prepare the land and use the remaining ashes as fertilizer. Other common practices are the use of simple tools where the work force comes from both the nuclear family, and the previously described voluntary work practices of 'mano-vuelta' and 'lamahtlak' from friends, and neighbours, where labor is offered between individuals out of reciprocity without intermediation of money (section 5.2). Finally, the picking different fruits and medicinal herbs, fishing, hunting, and recently small animal production are complementary food security strategies practiced in both traditional agricultural systems.

Capitalist nature

Nowadays, most of the official ethnographic literature mentions that cultivation of coffee, pepper, sugar and vanilla are a part of the agricultural systems of the Totonaca and Nahua (Chenaut, 2010 and CDI, 2017). However, it is important to remember that these crops were introduced, if not imposed, during the reformation period in the late 1800's by the agricultural bourgeoisie with the support from the national and regional governments to boost the late development of capitalism in Mexico.

Together with the commercial crops introduction, also came the privatization of communal lands with different strategies, such as the use of the national laws of the reformation period to claim lands that were 'unproductive', unlimited conversion of forests into agricultural lands, and the hiring of indigenous farmers as the workers of the agricultural bourgeoisie. Those

radical shifts contributed to the change in the landscapes, and affected the perspectives and uses of nature of the indigenous populations in the region.

An example of this change in perspective and uses of nature brought by the capitalist nature regime was the vanilla plant. It was discovered and picked by Totonaca people, and was considered as a sacred plant and the symbol of the Totonaca identity (Menchaca Garcia, 2009). When it became a commercial and highly valuable product during the 1800s, the Totonacas adopted the artificial breeding techniques to produce the plant and started selling it to the European and rich Mexicans in the cities in order to support their livelihoods (Chenaut, 2010).

That is how Nahuas and Totonacas started producing coffee, sugar, and other fruits to support their incomes, and commercial production became the 'new traditional' agriculture of most indigenous families since the 1800s and onward.

Regardless of all these radical changes, the indigenous farmers managed to continue with their own food production, either in their own lands if they managed to conserve it in small private property, by renting land to cultivate inside private plantations, or by having the permission of their boss landowner to use small portions to cultivate for auto consumption. That is how most of the indigenous peoples kept producing food according to their original agricultural systems, and this allowed them to conserve to some degree their traditional ways to relate with nature. However, the practice of such traditional systems transformed into a much smaller part of their total economic activities since then.

Pierre Beaucage (2012) mentions that although the indigenous identity remained strongly influenced by their cosmovision of nature and the order of the universe, they had to readapt to the 'different ecological contexts', that never again allowed them to maintain a functional balance for the reproduction of their previous subsistence strategies. Meaning that they had no choice but to integrate to the capitalist economic dynamic of the region.

Thus, the previously described dynamics brought by the penetration of capitalism had consequences on the way nature is perceived and used by Nahuas and Totonacas, in spite of their strong organic vision and understanding of nature.

Nowadays the capitalist economic and nature regime has the most dominant influence in the specific way nature or natural resources are used. Today the land is divided into small private property, and the main economic activity of the region is the commercial agriculture of diverse products such as maize, coffee, pepper and diverse fruits that move from the local to the international markets. Production of Coffee in the region, the most remarkable crop, makes the whole state of Puebla the fourth producer at the national level out of 11 coffee productive states in the country (FIRA, 2016).

Techno- nature

As mentioned in the background section 4.1 when I talk about Mexico's agricultural policy, during the post-revolutionary decades of the 20th century (1927-1977), before the overall liberalization of the Mexican economy, the governments supported the national agricultural

production as the economic foundation for a new industrialization. And it was in this historical context that the first technological transfer came to the region of the Northern Mountains of Puebla with the implementation of the Zacapoaxtla plan[44] (1974-77). As long as the farmers produced commercially, the plan provided subsidies, new inputs, the required technical assistance, and programs so producers could organize into cooperatives. Regardless of the wider economic goals, for the first time in Mexican history a plan was aimed at small scale farmers.

Nevertheless, the techno vision of nature entered into the region connected to the capitalist vision, with the goal to increase and accelerate production, and this also influenced some of the perspectives and uses of nature among all the indigenous farmers.

According to a report from Bert Kreitlow (Romero Aldemaro, et. al., 2005), the 'green revolution' came to the region through the Zacapoaxtla plan. But he concluded that its effects were partial, since the small scale farmers ended up not implementing the use of the hybrid seeds of coffee and maize brought by the plan, since they were not suitable for the altitude of the areas, and the farmers had better adapted varieties themselves. However, many of the farmers adopted the application of synthetic fertilizer for maize production since then, and the practice remained very rooted at the time of his study.

In similar observations, Aguilar (in Gonzalez Rodriguez, 2014) concludes that the impact of the 'green revolution' of the 1970s in the region was a 'collateral' experience, since its influence was not as big as the one in the north of the country, where more agro-chemicals (such as insecticides and herbicides), big irrigation systems, and heavy machinery were introduced and adopted for maize production.

In the end, this three year plan did not have a follow up strategy with all the farmers in the region, and left a poor understanding of the negative environmental effects that the application of inorganic fertilizers have on the soil when applied incorrectly. i.e over application, when the soil does not require it, without considering soil humidity, without knowing the physical properties of the soil, etc. (Cueto Wong, 2012). In all of those previous cases, fertilizer can actually pollute the soils, the water springs, the atmosphere, and can cause severe animal and human poisoning, especially in children (Cueto Wong, 2012).

Furthermore, when public subsidies were actually reduced during the liberalization of the Mexican economy in the 1980's, there was not any type of technological transfer made by public agencies since then. Nowadays the application of conventional fertilizers in the area depends on each year's governmental decision to grant some subsidies to small scale farmers, but there is no technical support included (Perez Fornies, 2011).

Although the technical balance of the Zacapoaxtla plan is rather negative due to the introduction of conventional fertilizers to boost production, which nowadays are highly questionable for the health of the environment. Parallel to this, the agronomists hired to execute the plan also introduced or encouraged new processes of social organization that

[44] Introductory information about the Zacapoaxtla plan is found in the background section 2.2.

provided the political actors of Tosepan, and many other organizations that later on developed, with new tools for a more autonomous development.

The establishment of a trustworthy working relationship between the indigenous farmers and the agronomists from the plan was difficult, and took three years. According to one former agronomist from the plan (Aguilar Ayon in Reseñas ICSyH, 2016), first, they tried to organize all small scale farmers into cooperatives so they could apply for agricultural subsidies to increase their commercial production with the newly introduced inputs. However, the farmers kept denying such invitations, and after three years they finally explained the agronomists that rising coffee and pepper production meant more offer in the regional market, and hence, lower prices for them. To what the agronomists asked: 'So then, for what do you want us to organize you?' The farmers shared their view about the monopoly on the food supply, and their need to solve it. This is how agronomists and indigenous farmers began to work in the first Tosepan project of consumer cooperatives for food supply in 1977 (Aguilar Ayon in Reseñas ICSyH, 2016).

In a similar narration regarding the beginning of Tosepan from Bartra (2004), he points out:

> *There were talks with the agronomist about the improvement of harvest with fertilizers and hybrid seeds, but in these reunions the small farmers pointed out that these strategies were useless if the 'caciques' [agrarian bourgeoisie] continued to buy coffee at such low prices. There were meetings with the engineers to get rid of the abusive middlemen (Bartra et al, 2004; 21. Pers. transl.).*

When the Zacapoaxtla plan was officially over, the agronomists accompanied Tosepan development as external advisers during its first 5 years by a governmental agreement (Martinez Borrego, 1991). After this experience, one adviser stayed with a permanent position, but the organization kept looking for external advising and training from different agricultural organizations, even at the international level (Fornies, 2011 and Bernkopfová , 2014).

In the specific case of the political actors of Tosepan, they used their techno-nature perspective in order to support its goals, and started a more conscious and integrated agricultural management among its producers since the 1990s. But this could only happen thanks to the continuous technical support from external advisers.

Since then, the adoption of different external technologies towards a more sustainable development has been a part of Tosepan administrations and the rest of the political actors. However, most of the regional producers of coffee and pepper whom sell their production to Tosepan, kept practicing the conventional application of fertilizers to their commercial crops due to different economic reasons that will be mentioned in the next chapter. Tosepan has been working since 2001 towards changing the preference of the producers to practice conventional agriculture into certified organic, but that is one of the biggest challenges of the organization, as I am going to explain in the next chapter.

6. Tosepan governance: The actors and their institutions

Through the past two chapters I have been identifying Tosepan political actors as a group of Nahuas and Totonacas from the region of the North-eastern Mountains of Puebla. I also explained that their specific ethical backgrounds, together with some adopted external influences, shapes a set of cultural features that influence the way they are organized into Tosepan.

In the following two sections of this chapter I will identify, characterize and analyze in detail the governance of Tosepan: the actors, their goals, actions, internal and external interactions, as well as the institutions that not only legitimize such actors, but also provides them with the specific political and economic rules to interact at the social and environmental levels. In addition to that, I will point out the specific ways in which the cultural features of the political actors influence such governance.

6.1 Political actors and their institutions

There are two kinds of membership to the organization: One corresponds to the active partners, which grants them the right to have a vote in the political process, to be a member of any of the cooperatives, and to be eligible to take any position within the organization. The other one is the indirect or associate membership, which only gives them the right to be a member of any of the cooperatives to get the services, with few exceptions. Between active and associate, the organization currently has around 35,000 members from 29 municipalities, and 430 communities within the entire region of the Northern Mountains of Puebla (Albores, 2016).

From now on, when I refer to 'members' I mean both active partners and associate members without any distinction. All members have to follow the internal regulations of Tosepan to be enrolled as such, but in order to get the active partnership it is necessary to attend regularly to the local assemblies of Tosepan for a period of one year.

Thus, the political actors who can steer Tosepan governance are the active partners, and currently they are 1, 600 indigenous small scale farmers[45] that are concentrated in 80 communities and 9 municipalities surrounding Cuetzalan municipality, which is Tosepan physical center of operations (Mora Aguilera, 2012 and Bernkopfová, 2014). The 9 municipalities apart from Cuetzalan are Jonotla, Zoquiapan, Tuzamapan de Galeana, Tlatlauquitepec, Huehuetla, Ixtepec, Zapotitlan de Mendez and Caxhuacan. I will call this concentration Cuetzalan area from now on.

Goals of the political actors

In regards to the goals of the political actors of the organization, they remain harmonized with the general goals of Tosepan: To improve the quality of life of the members, and to develop the region into a 'Yeknmelis' or good life vision (Tosepan, 2017). The 'Yeknemilis' vision is an integration of ideas from the two indigenous groups, in which a good life or happiness is

[45] The active partnership is given to the producer and his/her entire nuclear family.

accomplished by keeping a continuous balance between the human productive activities, nature, the socio- political activities, and the recreation of culture (Tosepan, 2017 and Albores in Rocha Caballero et. al., 2014).

Here I locate the first influence from identity developed in section 5.1, which explain the reason behind the shaping of these two goals that aim at reaching a specific type of development based on the cultural visions of the political actors. The identification of the political actors with these goals is also what have kept the cohesive and sustained work towards its accomplishment.

Regarding the strategic goals of the organization, those are officially declared by the administrative council of the organization every 8 years. All the active partners have to discuss them through their local assemblies, and its final definition takes place in Tosepan general assembly. From 2004 to 2012, for example, the defined strategic goals were: To increment in 500% the productivity of coffee in each of the plots, to 'improve the living conditions of the members' by supplying food, housing, basic-need products and services. As well as to make Tosepan the main supplier of such products in the region (Tosepan in Vinculando, 2004).

For the period 2012-2020, those strategic goals amplified, and to the food supply was added 'based on a nutritious alimentation', and the following new goals were also added: To improve the income of the members with diversified productive strategies and training, to conserve and revalue the knowledge and principles of the Nahua and Totonaca cultures, to create a gender equality environment, 'to use in a rational way the natural resources of the region, to inherit them in better conditions to the sons and grandsons' (Tosepan in SICETNO- UNAM, 2012), and finally, in 2015 the defense of the territory from the public and private threats of mining was also declared (Aguilar Ayon in Reseñas ICSyH, 2016).

The institutions of the political actors

Before I continue with the institutions, it is important to mention that although the political actors have in theory the same power in decision making, which is their voice and vote, there are different roles at different levels, and all of them influence Tosepan governance in different ways. After this note, I will begin with the division of responsibilities among the political actors to present their institutions.

First, all active partners have the right and obligation to assist to their local assembly to be informed, to discuss and try to find common positions regarding the local and general issues of the organization. As well as to choose their own local representatives and be able to be chose as a representative. They also have priority access to any subsidy or economical support that Tosepan can get. Currently, there are 80 local assemblies in the previously mentioned 9 municipalities where the active partners live (Mora Aguilera, 2012). But in these local assemblies there are also associate members that get access to information and services from Tosepan cooperatives. All local assemblies are open to whomever wishes to join (Paulina Garrido, pers. comm.).

The number of local assemblies increases to a total of 430, where 350 are made out of associate members that are enrolled to get the services of one or two Tosepan cooperatives.

All local assemblies have to meet at least once a month, but they can meet as much as they wish or need to work.

The structure and dynamics of the local assemblies are the ones that resemble the most the indigenous political systems mentioned in section 5.3. But this type of political system is established at all levels of Tosepan governance structure. Which means that there are local assemblies in the different communities where the members live, a general assembly of the entire Union of Cooperatives in the municipality of Cuetzalan, and each of the cooperatives have its own internal assemblies too. According to the president, the focus is supposedly at local level, where the main aim of the local assemblies is so the members can work for the accomplishment of their particular goals and needs parallel to Tosepan scope of action (Paulina Garrido, pers. comm.).

The leadership positions are considered to be in the administrative structure of the organization. But nevertheless, they play a fundamental role in the decision making processes. At the level of the local assemblies these positions are called directive boards, and its representatives are a president, a secretary and a treasurer. They are in charge of being the managers of the local assemblies, the mediators of discussions, the carriers of all the issues, doubts and common positions into the general assembly (Paulina Garrido, pers. comm.). All directive boards have their own vigilance councils formed by three members, who are in charge of controlling and examining the directive boards' performance (Paulina Garrido, pers. comm.)

The general assembly is the highest political authority in Tosepan governance, and hence, in policy making. It is made out of the representatives of each of the 80 local directive boards and its vigilance councils. They are the only ones allowed to vote during the political process of Tosepan. However, the general assembly is also a public event, and all members are allowed to give their opinions during the discussions (Martinez Borrego, 1991 and Paulina Garrido, pers. comm.).

The general assembly sessions are on a monthly basis, among the discussion topics are: The use of economic surplus from any of the programs, revisions of finances, the authorization of policy or new programs proposed by any of the directive boards, the administrative council and/or the permanent external advisers. The general assembly also propose and elect the members to the administrative council of the organization every 5 years. Finally, the representatives or directive boards' responsibilities in the general assembly also makes them the official informants of all the agreements made into their local assemblies (Paulina Garrido, pers. comm).

At the general level of the organization, the main executive department is the administrative council, which is also formed by a president, a secretary and a treasurer. Their main task is to make sure that the general and strategic goals of the Union are being fulfilled (Tosepan Titatansike, 2004). The council is entitled by the internal regulations to be the highest representative organ of Tosepan, it is the directive board of the general assembly and also supervises the local assemblies. The administrative council is entitled to define and sign contracts as a corporation, hires new personnel, organize the documentation to apply for public subsidies, watches over the correct use of economic resources, coordinates the entire

union personnel, the performance of the cooperatives, keeps the records and documentation of the general assembly and all the members (Tosepan, 2004).

At this general level there is also a vigilance council formed by 3 members, and just as in the local level, they are in charge of following up the work of the administrative council on the daily basis; verifying the agreements made, signed contracts, financial states, and that the general regulations are being fulfilled (Paulina Garrido, pers. comm.).

According to my observations, there are different weekly meetings of the administrative council and its vigilance council with the permanent external advisers. In addition, other separate meetings with all the previous actors and the 'promotores', who are also an informative link between the local assemblies and the administrative council (Paulina Garrido, pers. comm. and Tosepan in Vinculando, 2004). Although the local directive boards do not participate in any of these meetings, they get notifications of all the relevant actions during the general assembly (Paulina Garrido, pers. comm).

For now I have not mentioned the permanent external advisers and the 'promotores', since I concluded that they are economic actors that provide services to the organization, and hence, they will be described and analyzed as such. Nevertheless, even though they do not have the right to vote during the political process in the general assembly, they have the right to give their opinions and the reports of their work, and that makes them have an informal political influence. Especially in the case of the permanent external advisers, who are the ones that usually propose new policy and strategies for the cooperatives (Bernkopfová, 2014)[46]. Furthermore, I also noticed that the permanent external advisers are the public representatives of the organization in 90% of the discourses, video archived interviews, and conferences that I found during the data collection process.

These are the 8 cooperatives, which are also called 'programs' or 'working programs' by the members of the organization: 1. Maseual Xicaualis (trade), 2. Tosepan Kali (ecotourism), 3. Ojtasentekitinij (bamboo processing), 4. Tosepan Pajti (health services and pharmacy), 5. Tosepan Tichanchiuaj (sustainable housing), 6. Tosepantomin (bank), 7. Tosepan Siuamaej (productive projects for women) and 8. Tosepan Titataniske (organic production). Besides, there are also 3 civil associations: 1. Yeknemelis (Technical assistance), 2. Limakxtum (communications) and 3. Tosepan Foundation (education).

All of the previous economic institutions have their own administrative and vigilance councils, and they also gather with the promotores, and their own employees in internal assemblies according to their own needs, especially to plan work schedules on a weekly basis (Paulina Garrido and honey factory worker, pers. comm.). All relevant work of the cooperatives and associations must be communicated to the general assembly and the administrative council. Besides, they all prepare annual reports for a special informative session of the general assembly that is open to all members of the organization (Paulina Garrido, pers. comm.).

All leadership or administrative positions are proposed and granted by the local and general assemblies. Just as it is made in the traditional indigenous way mentioned in section 5.3.

[46] One year observations from the author.

However, the specifics in Tosepan is that only the local representatives of the general assembly can propose and vote the positions to the administrative and its vigilance council, as well as the directive boards of the cooperatives.

A fundamental fact about the elections at the general level is that once the candidates are proposed by the general assembly, they have to present a work program for the following five years, and it is based on each of the candidate's proposals that the representatives vote for the most convincing one (Paulina Garrido, pers. comm.). Just as Martinez Borrego states regarding this topic, in Tosepan case 'the leadership is legitimized by the capacity of the candidates to be social managers' (Martinez Borrego, 1991; 198. pers. transl.).

The actors and its political institutions are officially defined in the constitution or the *General Regulations of Tosepan Titataniske*, which was created in 1985 due to the need to avoid conflicts among the members (Martinez Borrego, 1991), but had its more recent update in 2006, right before the organization changed its name from the Regional Agricultural Cooperatives Tosepan Titataniske, to the Union of Cooperatives Tosepan Titataniske in 2008 (Octavio Zamora, pers. comm. and Bernkopfová, 2014).

Although, the governance system of Tosepan is mainly based on the socio political structures of the Nahua and Totonaca groups, different external advisers of the organization, who will be described in the next section 6.2, have also contributed to the development and adaptation of both the political and economic institutions, so the organization can accomplish its goals. The president recognized the influence of the external advisers on the current governance structure of Tosepan, and appreciated that regardless of its contributions, they have always respected the traditional social structures of the members of the organization:

> *We have had the accompany and support from external people that have the education, some of them with agronomic background but with some Master's or specialization in local development, so I think that has helped a lot because the people with this specialization is focused in the way Maseual [indigenous] people it's originally organized, our main background, the way we organize ourselves from our communities.*

Characterization and analysis of the internal interactions

From the analysis of the total sample of collected data, my conclusion is that the internal interactions between political actors are highly cooperative regarding the cohesive work towards fulfilling the general and strategic goals of the organization. From the beginning of the organization in 1977 until nowadays, I did not find any conflict that could have damaged or shifted the internal interactions of the political actors in a negative way. Although they have faced external and internal challenges as an organization, they have found more constructive solutions to deal with them, and the programs to fulfill their goals have always expanded.

My interpretation of the reasons behind these social dynamics where cohesion and cooperation prevails inside the organization, are due to the previously developed cultural features of the political actors in section 5.1 and 5.2. These features define the internal interactions within the actors in at least two ways: First, their identity or identification with the

indigenous movement above their own specific ethnicities, in this case pulls them together, because outside of indigenous organization, there is no other type of support to their specific needs of development, and if there is, most of the indigenous individuals, especially if they come from localities far away from the municipalities, they are not able to get the access to governmental programs for themselves, due to extreme personal limitations[47] that come from their historical marginalization based on their ethnicity. In the second place, the active partners come from cultures where cooperation in community based interaction is fundamental to protect their livelihoods, so they express this value in many of their daily social interactions inside the organization.

Nevertheless, different conflicts or rather disagreements have been a part of the internal dynamics, and even in those, they have managed to overcome them with a strong sense of cooperation and consensus[48] instead of conflicting or splitting. For example, in the most fundamental issue for this research: The preference of around 60% of the active partners and the permanent external advisers to convert the entire production of the organization into certified organic and diversify the commercial crops more (Santiago Romero, 2016 Octavio Zamora pers. comm.). Against 40% of the partners that remains for the conventional or uncertified production of few crops such as coffee and pepper. That in addition to them, the associate members who are producers also practice conventional or uncertified agriculture, and although they do not have a vote in the political process as I mentioned before, their preference to remain conventional, mostly due to legit economic reasons[49], has a big influence in the decisions of the political actors.

To this fundamental issue I will recall that one of the main historical achievements of Tosepan in the 1980s was to be able to compete with the commercial monopolies of the regional agrarian bourgeoisie, by providing the access to a stable market channel with better prices to all small scale farmers of the region. Later on in the 1990s, the international prices in the coffee market drop due to the failure of the WTO to regulate the prices, that, in addition to a frozen season that ruined half of the crops in the region, lead the general assembly to declare their diversification strategy during the 1990s, and to finally declare the organic program in 2001 as the main strategy to both fight the 'persistent' crisis on the coffee prices and to take care of the regional environment (Tosepan in Perez Fornies, 2011).

My interview with one of the managers from the trade cooperative Maseual gives an example of the active partners' perspective who are in favor of organic production. He expressed that conventional and un-diversified producers were, in a short time, not going to continue producing for many environmental and economic reasons, and he pointed out: 'We have told them in the assemblies: either you turn into organic or you stop being a producer for us.

[47] The language barrier and poor alphabetization in this case are only two example of their historical marginalization, at least 17% of the indigenous population of the region does not speak Spanish and 30% of the total have no basic education (Baez, 2004). Which keeps them from not being able to write and read any text.

[48] I explain this behavior in the cultural features of the actors in section .3 when I talk about the dynamics of the popular assemblies in the communities.

[49] I address the economic reasons behind this preference in section 6.2 under the subtitle 'Preferences of the economic actors: the producers'.

Because in real life, there is no option' (Octavio Zamora, pers. comm.). To what I asked if his declaration was going to become a rule of the organization any time soon, so he proceeded:

> *Well, it is going to happen, it is going to happen in practice. We predict this. We are encouraging the producer; the conventional ones turning into organic. Because with the coffee crisis, so cheap, and with only one crop, they are not going to make it. But this is being informed, and also, we are making a national analysis on how things are. So people is being informed. So each can take their best decision, but at least information is there.*

Right after his answer I also asked him if the conventional producers had access to technical assistance[50], just as the organic producers, to what he replied: 'Yes. Because the assemblies are shared to everybody. And we also share the market. And a lot of people has joined observing the practice' (Octavio Zamora, pers. comm.).

Thus, the mediation of this issue within Tosepan political actors consisted in launching the organic program in 2001 as an strategy that have remained as a voluntary program, and kept Maseual cooperative as the organization in charge of maintaining the access to markets and better prices for all producers in the region, regardless of their type of agricultural production.

The current state of this issue is especially relevant for the results of this research, because even with this deep fundamental productive disagreement, all the active partners kept working together to accomplish both the general and strategic goals of Tosepan. With the definition in 2012 of food security and sustainable development, these are slowly moving the organization towards making more remarkable and concrete rules and actions to fulfill them. I will explain more in depth the rules and actions taken to fulfill Tosepan general and strategic goals in the next section about the economic aspect of the governance of Tosepan.

Besides the previous productive issue, the communications and efficiency in the provision of services from the central administration and the 8 cooperatives, to the increasing number of local assemblies of associate members, has been identified as problem inside the organization. In the observations made by Estela Martinez Borrego in 1991 and Bernkopfová in 2014, they found that the more remote the local assemblies are from Cuetzalan center, the more likely to observe members that are not well informed, and sometimes even misunderstand Tosepan operations and decisions.

This problem has been persistent, and Tosepan have tried to implement some strategies to establish better communication with the associate members of remote communities outside of Cuetzalan headquarters. For example, with the implementation in 1993 of the promotores to support the agricultural management of the producers, but that later on gained more responsibilities to fully support the communication and services of some of the cooperatives to the local assemblies outside of Cuetzalan area.

[50] The agricultural management of the organic and conventional producers of Tosepan is covered in the next chapter 7.

In addition to that, each of the 8 cooperatives and 3 civil associations have their own strategies to maintain proper communications with the members, I will analyze them and its outcomes in the next section 6.2.

External interactions

In regards to the external interactions of the actors, I conclude that they are harmonized with the Tosepan goal of being actively involved in the regional development with the Yeknemilis vision of a good life. In this regard, they not only work with their different cooperatives that are open to whomever wishes to join as an associate member. But also, they have engaged in different contextual experiences that have made Tosepan become into an influential civil actor in the region. For example, through the years they have taken the responsibility of being the official receptor of public subsidies in order to support employment, infrastructure and food supply to the benefit of all the population in the region (Bernkopfová, 2014, Borrego, 1991 and Fornies, 2011)[51].

One of the main reasons why Tosepan has been actively supporting the regional development has to do with the influence of the cultural features of the political actors. First, their belonging or identification to an indigenous movement that has specific ideas and goals beyond an specific ethnicity (section 5.1), and then, in the perception that through cooperation as the main attitude in their social interactions is how they will accomplish their goals, which are usually common or communitarian (section 5.2).

Furthermore, in 2010 Tosepan became a part of the committee of the *Ecological Management Program of Cuetzalan* (COEC), which is a government approved environmental overview and a policy guide that expresses the collective wish of Cuetzalan citizens to maintain a local economy of small scale farming, 'micro-industry', and the development of ecotourism in the economic order, among other topics regarding the sustainable use and protection of the natural resources of the municipality (COEC, 2010).

Since 2012, COEC became the main legal tool for the defense of the territory from different private mining projects supported by the federal government, which came to Cuetzalan municipality and many others that are nearby, to try to operate these projects. The committee, which is in charge of organizing informative assemblies for the population and it is the official interlocutor with the regional and federal governments, have managed to cancel at least 4 different projects that violated the *Ecological Management Program of Cuetzalan* (COEC, 2017). The most recent conflict was in 2016, with the plans of the state power company to build a power plant installation to eventually provide electric power to the aspiring mining companies. But this installation has also been paused by the legal work coordinated by the committee.

[51]For example: In the 1980s the federal government agreed a partnership with Tosepan to manage food stores, this project lasted for 5 years. In the 1990s Tosepan signed a contract with the federal government to build different roads in the region and hire the local small farmers who were struggling economically with the loss of their harvests due to a frost season. In addition, they implemented a political strategy in the 1990s to ask the majors of Cuetzalan area municipalities to act for the social development of indigenous peoples.

As part of the committee of COEC, Tosepan is in charge of organizing assemblies every two months, which are open to all Cuetzalan citizens to discuss the state of the power plant installation and the legal status of the appeal that the Committee applied in a state court since 2016. One of the permanent external advisers claims that they have reached the attendance of 6000 to 8000 people in the assemblies (Aguilar Ayon in Reseñas ICSyH, 2016).

At the early beginning of my interaction based data collection, all interviewees mentioned Tosepan participation in the defense of the territory through COEC as a topic that came out without even asking or referring to it. I first came across the importance of this issue during the interview with one former external adviser in Mexico City, when I asked him about Tosepan experience in the environmental governance field, and he told me that the main current risk for this organization and the entire indigenous population of the region was actually to be able conserve their territories in the first place, so they could keep managing them according to their own cultural visions and goals.

Then, he mentioned the role of indigenous organization into COEC for the defense of their territory, and he graded this as strong, since the communal assemblies have always been an ancient tradition in the region to solve communal problems. But he pointed out that in his view, this was not enough to face the newest threats that were escalating with extra judicial procedures from the government[52], which was introducing criminal groups in the area to frighten the population (Nestor Chavez, pers. comm.):

> *If there is a rupture in the social network promoted by this criminal groups, well it is more easy for private companies to get in in the area and that are not necessarily going to promote an integrated management of natural resources […] Because you can obtain from your research that the cooperative is working properly and it elevates the conservation levels and environmental dynamics, and that their governance can […] renew this type of economic dynamics such as cooperatives, but I think external pressure could break all of those efforts because […] well it is not enough, the existence of some communities integrated to this cooperative, they need that all the region can be united to face external pressures.*

In other two interviews with one of the managers from the trade cooperative and one active partner, they talked about the threats to the territory from the federal government and the mining companies, even when the topics of discussion were agricultural management and environmental protection programs of Tosepan. Both interviewees were well aware of the conflict, its possible consequences, and the connection that Tosepan has with COEC (Active partner, Octavio Zamora and Paulina Garrido pers. comm.).

The president's perspective about Tosepan role inside COEC was that at least until now they had succeed, and she was sure that not only Tosepan role but the different civil organizations involved in COEC were strengthening the defense of the territory:

[52] They believe it is the regional and even federal government since it is a well-recognized practice to break social organization and resistance, see background section 2.1 and 2.2.

I think our experience up until now has been positive. We have this as a tool, as a legal instrument that is useful, and we give it a lot of importance, even inside of the organization, it is another tool to state: we have a commitment, we are in this territory, so we assume it, and we defend what it is ours.

We have done communal assemblies in the municipal auxiliary boards, and since we became aware of the threats to the region about extractivism of natural gas, building of hydroelectric power, open air mining, and currently, with the issue of the electric power plant and high tension lines, this has take us to be more organized, the communal assemblies started with 100, 300 peoples, and currently we have reached 5000, 6000 peoples getting closer, informing themselves, this has been a huge strength that has helped us.

Now, for example: the construction work of the power station is stopped since the 19th of November; in a general assembly in Cuetzalan with the Maseual [indigenous] people, we proceeded with the closing of the construction work. We took over the space. Maseual people is guardian. The guardians so the construction work is not done, and I think we have had influence. That's something good, also in collaboration with other organizations. And I think that is the biggest thought: this job made as originary [indigenous] people, using our autonomy of indigenous peoples (Paulina Garrido, pers. comm.).

The previous declaration of the president, together with diverse declarations of many indigenous inhabitants of the region that I found and analyzed in the vision of nature of the political actors in section 5.4, supports the idea that the political actors and indigenous people in the region assume themselves as spiritual guardians of the territory, and that this have had a great influence in the attitude and collective mindset of all indigenous of the region to accomplish their goal to protect their territories from these projects, which are paused by them, at least until now.

6.2 Economic actors and their institutions

The producers

According to Arild Vatn (2015), a governance actor can have more than two roles, and that is the case of Tosepan political actors. They are also productive actors because they cultivate commercial crops to sell them to the trade cooperative Maseual Xicaualis. In addition, if they work for any of the cooperatives as employed staff or for the general administration, then they also provide services to the organization, which makes them producers.

Associate members that sell to Maseual Xicaualis are also producers, and they get the same price and 'alcance' [profit] for their harvests as the active partners who are producers. In 2017 there were 5,800 agricultural producers in total (Miranda Alonso, 2017).

The *General regulations of Tosepan* (2006) state that any person can join the organization in any of its previously described types of memberships, but if an agricultural producer joins, then his or her lands cannot have more than 10 hectares. Meaning that they have to be small scale

producers working for the subsistence of their families (Tosepan in Bernkopfová, 2014). In this economic rule it is possible to identify that the vision of nature of the political actors (section 5.4) influence the fact that even though Tosepan is also an agricultural business, its aim is to produce in order to generate subsistence income for the producer members.

According to Perez Fornies (2011) and Gomez Gonzalez (2004), around 80% of the producers own from 1 to 4 hectares in a private property regime. It is actually very rare to find producers that own 10 hectares of land inside the organization. In addition, Perez Fornies (2011) found some cases, which are very common among indigenous farmers in Mexico, where the producer do not hold the land rights. In those cases they either lease the land, have a spoken agreement to restore or improve the plot at the end of the loan, or they provide a share of the income of the harvest to the owner.

I mentioned in section 6.1 that the main area where the political actors of Tosepan live is concentrated in 9 municipalities surrounding Cuetzalan, I called this concentration 'Cuetzalan zone'. Moreover, this is also applicable for the productive actors, they are also concentrated in the same area[53]. I will explain that the rest of the 19 municipalities where Tosepan operates are mainly of members from Tosepan Tomin cooperative, the financial services.

Preferences of the producers

Before I continue with the characterization of the rest of the economic actors and their institutions. I will address the issue of the preference of 85% of the producers[54] to practice conventional agriculture over certified organic. Which I already analyzed its political implications in the past section 6.1, but here I will try to explain[55] the economic reasons behind this preference of most of the producers.

The research of Bernkopfová (2014) deals briefly with the reason why not all of coffee producers of the region have enrolled to the organic program of Tosepan? The general answer to 50 interviews to members of the organization was due to economic reasons. In the first place, there is a group of farmers that could not afford to reduce their incomes for three years during the conversion arrangements[56] until his/her income stabilizes again once they become certified. On the other hand, there is another group of farmers, usually the ones holding slightly bigger extensions of lands, that actually managed to improve their incomes by being conventional producers for Tosepan, and that at this point they feel that there is no need for the conversion.

[53] With few exceptions. Some producers live in the nearest municipalities surrounding Cuetzalan area.

[54] There are 1,600 active partners who are producers and 4,200 associate members who are producers, 5,800 producers in total.

[55] I did not collected interaction based data about this topic during my fieldwork. Thus, I decided to use secondary sources for the analysis. See section 4.4 about the limitations and the implications in the results of this research.

[56] They need to buy few materials and one specific machine to produce organic, separate the crops where they have used conventional fertilizers or pesticides, and for close to 3 years they cannot sell their production as organic to the cooperative, but they have to follow the cooperative's regulations and increment their labor exponentially.

Even though the production of organic coffee pays on average 30% more than the conventional (Santiago Romero, 2016), this does not seem to be enough for the farmers to make the shift and complete the transition period. Another relevant fact that supports the hypothesis of the lack of economic resources behind the preference to stay as conventional, is that 20% of the producers who started the transition to become certified organic never finished it Santiago Romero (2016).

Issues with income are fundamental for Tosepan producers because it seems as though their incomes are carefully distributed to cover only the basic needs of them and their families, without almost no possibility to save money or agricultural excedents to use them when they need to, and this includes their possibility to afford their transition to being a certified organic producer for Tosepan.

Perez Fornies (2011) sample of 26 interviews to Tosepan producers, which 19 of them were enrolled to the organic program and 7 were conventional, shows that both subsistence and commercial agriculture are complementary economic strategies for all the producers of this sample. The percentage of income obtained from their total agricultural production goes from only 20% up to 60% of the total family income. In only one case the producer could fully support himself out of agriculture, but this is because he works in 22 hectares, which are owned by his brothers who let him cultivate their lands for free.

Following Perez Fornies (2011), all of the producers from this sample get their family income from a combination of the following economic strategies: 1. Commercial and subsistence agriculture in their own plot 2. Work of the family members outside of their plot (agricultural and non-agricultural) 3. Pensions, 4. Remittances from abroad and 5.Public subsidies (agricultural and non-agricultural[57]).

These economic conditions of some of the producers from the previous studies are also supported by the federal government (CONAPO, 2010), which states that the region of the North-eastern Mountains of Puebla has one of the 'highest poverty' rates[58] in the whole Puebla state. The 9 municipalities of Cuetzalan area in which Tosepan producers live are rated between 1. Very high poverty (1 municipality), 2. High poverty (7 municipalities) and 3. Medium poverty (1 municipality).

During the interviews with the president of Tosepan and the manager from the trade cooperative, both mentioned that the main incomes from Tosepan producers and their families come from commercial and subsistence agriculture. But that they were sure that their incomes from agriculture were not the only ones. Neither of them knew exactly in which percentage agricultural activities covered Tosepan producers' total income (Paulina Garrido and Octavio Zamora, pers. comm.).

[57] Specific social subsidies for low-income families.

[58] Poverty rates are 1. Very high, 2.High, 3. Medium, 4. Low and 5. Very low. They are based on the percentage of the population in the municipality that has basic education, access to basic housing services such as water, sanitation, electricity, concrete floor, and earns more than two minimum wages, which in 2010 was 6 USD per day (CONAPO, 2010).

Finally, the manager of the health cooperative Tosepan patji commented that membership to all of the cooperatives, and not only the organic, is hindered because most of the people in the region needs to fulfill many fundamental economic aspects of them and their families' livelihoods, so they experienced a hard time joining all of the activities of every single cooperative of Tosepan (Daniela Ruano, pers. comm).

Thus, commercial and subsistence agriculture is fundamental in all producers, but is not enough to support their livelihoods, they are engaged in other economic activities. Moreover, the available data also points out that the majority of the alternative incomes from the producers cannot provide them with the economic possibility to engage in the conversion to certified organic producers.

The rest of the economic actors: Consumers and other types of producers

Before I continue with the rest of the economic actors and its institutions. It is important to mention the permanent external advisers as the productive actors that offer professional services to the organization, and that throughout the analysis of my sample, I conclude that they are the reference point[59] when it comes to the development of the rules for the economic processes and the organization's economic strategies, which not only include the programs that deal with agricultural management, but also all kinds of strategies such as technological innovation and marketing of Tosepan products, for example.

The permanent external advisers also supervise all Tosepan cooperatives on a daily basis. The staff consists of 5 advisers: 4 agronomists that came from the previously mentioned Postgraduate Agricultural College[60], and 1 Nahua from the region, who is specialized in working with the cultural development of Nahuas and Totonacas of the region, especially in the topic of 'biocultural knowledge', together with Victor Manuel Toledo, one of the reference authors that is mentioned in the theory section 3.1 of this research.

I recognize this staff as permanent external advisers because Tosepan has worked with other external advisers through the years, and they have stayed for shorter periods of time to accomplish different contextual tasks. As opposed to the permanent external advisers who are permanently hired by the organization; one of them has been working since the Zacapoaxtla plan (1974) and the legal establishment of the organization in 1980. The other four started to work for the organization since the establishment of the organic program in 2001 and onwards.

In addition to the permanent external advisers, there is also an important staff that provides services to Tosepan, they are called promotores. I have briefly mentioned them in the previous section of the political actors and its institutions. These positions were actually developed due to the lack of funds of Tosepan to pay full salaries to permanent external advisers. In 1993 they started as volunteer members that were trained by Tosepan to take the

[59] They are allowed to propose strategies and programs during the general assembly, as I mentioned in the previous section.

[60] See section 2.2 and 5.4 when I talk about the agronomists from the Zacapoaxtla plan who came from this academic institution.

knowledge on agricultural management and spread it among the rest of the members through the different local assemblies. When this program gave positive results by facilitating and enhancing the spreading of the knowledge among the producer members, this positions became a full time work, and began to be paid with the Tosepan own funds and some public subsidies since 1997 (Bernkopfová, 2014).

More recently, the promotores shifted their previous responsibility and began to work with the local assemblies in provision of different services within the newest Tosepan cooperatives: technical support in organic production, information and financial procedures, and diverse information on health topics. Regarding the dynamics of the promotores in each of the communities, the president described:

> *In a local assembly it can be up to three different promotores, plus the [directive] board, plus all the members working on the information and decision making. [...] we look for the comprehensive training and education from the promotores, so that they can also accompany the communitarian life that we look for; autonomy as originary [indigenous] peoples (Garrido in Mijares, 2017).*

Currently, there are 60 promotores in total: 8 for the organic program, 8 for the health program, and the remaining 44 for financial services (Aguilar Ayon in Reseñas ICSyH, 2016). Moreover, they are also the connection between the administrative council and the 430 local assemblies as I mentioned before. They are in charge of following up that the strategic goals of the organization are being fulfilled by informing and supporting the members at the local level and bringing back the progress and reports of the communities to the administrative council and the general assembly (Paulina Garrido, pers. comm. and Tosepan Titataniske, 2004).

Finally, Tosepan cooperatives and 3 civil associations provides different services, which also makes all members consumers. Membership to any of the cooperatives is separate and voluntary, each member can decide which cooperative or cooperatives he/she wants to enroll.

Economic institutions

The next 8 economic institutions are identified by the organization as 'the programs', but they are legally registered as cooperatives with their own name. In addition to the cooperatives, there are also three civil associations, which are considered to be the ones that provide technical support, training and education to the entire Union of Cooperatives.

Maseual Xicaualis, the trade cooperative.

Since 1997 it is in charge of gathering, processing and trading Tosepan agricultural production. Its main goal is to give value to the products of the farmers by stabilizing the prices in the region and looking for the adequate markets (Tosepan, 2006).

This cooperative is also in charge of making individual annual agreements with all the producers, so they deliver in time expected quantities of their harvests. These contracts are not only important to ensure that both parts will meet their obligations, but they are also the main requirement so the producer can apply for public subsidies for commercial production (if that year the government grants them). However, this cooperative does not offer any service

to get those individual financial supports, the producer has to apply personally (Octavio Zamora, pers. comm.).

Maseual cooperative, as all of the other cooperatives, has paid workers, which are usually the active partners or any of the member of their nuclear family. The staff is either in charge of the gathering and processing tasks of the raw materials, or the administrative and accountings positions in charge of the trade. In addition to the workers, the directive board and the vigilance council of the cooperative are also considered as part of the workers, but they have the leading positions.

Maseual has 8 gathering spots in the region for both conventional and organic agricultural production of coffee, pepper and bamboo. Those places where there is no gathering spot, the organization hires transportation to get the harvests from the producers. With the exception of honey, which all of its producers have to bring it to Maseual installations in Cuetzalan municipality in a suitable packaging (Honey factory worker, pers. comm).

The processing of all raw materials takes place in Cuetzalan municipality, where there are two coffee and pepper processing plants, a big storage, and one small factory where the honey is processed into cosmetics, nutritious supplements and industrial wax (Octavio Zamora and Honey factory worker pers. comms.). The equipment for coffee and pepper is energy and water efficient, they have managed to get machines that use biodiesel made out of coffee byproducts, and that save up to 90% of water compared to conventional coffee processing machines (Octavio Zamora pers. comm and Perez Fornies, 2011). Currently, they are planning to install solar panels for some of the activities of the cooperative (Octavio Zamora, pers. comm.).

The infrastructure and equipment of the processing plants are the product of a combination of public subsidies and individual monetary and labor contributions from the members (Bernkopfová, 2014 and Perez Fornies, 2011 and Paulina Garrido, pers. comm.). This good level of technological development is also influenced by the specific knowledge from the external advisers who suggest the innovations (techno-nature section 5.4), together with the cooperation of the members to contribute with their own income when it is needed (cooperation in section 5.2).

Once the processing of the raw materials into the final goods is done, these are the following market strategies or channels to sell the products (Octavio Zamora pers. comm., 2017 and Maseual Xicaualis, 2017):

- Regional and national distribution of finished products to small business and individual consumers of: Both conventional and organic roast coffee beans per bag, organic unroasted coffee beans per kilo, conventional and organic pepper seeds per kilo, honey in jars or per liter, wax per kilo, as well as few wood from bamboo.

- To the international market of medium and small companies from U.S, Germany and Japan: Organic unroasted coffee beans and conventional pepper seeds. All sell by large quantities of 69 kilos per bag.

Regarding these strategies, it is important to mention that it has been a real challenge for Tosepan and this cooperative to get an equitable access to the markets. In the international trade niche, for example, at the beginning it provided them with the ability to stabilize the coffee and pepper prices in the entire region, which faced successfully the middleman influence during the 1980 and 1990s. However, nowadays they have not being able to find an international buyer for their finished or packed products, so by only selling the raw materials they have no chance to add more value, and covering the exportation costs and the organic certifications since 2001 in the case of the coffee is becoming increasingly more expensive for both the producers and the organization (Octavio Zamora pers. comm.).

On the other hand, the situation of the distribution at the national level of both conventional and organic roasted coffee beans has even more limited space in the market. Currently, there are three companies: Nestle, Amsa and California coffee that virtually monopolize 90% the entire coffee market in Mexico (Octavio Zamora, pers. comm.). The prices that these companies would pay for coffee, through their regional intermediaries, would be the lowest Tosepan producers could get. The analysis of the trade cooperative, according to one of its managers, is that these companies monopolize the market with the power of their millionaire marketing campaigns and middleman, and that is the biggest limitation or weakness of Tosepan coffee brand, even though their coffee has higher quality standards than the previously mentioned companies (Octavio Zamora, pers. comm.).

The previous issue is the reason why the tendency of Maseual of trading conventional coffee has decreased a lot in the past decade. The national and international reality shows a sustained crisis in coffee prices, being the conventional type the one with the lowest prices. Nowadays most of the conventional producers have turned into pepper production, benefited from Maseual ability to export their pepper, especially to the United States and Japan.

Finally, for the case of the honey, the marketing strategies of the cooperative are still weak, since currently they are producing more honey that the one they can sell. For now, they are selling some honey and wax for art craft uses at the regional level, and processing the rest into cosmetics and as vitamin supplements, and currently trying to find regional markets for the processed products (Honey factory worker, pers. comm).

The concrete approximate balance of the total sales of Maseual cooperative for the period (2012 -2017) is the following one*:

- Conventional pepper is the most sold product of the organization with around 900 tons a year (of which 800 tons are exported). It represent 50% of the total sales of the cooperative.
- Then organic raw and roast coffee beans are in second place with approx. 700 tons (which approx. 600 are exported), and 20% of the sales.
- Conventional raw and roast coffee in third place with only 80 tons and 16% of the sales.
- Organic pepper with 27 tons. Honey, its wax, and wood from bamboo with very variable quantities, all accounting for 14% of the sales.

*Sources: Maseual coop. worker pers. comm.,Tosepan in Bernkopfová, 2014 and Mora Aguilera, 2012.

As to the business plans for the next years, one of the managers from Maseual cooperative mentioned that international trade helped them to accomplish one of their first challenges as a producers cooperative, but that currently it was becoming increasingly expensive this type of trade. Moreover, since the national market was monopolized, they were looking for different strategies for the marketing of their products. He mentioned a business plan for 2018 to open a cafeteria in Cuetzalan municipality, which it is a touristic place where the coffee will be sell by cup, as well as other types of drinks and products from the organization, providing the maximum income to Tosepan producers and their families (Octavio Zamora, pers. comm).

Another marketing strategy for the distribution of conventional coffee at the regional level, which was being implemented during the time of my fieldwork, was the elaboration of small 50g packs to sell it in the local stores to compete with the Nestle product that has the same characteristics, and it is highly purchased by the indigenous farmers because is very cheap and they use it actually as a food to get energy to work in their plots all day (Maseual coop. worker, pers. comm.).

Tosepan Titataniske, the organic production cooperative.

This program was established in 2001 and is currently working only with 847 organic producers of coffee, pepper and honey (Miranda Alonso, 2017). The goal of this cooperative is to achieve the agricultural sustainability in order to improve the quality of life of the members in the economic, environmental and health aspects (Tosepan, 2006).

Consistently, the tasks of the program are: to offer specific technical support for this type[61] of production through the organic promotores, the local assemblies, and specifics workshops offered to the producers. Tosepan Titataniske is in charge of the annual organic and fair trade certifications processes, the marketing of the products together with Maseual cooperative, and also in charge of the management of a garden nursery in the community of Xilochicho in Cuetzalan.

Regarding their productive procedures, the cooperative has its own internal regulation for the producer members, but this rules are based on their certification companies: The Mexican Certification of Products and Ecological Processes (CERTIMEX), which is affiliated to Organics International (IFOAM), and enables Tosepan to export organic certified products to North America, Germany and Japan (CERTIMEX, 2017). The cooperative is also certified and implements the guidelines of Fairtrade Labelling Organizations (FLO) (Octavio Zamora, pers comm).

In addition to the previously mentioned guidelines or regulations to produce and sell organic products, this cooperative has its own internal inspection committee, formed by members chosen in the local assemblies, that are trained to perform examinations on the producers plots, so when the audits from CERTIMEX and FLO happen, the entire cooperative can get positive results from these certification companies. Those members that do not pass the

[61] See annex II for a short description of organic agriculture.

internal inspection are temporary expelled from the cooperative until they can prove that they can get back on track with the organic agricultural procedures (Bernkopfová, 2014).

The cost for the initial certification process, as well as the periodical revisions of these companies to each of the producers, are paid by all the members of the cooperative as a group. They usually use some of the extra income of the total sales to cover it (Jaime Santiago, 2016 and Bernkopfová, 2014).

Only in this specific trade is that the producers have an insurance for 'price volatility' purchased from the New York stocks exchange, which covers any price instability because it ensures a minimum price for the production (Lopez, 2015).

> *With hedging, it now estimates the crop size and locks down a favorable price to sell at a later date on New York's ICE Futures exchange, protecting themselves from a price slump. When the harvest is over, if the group still has inventories or picked more than expected, the farmers can buy options to sell at a higher price if the market is rising (Rosenberg and Segura, 2011)*[62]*.*

In addition to this steady basic price, this cooperative adds two annual prizes to the producers; the 'social prize', which are the extra profits where all the producers decide how to use for a communal benefit, and the 'environmental prize', that is paid individually to every producer (Bernkopfová, 2014).

In order to become an organic producer for this cooperative, it is necessary to enroll as a member and start getting the proper technical assistance from one of the organic promotores. At the beginning the producers need to attend to informative meetings at least 3 times a month (Bernkopfová, 2014), as well as to participate in mandatory workshops of diverse topics regarding organic production.

The initial investment is in a de-pulp machine that removes the pulp from the coffee cherry so it can be washed and dried into a grain, as well as other investments in diverse arrangements; such as the separation of crops if the plot has the risk to be contaminated, among others. The initial cost is around 8000 pesos or 400 USD, an amount of money that is rare that the producer's family has in savings (Leonardo Duran in Bernkopfová, 2014).

An important economic issue for the new producers is the period known as the transition: Three years where the farmer cannot sell its production as organic and the yields are temporarily lower since the conventional fertilizer is withdrawn (Jaime Santiago, 2016). During this time, the producer receives more technical assistance and continuous inspections until they get the final certification (Bernkopfová, 2014).

[62] On an interview for the previous article, one of the permanent external advisers talked about the one year process to train Maseual staff on how to use the stocks exchange system and he mentioned: 'We would ask to them, 'what do you understand about the market in New York?' and they would associate it with the market where they go to buy and sell their goods. It was unthinkable that you could negotiate a price for something without having the physical product. They thought there were containers of coffee piled up in New York.' (Duran in Rosenberg and Segura, 2011).

I will describe and analyze in detail the agricultural management of this cooperative in the next chapter.

Tosepan Tomin, the bank-cooperative.

This cooperative was created in 1998. Its goals are: To give the opportunity to its members to access credit[63] and give value to their money (Tosepan, 2006). Tosepan Tomin is ruled by its own internal procedures and regulations, but also operates under the national law to protect *Savings and popular credit* (2001).

From the beginning and to date, Tosepan Tomin has had as main source of funding the savings of its partners. It started with a capital of 636, 000 Mexican pesos or 34,000 USD; in 2010 reached 90 million Mexican pesos or 4, 8 million USD; and nowadays it has a capital of 290 million or 15.5 million USD. More than 90% of this capital is currently granted in credits (Aguilar Ayon in Reseñas ICSyH, 2016).

In 2016 there were 33, 500 client-members and 9 thousand 'young clients' from the under 18 program. Here, 73% of the clients are indigenous, Nahuas or Totonacas (Aguilar Ayon in Reseñas ICSyH, 2016). This is where most of the members of Tosepan are enrolled; they are combination of the active partners and their families, and diverse associate members from the entire region of the North-eastern Mountains of Puebla.

Tosepan Tomin offers the following saving services:

- Children's or under 18 savings account, retirement program, commitments and holidays[64], investments, and regular savings account.

As well as five types of credits for:

- Agricultural production, housing, for women[65], commercial or to start a business, and for emergencies. The credits are granted using the methodology of the 'solidarity groups', which are groups of five to seven members that are granted with a credit, where the whole group establishes a credit committee that serves as a moral endorsement for each of the client-members so they can pay the credit on time.

Finally, Tosepan Tomin also provides life insurance services and remittance payments from the U.S (Tosepan, 2017).

The types of credit that are most requested are the housing credit and the agricultural production one, which is not only limited to the organic producers, it can be for any type of

[63] As stated in the background, the middleman of the region was also the only one who granted credits to the farmers at the highest interests rates, taking advantage that the conventional banks won't lend them money.

[64] For the cases when they are in charge of the religious festivities of their communities that year.

[65] The interest rate is lower compared to any bank of the state (Bernkopfová, 2014).

agricultural production, even for producers who do not sell to Maseual trade cooperative (Bernkopfová, 2014).

As I mentioned before, the largest part of the capital for the credits comes from the savings, but currently it also comes from the interests rates of the previously granted credits, as well as the annual 'social contributions' of the members, that are around 300 pesos or 16 USD (Iturbide in Bernkopfová, 2014). Recently, as the cooperative has increased its capital with the increasing number of client- members, it has economic excedents, which are used to give them to the active partners who are clients, and to finance Tosepan programs (Bernkopfová, 2014).

Tosepan tomin has five branch offices and nine service centers, which are located in strategic communities of the region. However, this cooperative also provides more personalized attention to each of its members through a group of 44 promotores who: Train the solidarity groups, promote financial services, recover the credits, and brings paperwork to the clients if they live far away in a community without any representative office (Tosepan, 2017). Here it is where the local assemblies of associate members expand to a total of 430 in 28 municipalities of the region with the promotores and the client-members of Tosepan tomin.

Tosepan Tichanchiuaj or the sustainable housing cooperative.

The main goals of this cooperative established in 2006 are to facilitate to its members an adequate housing on a reasonable price, and at the same time, that they can adopt different ecological techniques that allow them to live in a sustainable and autonomous way (Tosepan 2017).

This program works closely with the bank Tosepan Tomin, because it is the institution that partially finances each client-member with its previously mentioned housing credit. Once the client-member is also accepted into this program, the rest of the cost of the house is covered with public subsidies, and a small part of around 10%, with the client's own savings[66] (Aguilar Ayon in Reseñas ICSyH, 2016).

Tosepantomin has registered that the 'housing credit' is the most required of all of its credits. But it is important to mention that every year there is a limited number of families that can have access to this specific program, due to a lack of public subsidies that are not enough in comparison to the number of applicants to the program (Aguilar Ayon in Reseñas ICSyH, 2016). The priority is always given to the active members' application.

The program is aimed at either building an entire house, or only performing renewal or improvements. Moreover, it is called 'sustainable housing program' because it is proposed that the construction or renewal of a house should be done with:

[66] The savings can be from the family's own construction materials.

> *Durable materials, preferably from the region (stone, adobe or clay, bamboo, wood, etc.), as well as with the implementation of adequate use of rainwater and solar energy, recycling of waste and food production (Tosepan, 2017, n.p.).*

However, in the end the preference of the type of construction materials are up to the family that is granted with the credit/subsidy. This cooperative has two architects and 5 professional construction workers who supervised all the housing projects (Bernkopfová, 2014). However, after the house is built, there is no follow up to the previously mentioned ecological techniques that are supposed to be implemented.

A relevant feature from this program is the advice given to the client-members to build their houses with the support of the voluntary work of 'mano-vuelta'[67] from their close family, neighbors and friends, so they do not have to use a big part of the economic resources in salaries for the workforce (Aguilar Ayon in Gutiérrez, 2017, n.p.).

Finally, from 2006 to 2017, this program granted support to 17,000 families of the region, which made them win in December of 2017 the 'European prize of microfinance', granted by the Ministry of Foreign Affairs of Luxembourg. According to the permanent external adviser who received the 100,000 USD prize, with this money they will 'evaluate the social impact of the program and train young people so they can learn how to manage and install solar panels in the houses of the region' (Aguilar Ayon in Gutierrez, 2017, n.p.).

Tosepan Kali, the eco-touristic cooperative.

In 2001 the general assembly decided to develop touristic services in order to provide a complementary income to the youngest active partners.

The construction of the first installations was made in 2004 with Tosepan own resources and subsidies from the National Commission for the Development of Indigenous Peoples (CDI). According to one of the managers of this cooperative, the firsts guests of the hotel were the active partners or as he said, the 'grand parents', who came from outside Cuetzalan area for the general assembly or for training, and that were discriminated in the rest of the hotels of the municipality (Antonio, pers. comm.).

Nowadays this cooperative has only 28 partners that work autonomously to run the hotel installations. They manage all the finances to cover the operations of the hotel and their own personal incomes. Nevertheless, they are legally a part of the Union of Cooperatives Tosepan, and they have to present annual reports, and support Tosepan activities[68] (Antonio, pers. comm.).

The hotel has 9 cabins in the forest areas with a capacity of 27 lodgings, and one 15-room building in Cuetzalan center. All of the installations were built with materials from the region

[67] A practice of voluntary and reciprocal labor between privates, it is explained in section 5.2.

[68] For example, the eco-touristic installations are used to accommodate active members when they come to Cuetzalan for training, to assist to the general assemblies, or to accommodate any visiting guest of the Union.

such as stone and bamboo, and use some ecological techniques to keep the installations functioning properly, such as rainwater harvesting and sewage cleaning.

During my interview with one of the managers, he mentioned that they have plans to take the guests from the hotel to the plots of the producers so they can see how coffee, pepper and honey are produced, but this is not a concrete action plan yet (Antonio, pers. comm.).

Tosepan Siuamej, productive projects for women.

This cooperative started as a special commission of artisan women members in 1985, who were looking for better prices and conditions for their products. During its first years they slowly gathered up to 500 women members from diverse communities (Bernkopfová, 2014). Nowadays this is the only program that has decreased in numbers, only 230 women are enrolled. This is in part because in the 1990's half of the members split and created its own independent group outside of Tosepan (Bernkopfová, 2014).

This cooperative, just as Tosepan Kali, is autonomously operated by its members. It is usually made up by the wives of the productive members, which means that they do not hold the land rights of the lands, and therefore, they do not have a personal or individual income if it wasn't for this cooperative.

The activities of the cooperative are divided into working groups that vary from artisan work, to the processing and sells of some local raw materials into cosmetics and food. Other groups manage some retail stores of different manufactured goods in Cuetzalan area.

Tosepan Pajti, the health cooperative.

It was established in 2009 with the aim of creating a health model suitable for the indigenous communities of the region (Tosepan, 2017). Tosepan Pajti focus its efforts in disease prevention. Thus, its main actions are related to the strengthening of the health of its members. Furthermore, in 2012 Tosepan strategic goal of food security based on a nutritious diet also became one of the central strategies of Tosepan Patji in order to support health prevention.

In this program there are 461 families enrolled with 3 to 5 members each, 48% of these families are active partners and the other half are only associate members to the program (Daniela Ruano, pers. comm.). This means that there are around 1,900 individuals continuously getting services from this cooperative. The area of influence of this cooperative it is limited to the 9 municipalities of Cuetzalan area that I mentioned before.

Anybody can join the cooperative with a small annual fee per family. This cooperative does not work under any subsidy, it is completely operated by the economic contributions of its members, from the annual fees that are around 400 pesos or 20 USD, payments of medical consultations, dentistry services, the sold products from the pharmacy, and some available lab tests for prevention of different chronic disease (Daniela Ruano, pers. comm.). All of the previous services are considerably lower than any private health service of the region.

Regarding Tosepan Patji pharmacy, the cooperative buys the medicines directly to the distributors and sells them with the following prices: Patent with 40% discount and generic

with 50% discount. Nonmembers can also get access to cheaper medicines, they get a discount of 20% in patent and 30% generic, the same applies with the lab tests and the consultations, and nonmembers can access those services at higher costs than the members (Daniela Ruano, pers. comm.).

One of the most important services of this cooperative is the fact that the doctors and the health promotoras visit the members in their communities on a regular basis. In these visits, either domiciliary or during the local assemblies, they give all kinds of information related to health, consultations, they take some medicines from the pharmacy to sell them in the communities, and also take some samples from the members to perform basic lab tests (Daniela Ruano, pers. comm.). The visits of doctors and health promotores are done because most of the members cannot afford to pay the transportation to come to Cuetzalan where the cooperative is permanently established.

Besides the domiciliary visits and the local assemblies, there are also 6 small clinics strategically located in the communities where most of the members are concentrated. These clinics work with the minimum material to provide medical consultations and there is only one permanent doctor, one dentist, and various temporary interns or medical practicants who visit the clinics one or two days a week (Bernkopfová, 2014).

In regards to the promotoras, they are 8 women[69] that are in charge of the rest of the activities that are not medical consultations; such as diverse preventive talks and the promotion of a nutritious diet based on locally produced foods. In addition to them, there are 461 'healthcare guardians', who are the mothers of the family-members, that are trained to collaborate with the tasks of the cooperative, such as nutrition, food production, prevention, etc. (Daniela Ruano, pers. comm. 2017 and Tosepan, 2017).

As I mentioned before, this cooperative is in charge of taking actions in order to fulfill Tosepan strategic goal of nutritious food security for the members (2012), and although the process to develop concrete actions was slow, there is a specific action plan that is slowly starting to give some results, as I am going to explain in the next chapter about the programs that deal with agricultural management.

*Bamboo program***.**

The main goal is the gathering, transformation and commercialization of the wood from bamboo (Tosepan, 2017).

Although there are some bamboo producers, they are the less, because this activity is only complementary to the rest of the agricultural production of the producer. Although they do sell it to Maseual when it is required, this rarely happens. For now, most of the bamboo has been used for Tosepan infrastructure: the general assembly installation, the training center, the hotel and its cabins, the school, and some of the houses built from the sustainable housing

[69] According to one of the managers from this cooperative, the health promotoras are always women because it is easier for the members to trust the advice, informative talks and workshops of women, as sometimes it involves more private or intimate health topics (Daniela Ruano, pers. comm.).

program (pers. obs.), which it would be the ideal market for this products, but there is no demand yet.

The bamboo program is a cooperative according to Tosepan organization chart in their official website (Tosepan, 2017). But is actually not, I describe bamboo production not as a separate program, but into the organic program (7.1) and the agricultural management of the conventional producers (7.4) in the next chapter.

The 3 civil associations.

These are institutions that provide different technical and educative services to the entire Union of Cooperatives;

a) *Yeknemilis A.C***.** This civil association was established in 2002 as the organization for the group of permanent external advisors and the promotores who had been providing technical assistance and training to all Tosepan programs from before (Tosepan, 2017).

   The technical assistance is provided by the permanent and non-permanent external advisers to all Tosepan cooperatives, and to the promotores, who are trained so that they in turn can offer services to Tosepan members. However, the installations of this civil association are actually available to active and associate members whenever they have the logistical possibilities to train them directly in this place.

   The main physical space for Yeknemilis is the biggest building of the Union, the facilities of the Kaltaixpetaniloyan, known as the heart of the Union of Cooperatives or the training center (Tosepan, 2017).

   It is especially in the goal and the actions of this association that it is possible to recognize how the techno vision of nature of the political actors of Tosepan, which is explained in section 5.4, have influenced the fact that they consider innovation and technologies and technical support as central aspects of their governance, not only in the environmental and productive dimensions, but also in the social dimension too.

   The president of the organization referred to this association as the ‘heart of the union that gives blood to the cooperatives’ (Paulina Garrido, pers. comm).

   The only indigenous permanent external adviser of the organization mentioned that the training center was very important ‘so that the cooperative does not get old and can last for 100 years’, and they can keep training the new generations and their leaders (Aldegundo Gonzalez in La Jornada del Campo, 2007; n.p.).

   Nowadays the more important topics for the training of the cooperatives, promotores, and occasionally Tosepan members are: organic agriculture, microfinances, communitarian health and women's development. However,

there is a wide diversity of topics addressed, and many different external advisers have come to work on environmental education, nutrition, business skills and alphabetization (Paulina Garrido, pers. comm. and Bernkopfová, 2014).

Sometimes the installations of the training center host open events related to the promotion of Nahua and Totonaca cultures (Paulina Garrido, pers. comm.).

b) *Tosepan Limakxtum, the communications cooperative*: Tosepan started in 2014 to operate a bilingual radio as a separate company where it broadcasts topics and news mostly about the organization and the region (Mexico Pymes, 2017). This radio started and currently works in accordance with the newest strategic goal of 2012 to strengthen the cultural identity of Nahuas and Totonacas in the region.

c) *Tosepan Foundation, elementary and middle school*

The school project of elementary (2006) and middle education (2009) is meant to be the keystone for the preparation of the future cooperative members of Tosepan (Aguilar Ayon in Reseñas ICSyH, 2016). The goals of the school are centered in the promotion of indigenous values, especially reciprocal help in the community and environmental awareness (Tosepan, 2017).

Although nowadays there are enough public schools in the region that can offer basic education to the indigenous children in the area, the active partners of Tosepan realized that there was still a persistent discrimination in schools, because they were not allowed to speak their own language or wear their customary clothes. Those reasons lead to the development of the school project in 2006, which was financed by the extra revenues of Tosepan tomin cooperative (Aguilar Ayon in Reseñas ICSyH, 2016).

The school offers elementary and middle education to around 50 to 80 students, depending on the academic year. However, since my first visit in 2008, the directives of the school mentioned that there is more demand of new students than they can offer, and that they do give priority to the children of the active partners (pers. obs.).

There are 2 teachers and 5 teacher assistants as the only workers of the school (Bernkopfová, 2014). The monetary cost to enroll as a student is extremely low, around 20 Mexican pesos or 1.5 USD per year. But the parents of the children most help in the school in the cleaning, supporting all the students by teaching them a practical ability, and by providing food for all the kids. They take turns to accomplish these tasks (Bernkopfová, 2014). The parents also need to attend monthly meetings to introduce healthy habits in the kids and discuss other topics related to their education. Beyond the analysis of the whole educative system, I will explain the concrete parts of this

project that contribute to the agricultural management of Tosepan in the next chapter.

7. Programs that deal with agricultural management

> *We, as a cooperative, we are proposing a way of life: first that the producers can produce all the food that they consume, to look for sustainability so they don't depend from the outside. That the producer can produce his food, and whatever is left he can sell, if he sell its coffee and pepper, well, in that way he can complement his income. But if the people don't produce what they eat, they will depend from the outside, and this is starting [...] (Octavio Zamora, pers. comm).*

The next chapter presents the characterization and analysis of the programs that deal with agricultural management: the organic program of Tosepan Titataniske, the nutrition strategy from Tosepan Patji, and a short mention to the rest of the programs that deal with the matter in less degree.

In addition, in section 7.4 I also analyze the agricultural management of the conventional producers of Tosepan. Here I acknowledge that they do not have an official program, but nevertheless, they implement specific practices that came from a previous historical stage of Tosepan where technical support for agricultural management was offered to all of its producers through the first promotores of the organization. I will analyze this issue in depth, as it is highly relevant for the next chapter and the conclusions of this research.

7.1 The organic program of Tosepan Titataniske

This program was named Tosepan Titataniske[70] in 2001 by the general assembly because it was considered that the first producers' cooperative of the union was transforming into organic production. Its main goal, as I mentioned in the last chapter, is to accomplish agricultural sustainability in order to improve the quality of life of the members in the economic, environmental and health dimensions (Tosepan, 2006).

Currently, this cooperative has 847 producer members who come from 50 communities from 10 different municipalities of the North-eastern side of the Mountains of Puebla (Miranda Alonso, 2017).

In order to accomplish its goal of agricultural sustainability, the strategy of the program is that every producer, together with his/her family, manages a *Kuojtakiloya* or a 'coffee garden'. Which is a diversified organic[71] plantation that has from 1 to 4 commercial crops, and the rest of the crops, trees and naturally growing plants can be used for auto consumption as food,

[70] Although not all members are enrolled to this program, and it can be confused with the entire organization's name *Union of Cooperatives Tosepan Titataniske*, this is how this specific cooperative is named. It is also conceived by the organization as the first cooperative, probably because it employs the central idea of a 'Yeknemilis' or a good life in all of its strategies.

[71] Organic production is described in Annex II.

medicines, construction material, for ritual /spiritual uses, and to generate different environmental services to promote the health of the agro-ecosystem.

The idea of the Kuojtakiloya was developed by the external advisers together with the active partners of Tosepan. It has an hybrid influence[72] from the indigenous agricultural systems that are based on polycultures with the use of endemic plants trees and grasses, and, the original technique of coffee cultivation that uses the shade[73] of introduced and/or native trees to protect the humidity of the soil and the coffee plants. Many of the same elements of the original technique of coffee cultivation are also used in the organic method, with the exception of the application of any inorganic substance to the soil and plants.

In only one hectare, which is the average extension of the producers' plot, in these coffee gardens it is possible to find up to 120 species of plants with the different uses mentioned above (Albores, 2016 and Gomez Gonzalez, 2004). According to the external advisers, the coffee gardens of the organic producers of Tosepan are possibly the most diversified coffee plantations in the entire country (Albores, 2016 and Gomez Gonzalez, 2004).

In regards to the main commercial crops, all the current varieties of coffee that are used among the producers come from the Coffea arabica species: *Bourbón, Criollo, Garnica, Caturra* and *Costa Rica*. Regarding the pepper, they use one variety called *Pimienta gorda* or *dioica* pepper, this tree is actually endemic of the region. I will talk about the specificities of the honey towards the end of this section.

This agricultural system is aimed at the continuous production and harvest: From august to November pepper is produced, coffee from November until April, and from April to June it is possible to harvest honey. In addition, in mid-November producers can harvest different types of fruits and woods from the trees (Octavio Zamora, pers. comm.).

The technical base for the operation of this agricultural system is done through what it is usually called 'integrated management' for an organic 1. Control of diseases and pests, 2. Application of fertilizers, and 3. Different techniques to enhance cultivation in sloping lands. As I mentioned before, all the producers from this cooperative get continuous technical assistance so they can properly apply the integrated management; either they get it from the organic promotores directly in their plots or during the local assemblies, or through training sessions and workshops offered at different locations.

These are the following concrete practices of the integrated management followed by the producers:

1. **Control of diseases and pests.** As opposed to the conventional method that applies inorganic pesticides to deal with the issue, the main strategy of this system is to constantly regulate the micro-environmental conditions of each of the plots, so the agro-ecosystem becomes resistant to disease and pests. Shade regulation, regular

[72] Here it is expressed the vision of nature of the political actors of Tosepan explained in section 5.4.

[73] As opposed to the newest techniques from the 1970s that introduced intensive, sun-based, fertilizers and pesticides that are aimed to enhance productivity.

pruning of old branches, accurate application of organic fertilizers, manual[74] and selective weed control, since there are some grasses that can enhance the soil cover of the plantations. The set of these practices, which are described in more detail shortly, are meant to prevent disease and pests (Sosa L. in Santiago Romero, 2016).

2. **Application of organic fertilizers.** There are many workshops and training sessions focused on production of organic fertilizers. Once the producer has learn the different available techniques, he or she is free to choose which one to elaborate and apply (Octavio Zamora, pers. comm.).

   The amount of applied fertilizer is done based on the specificities of every plot, such as: The size, its altitude, the precipitation levels, and the soil fertility, which is strongly related to the group of soil that is present. Thus, the frequency and quantity of the application varies in each case; either annual or biannual application of 3 to 10 kg of fertilizer per plant, which equals around three tons of fertilizer per hectare (Sosa L. in Santiago Romero, 2016).

   These are the current available techniques for the production of organic fertilizers for the producers:

- Composting of different organic substances, especially out of fermented coffee sub products such as the husk or pulp. The composting process is based on the japanese 'bocashi'[75] method, which takes around 20 days to be produced. The producers can also implement worm composting, and/or the newest technique introduced in 2013 by an external adviser who developed a slightly more complex process that requires fermentation and mineral application of: Treated animal bones turned into 'flour', ashes from wood, sugar, molasses, yeast, milk and cow manure (Miranda Alonso, 2017). All of these fertilizers are stored in 200 liter containers before they are applied, and they need certain special treatment and air regulation so they do not rot and become toxic.

  Usually, the producer bear the production costs of his or her own fertilizer, since there are few public subsidies for organic production. However, for the agricultural cycle 2016-2017, as a result of a negotiation with the Mexican Ministry of Agriculture, it provided the containers to produce 90,000 liters of organic fertilizer, while the producers of the cooperative contributed with the extra income of their 'social prize'[76] in order to share the production of organic fertilizer that year (Miranda, Alonso ,2017).

- The use of flemingia. This is a specific technique that all producers have to implement due to its different benefits. The flemingia is a plant that naturally fixates nitrogen in the soil with its roots, so that other plants, such as coffee and pepper, can absorb this nutrient from the soil. In addition, the plant produces abundant organic matter that

[74] Without the tool known as 'azadon', since it damages the soil.

[75] See Glossary of agricultural practices in Appendix III, Bocashi method.

[76] In section 6.2, under *Tosepan Titataniske* I describe that the social prize is the annual extra revenues of the total coffee sales, shared by all producers of the cooperative.

decomposes slowly, which protects the soil, and it also works as a living barrier inside the plot to avoid erosion (Perez Fornies, 2011 and Miranda Alonso, 2017).

3. **Different techniques to enhance cultivation in sloping land.** Cultivation in flat surfaces tends to be easier in a technical sense[77]. As the land elevates not only horizontally but vertically, it is necessary to implement specific techniques to protect the physical properties of the soil in order to support cultivation. As I explained in the characterization of the environment of the region, the physical characteristics of the lands belonging to all Tosepan producers are that they are located in slopes with altitudes that go from 300m up to 1000 m above the sea level. That is why the implementation of a combination of methods for cultivation in sloping land is fundamental. Such methods that are actually well known among all producers in the region are: contour plowing[78], natural barriers[79] and terraces[80]. All of them contribute to avoid soil erosion.

   In the case of the natural barriers, for example, the trees that are planted as barriers regulate the proper flow of water in the soils to avoid landslides and even loss of fertilizers (FAO-EU, 2013). At the same time, this specific technique supports reforestation and the possible use of the planted trees for fruit recollection (pepper, citrus, etc.), and for the provision of wood for energy or for construction. Tosepan producers plant different trees according to their needs; flemingia, pepper, bamboo, mahogany, the naturally growing oaks and cedars, fruit trees, macadamia, among others, (Octavio Zamora, pers. comm.). Each plot under the organic system ends up with around 1,500 plants or trees per hectare (Sosa in L. in Santiago Romero, 2016). The producers have the option to either use the resources from the trees for auto consumption, or with commercial purposes, and that is the case of the precious woods and the bamboo.

In order to enhance the productivity of the commercial crops, the cooperative advised to increase the number of coffee plants per hectare: from 1000 and 1500 before 2001, to 2500 and even 3300 in 2004, depending on the specific properties of the producers' plot (Tosepan in Vinculando, 2004). Currently, the entire cooperative is also working on the renovation of coffee plants that will be partially financed between Tosepan tomin credit and some public subsidies. Around 75% of the producers' coffee plants will be removed and exchanged for new ones (Miranda Alonso, 2017).

Furthermore, as I mentioned in the last chapter, the cooperative runs its own nursery garden, which is in charge of providing naturally improved plants for the producers. Coffee, pepper,

[77] The INEGI rates agricultural land use as 1.Productive 2. Partially productive and 3.Unproductive based on the inclination and elevation of the land, and the possibility to use animal or artificial traction. That is why for INEGI the lands of the Northern Mountains of Puebla are either partially productive or unproductive (Perez Fornies, 2011).

[78] *See* Glossary of agricultural practices in Appendix III, Contour plowing.

[79] *Ibid.* Natural Barriers.

[80] *Ibid.* Terraces.

macadamia and different fruit trees are produced every year[81]. This type of controlled production has lowered the cost of each plant by more than 50%, as compared to buying from external companies or producing the plant inside the producer's plot (Bernkopfová, 2014). In this garden there is also a seed bank with the most efficient varieties that they have found.

Once the coffee cherry is cultivated with the previous techniques and then harvested by hand, the producers make a primary processing of the product. They depulp it, wash it, and dry it. The result of this process is called 'pergamino' coffee, and at this stage is how the producers turn it to Maseual cooperative.

Overall, the producers use few basic tools throughout the entire cultivation and harvest process, and one de-pulp machine for the primary processing that they have to buy, but other than that, the drying of the grain is sun-made. Regarding the primary processing method, one of the managers from Maseual cooperative commented:

> *At some point people thought that drying machines [for the coffee and pepper grains] were better, but we reached the conclusion that the best method is sun-dried because it is a gradual process, and all the properties of the grains are conserved. Besides, before costs were very high because one uses a natural gas tank [to dry the grains in the machine], and you have to pay for it. [...] so now at the producer level the thing that we use the less is energy (Octavio Zamora, pers. comm.).*

The 'pergamino coffee' has its final processing in the installations of Maseual cooperative in Cuetzalan, where they select the finest grains[82], and depending on the buyer they can pack it raw, toast it and even grind it.

For the case of the pepper, the seed is harvested green, before it acquires a purple color. Just as in the case of the coffee, it is also done by hand, with the support of scissors and hooks. The collector must not break the branches because it causes considerable damage to the trees (INIFAP-SAGARPA, 2011). The primary processing of the pepper is cheaper than coffee because Tosepan producers only sun-dry the grains, as opposed to other methods that uses drying machines, which 'smooths' the seeds and takes away its texture and oils (Octavio Zamora, pers. comm).

Since 2003, Tosepan started the project of honey production as part of the organic program. Mostly to conserve the native bee known as *pisilnekmej*[83]. This bee was domesticated by the Nahua before the colonial period, and its cultivation method is still used until now. It consist of a simple process where the producer attracts and keeps the bees in clay pots to recreate its habitat (Albores, 2016).

[81] The workers of the nursery garden have produced 1 million plants (Bernkopfová, 2014).

[82] This depends on the weight and wholeness of the grain. The heaviest it is, the better quality it has.

[83] *Out of the more than 20 thousand species of bees that exist in the world, 2 thousand have been identified in Mexico. There are two types of bees who produce honey (bees with sting and bees without sting). The stingless bees are divided into Meliponas (Melipona) and Trigonas (Scaptotrigona). In the Northern Mountains of Puebla inhabits the Pisilnekmej-Scaptotrigona Mexicana* (Slow Food Mexico, 2017, n.p.).

Regarding the honey production, one of the workers from the honey processing factory mentioned:

> *There are a lot of practices to produce honey. We found that in other states such as Chiapas or Yucatan their way is to go to the forest and find the bees on the trees and zaz! (sic.) They cut the tree and take it to their homes, but here our way to keep the bees is very different. We are not cutting trees, we have ceramic pots to attract the bees, and what the cooperative wanted at the beginning was to implement drawers to keep the bees, because it makes a cleaner harvest, but in that way we were going to kill our tradition because the elderly do it the traditional way (Honey factory worker, pers comm.)*

This type of honey used to be only for the auto consumption of the families as medicine and for spiritual/ritual uses (Maria Luisa Albores in ECOSUR, 2016). Nowadays that the honey is being commercialized, the producers are trained to harvest it in cleaner and efficient ways. They open the ceramic pots and separate the honey and its sub-products in specific places away from the ground and the open air, and they have to sterilize the tools (knives) that they use to do it (ECOSUR, 2016).

After the separation process, they filter the honey using simple fabrics and clean bowls, to finally bottle it into special containers, which have to be delivered at the honey processing factory in Cuetzalan. The producers are not allowed to bring the honey in other types of containers that are not the ones provided by the cooperative. In the past, some of the producers used to bring the honey in recycled plastic bottles, and often mixed with water, so now the worker in charge of gathering the honey is trained to measure quality standards for the honey that arrives to the factory (Honey factory worker, pers. comm).

Currently there are 300 honey producers, and the majority of them are also pepper and coffee farmers from the organic program, so all year they are selling to Tosepan Titataniske according to the harvesting seasons of each product (Honey Factory worker, pers. comm.).

For the division of labor, the cooperatives' suggestion is that the producer and his or her family together, together with the use of the traditional practices[84] of 'mano-vuelta' and 'lamahatlak', could be the workforce in order to save money and provide economic occupation to the entire family. However, this is not a rule, and there are some cases where the biggest landowners that have from 4 to 10 hectares, or the oldest producers whom her or his children emigrated or do not work as farmers anymore, they sometimes hire paid workers (Bernkopfová, 2014 and Perez Fornies, 2011).

Finally, I will emphasize that the management of the entire system is labor intensive, due to the fact that some of the tools and inorganic inputs employed in the conventional way are not allowed, as they not only contaminate the organic production, but they also damage the soil fertility and its vegetation.

[84] This is a cultural feature of the political actors, see section 5.2

7.2 Nutrition strategy of Tosepan Patji

As I explained in section 6.2, the activities of this cooperative are focused on the prevention of diseases, and it offers diverse services to accomplish this preventive goal. Among the diverse services, the subprogram or the strategy for nutrition and food production is the one that deals with the agricultural management of the members that are enrolled to this cooperative.

This specific strategy was implemented in 2014 based on Tosepan strategic goal of food security[85] based on a nutritious alimentation for the members. Which transformed the previous historical approach of the organization that aimed at a stable and affordable food supply from external sources. But that once the food supply for the region stopped being a problem during the 2000s, this renewed strategic goal became more focused on creating awareness among the members about the importance of a balanced and nutritious diet based on locally grown foods.

Tosepan Patji was appointed in 2014 to develop the action plan so the 461 family members[86] could learn about nutritional guidelines and useful resources or techniques to be able to expand their food production (Daniela Ruano, pers. comm). According to a manager from Maseual cooperative, the vision of Tosepan regarding this plan is that all of the members can produce 100% of the food that they consume (Octavio Zamora, pers. comm.).

Since 2014, this cooperative introduced to the action plan different talks and workshops about local food production and nutrition to be offered to all Tosepan Patji members. First, the health promotoras, attended to Yeknemilis training center to learn about nutrition and different strategies to enhance the cultivation of regional foods and herbs for medicinal uses. Later on, the promotoras started to spread this knowledge in both their domiciliary visits to the family members, and also during the local assemblies (Daniela Ruano, pers. comm.), which as I pointed out before, are open to all active and associate members that might not be enrolled to this specific cooperative.

There are also some workshops and talks organized by this cooperative in which some external advisers come to talk about diverse topics within the strategy.

Regarding the particular strategy to enhance food cultivation, the cooperative developed its own orchard models that are meant to be placed near the members' house. Both vertically, as a tower of supported pots or recycled plastic bottles, and horizontally, which means directly on the ground, but according to the particular available cultivation space of each member.

The orchards have different native and traditional medicinal plants such as wild mynth, cider leaf, purple and white 'maltanzin' plant, horsetail plant, 'atzomiate' or willow ragwort, and cedron tea. As well as native varieties of vegetables such as a tomato named 'jitomate riñon'

[85] See general and strategic goals in section 6.1 in 'goals of the political actors'.

[86] Approximately 1900 people, which 48% are the active partners' families and 52% are only associate members (Daniela Ruano, pers. comm).

and ‘quelites’, which is a commonly used name given in Mexico to all the different types of edible foliages. They also include natural barrier plants with bright colours or very strong smells to avoid plagues and be able to produce organically (Daniela Ruano, pers. comm.).

Currently there are also two shared or communal orchards of members in two communities of Cuetzalan area, and one demonstrative orchard in Tosepan patji installations in Cuetzalan (Daniela Ruano, pers. comm.). Each member gets a printed calendar where they can see which seasons are more suitable for each of the previously mentioned crops.

The health promotoras include in their weekly reports the number and specific topic of all their talks related to nutrition and food production. In addition, during the domiciliary visits they register on their ‘family diagnosis’ sheet, different aspects related to the health of the member-family, but they include the state of the vertical and horizontal orchards in each home. The health cooperative manager explained that she is in charge of following up that the weekly reports of the promotoras are in accordance with what they handed in the weeks before, so the directive board of Tosepan patji can have a continuous overview of the progress made, as well as the general assembly during the annual reports (Daniela Ruano, pers. comm).

The goal of the nutrition strategy for 2017 is that all family members can produce from 20 to 30% of their food and medicines from the orchard, which complements the already present traditional subsistence plantations of maize, together with one or two crops such as chillies and squash (Perez Fornies, 2011, Paulina Garrido and Octavio Zamora, pers. comms.).

7.3 Other programs

The actions of the general assembly. Here is where all political and economic decisions are made, and throughout the years there has been some isolated actions that either do not fall into any of the referred programs, or do not create new programs but adds new responsibilities to them.

For example, in 2014 the general assembly declared the year of ‘food sovereignty’, and that specific year Tosepan Tomin granted a credit called ‘credi- traspatio’ so people could buy small animals for meat production and could keep them in their backyards, as people in the region usually do it to enhance their food production.

The year 2016 was declared as ‘the year of the production of organic maize’. In all the monthly general assemblies that were made that year there was new information about the matter. Furthermore, the local representatives and the promotores had to talk about the progress made in the communities. Although there was not an specific follow up tool for the progress made, according to the manager of Maseual cooperative he saw how by only informing the progress of each of the local assemblies in the general assembly:

> *[...] those communities that were behind, well, people gave them the bad look because they were not progressing, so the next month they were making efforts to progress, and they used to come back saying: ‘we made this’, so when*

information was shared at the assembly level with the promotores, no one wanted to be in the back (Octavio Zamora, pers. comm.).

The School. As part of the education program, the children of Tosepan members dedicate two hours a day to work in the school's plot. Here they learn how to cultivate organic coffee, pepper, maize and other edible crops. The students not only learn agricultural technical skills that are taught by the parents of the children, but they also learn the process to organize the production as a cooperative. They have monthly assemblies for the division of the agricultural work, which they constantly rotate. The goal of this dynamic is to educate a new generation of active partners and organic producers of Tosepan (Aguilar Ayon in Reseñas ICSyH, 2016).

Women project. As I mentioned before in section 6.2, the members are usually some of the wife's of the producers who do not legally hold the land rights, so they do not have a personal income. This cooperative has different working groups of different economic projects, and there is only one group dedicated to collect the coffee byproducts of all Tosepan producers in order to elaborate coffee liquor and edible mushrooms for sale to generate their own income.

7.4 The agricultural management of the conventional producers

It is a fact that 4953 producers, around 90% of the total, are considered conventional, since they are not certified organic, and hence, nowadays there is no control over their agricultural practices. However, it is necessary to mention that Tosepan began to offer technical support for the agricultural management of all of its producers from the 1990s until 2001, and the outcomes of that decade of support remain present until now (Rappo, 2006 and Perez Fornies, 2011).

Practices such as the diversification of the commercial plantations (coffee, pepper, and different trees), the exact same soil conservation techniques for cultivation in sloping land[87] that are suggested in the organic program, as well as the application of some organic fertilizers from coffee byproducts, are all practices that were taught to Tosepan producers during the previously mentioned period. Different external advisers, together with the first promotores of the organization were in charge of the technical support for all Tosepan producers (Rappo, 2006 and Perez Fornies, 2011).

Regarding the 'productive diversification strategy', for example, it was implemented when the general assembly of Tosepan acknowledged the unsustainability of relying the agricultural production in only one or two crops. After that, cinnamon, nuts, pepper and different fruits and precious woods (cedar and mahogany) were advised to be planted in the producer's plots (Perez Fornies, 2011 and Bernkopfová, 2014).

Other relevant activities of the decade that are widely documented were the encouragement to increment of the number of coffee plants per hectare, the regular pruning of the branches

[87] Contour plowing, the establishment of terraces, and the planting of living barriers, description in Annex III.

of the trees so they could remain healthy and young, and adequate[88] or accurate application of conventional fertilizers and pesticides according to the bio-physical characteristics of each of the producer's plot (Bartra et. al, 2004, Perez Fornies, 2011).

One year after the organic program was established in 2001, Tosepan developed the *Conversion plan for organic production of coffee and pepper* (2002), a report that analyzed the situation of all Tosepan producers regarding their management practices, the state of their plots and their productive situation. The report found out that 100% of the producers were practicing more than one aspect of the previous agricultural management strategies that were spread during the 1990's. Moreover, 95% of them had "highly diversified" plots that were providing environmental services to their territories, such as CO2 capture, fauna and flora conservation, humid retention, and control of erosion (Tosepan, 2002 in Nava Cortes, 2012).

I will reproduce with my own translation the most relevant fragment of the report, in which the producers are divided into three groups and characterized in the following way (Tosepan, 2002 in Nava Cortes, 2012; 37-39):

1. **Traditional coffee farmers:** They maintain highly diversified plots under the structure of traditional polycultures, in which it is possible to find close to 200 species that are useful for coffee production. The variety of coffee that they mainly use is Typica, as well as Garnica and Caturra. The density of their plantations goes from 1000-1500 coffee plants per hectare. They practice a minimum management; seldom pruning of branches, they perform shade control after harvest, as well as herb control with 'machete'. They do not apply fertilizers or any other type of agro-chemicals as pesticides. This poor management causes low yields. 70% of the producers belong to this category.

2. **Medium technified coffee farmers:** They maintain a similar structure with the previous group. the difference is that they perform more activities, such as more systematic and regular pruning of branches, application of conventional fertilizer once a year, depending on whether or not they get the public subsidies, and herb control at least twice a year. Hence, the yields are slightly higher. Around 25% of the producers belong to this category.

3. **Technified coffee farmers:** The production system is substantially different from the two previous cases. Traditional coffee plantations have been renovated towards a commercial polyculture system where coffee is associated to trees that not only produce shade, but also provide with commercial products. The density of coffee plants goes between 2000 - 3000 plants per hectare. They apply worm composting before the sowing, regular pruning of the plants, application of conventional fertilizer twice a year, and herb control with 'machete' three times a year. Their yields are the highest amongst the producers. If the traditional and medium technified producers produce from 5 to 13 quintals per hectare, the technified ones produce up to 30 q/per hectare. Only 5% of Tosepan producers belong to this group.

[88] A fundamental aspect to protect the agro-ecosystem is the right knowledge on how to apply chemical inputs to avoid water, soil contamination and even animal and human health risks.

Here I did not find in my collected data which type of producers decided to join to the organic program since 2001. But the referred conversion plan was expecting a high rate of enrollment: around 1,500 farmers in a period of 5 years (Tosepan, 2002 in Nava Cortes, 2012). However, this never happened.

Nowadays there is no specific technical support or follow up for the commercial producers that are not in the organic program (Octavio Zamora, pers. comm). However, as I explained before, in every local assembly of Cuetzalan area the organic promotores have to show up and inform all active partners and associate members about the program. Moreover, they give informative talks and provide different strategies that are aimed at the organic producers, but the information is open to everybody who meets the assembly, even if they have no attachment to the organization at all.

In addition, all active partners who are conventional producers have access to the occasional workshops offered from the training center, which most of the time are about sustainable agriculture. There could also be the case that conventional producers are also enrolled to Tosepan patji, so in that case, some of the agricultural practices of food production from the nutrition strategy are accessible to them.

8. The influence of the cultural features of Tosepans' political actors on their governance and its implications for sustainability

In this final chapter I summarize the influence of political actors' cultural features on their governance. I also categorize these influences as strengths and in order to support the sustainability of Tosepan.

8.1 Strengths

Identity

I consider this feature as the reason behind the particular visions and goals of the organization, which aspire towards sustainability. Furthermore, the cohesion of the political actors around a wider indigenous movement also explains the institutional resilience for the past 40 years. This is a strength that have kept a slow but steady increase in active partnerships and associate memberships of mainly indigenous people, who contribute with about 80% of the total members.

Besides, Tosepan does not have an excluding identity project. Their invitation is open to anyone that wishes to join the organization under indigenous values of what they consider a 'good life'. Those 20% non-indigenous individuals are associate members that get access to the financial services of Tosepan Tomin, health services through Tosepan Patji, and are also Tosepan producers for Maseual Xicaualis.

In one of Ostrom and Cox (2013) principles, they enunciate a strong sense of identity and understanding of purpose as a principle that supports the accomplishment of common goals in a social group. I consider this principle as applicable to Tosepan. The organization identifies itself with the indigenous movement, beyond the ethnical background of each individual, a movement that has particular visions and goals that matches with sustainability.

Cooperation in community based interaction

Ostrom (1999), mentions that there can be many attitudes or behaviors within a social group that shares a common natural resource. But that cooperation is the main group attitude that must prevail to accomplish sustainable resource use.

Therefore, the willingness of the 1,600 active political actors to share the benefits and costs of the outcomes of their governance and to aim for consensus instead of conflict during their decision making processes; in addition to their willingness to share the benefits or services of their cooperatives with anybody that wishes to associate as an economic actor. It all comes from their value of cooperation in community based interaction, which is very rooted in them.

In the following paragraphs I will explain how the influence of this value of cooperation in community interaction is a strength that supports Tosepan governance towards sustainability.

The internal political aspect of the governance operates based on the constant participation of a system where 80 local assemblies gathers many times a month to discuss and find common positions for decision making. Then, all common positions are discussed and voted in the general assembly of local representatives once a month. The reproduction of this complex political system at the local and general levels requires a high level of cooperation and participation[89] among the actors, criteria that has been fulfilled for the past 40 years.

Besides, the 80 local assemblies expand to 430 with the purpose of sharing information, advice and services for the associate members who are not political actors, only consumers and producers. Any of Tosepan assemblies are always open to anybody that wishes to assist. Which shows the political actors' willingness to share the benefits or the cooperatives services with the entire population living in the region.

The organization and cooperation between the 1,600 active partners also enables several benefits that seemed impossible to achieve for single indigenous small scale farmers. For example: Technological development for their productive processes[90]. The key to accomplish this has been a combination of the organized application and negotiation of public subsidies for diverse equipment acquisition. Especially in the trade cooperative Maseual Xicaualis, who is in charge of processing the agricultural products and has energy and water efficient processing techniques and equipment[91] for both organic and conventional products. In addition, there are also cases where individual contributions of the active partners have paid for new technologies and technological support. Nowadays this last dynamic is especially visible in the organic program, where all the producer members have access to diverse and innovative agricultural practices, some of their equipment, and the organic certification itself thanks to the members' contributions.

Fair access to the markets is an opportunity that seemed impossible before 1977. Nowadays Maseual Xicaualis is fully able to compete with powerful commercial monopolies and stabilize the prices of organic coffee and conventional pepper in the region. Their direct participation in the New York stock exchange, to improve the prices of the organic coffee, is an example of a positive outcome of the organization and cooperation between the political actors. Besides, offering a more fair access to the markets to all producers of the region has been an historical achievement of the organization. Currently the total number of producers for Tosepan are 5,800, which means that are more economic actors than political actors, who are 1,600, but the political actors are willing to share their access to markets without restrictions and in equal conditions.

[89]Participation of the members of the system is an indicator of sustainability of communal natural resource management systems in MESMIS (2017).

[90] Change and innovation capacity is also an indicator of sustainability in MESMIS (2017).

[91] Efficiency in the productive processes is also an indicator of sustainability in MESMIS (2017).

Cooperation between political actors brought the possibility to access diverse financial services through Tosepan Tomin bank. This was also nearly impossible before 1998, since regular commercial banks would not consider indigenous people for credits due to various economic reasons. After 1998 the enrollment to this bank cooperative grew so much that currently its millionaire capital for credits is entirely made out of the savings of the client-members, which are 35,000. Here it is remarkable to emphasize that the most requested credits in Tosepan Tomin are for agricultural production and housing, which says a lot about the current needs of the regional population.

Further on, the ability of all Tosepan members to reproduce the traditional voluntary work practices of 'mano vuelta' 'lamahatlak' and 'faena' as part of the workforce without monetary intermediation contributes to Tosepan's self-sufficiency and efficiency (MESMIS, 2017). There are several examples where these practices are used among the producers in agriculture, for the housing program, and for the construction of all infrastructure of the Union of Cooperatives.

Finally, I consider the decision of the political actors to meditate instead of splitting in the conflict between organic and conventional production as a strength. Nowadays more than half of the active partners are organic producers (847), and a little less than half are conventional (753). Instead of splitting, they have stayed together, and they keep producing diverse strategies to support their general and strategic goals; as the nutrition strategy from Tosepan patji that includes the enhancement of organic food production, as well as the diverse actions of the general assembly to support self-sufficiency in all of Tosepan members. The organized defense of the territory from extractive projects that could seriously damage the regional ecosystems if they start operating in the area is another valuable example.

Indigenous political systems.

In an ideal type of political system there are mechanisms for transparency, division of powers, and representation (Vatn, 2015). The indigenous political systems include *per se* many of these mechanisms.

First, the traditional system of assemblies shows an organized process to share information, discuss issues, negotiate proposals, and full transparency in decision making as all assemblies are open. Moreover these assemblies are political authorities that operate by the consensus of the political actors rather than for majority of votes, which is a strength and an opportunity to express as many individual visions as possible. A good example of this last idea of consensus in decision making inside Tosepan that also relates to the last cultural feature of cooperation was the decision of the general assembly in 2001 to establish the organic program as a voluntary strategy to face the drop in coffee prices and to protect the regional ecosystem. While Maseual Xicaualis kept trading all the members' production (organic and conventional), and in this way all of the divided visions were expressed.

Moreover, the fact that the indigenous political systems resembles Tosepan's political system is a strength. Because the political actors are familiar with the system and they perceive it as legit.

Further, the way leadership and power are conceived in these political systems are also strengths. In such horizontal political systems leaders are seen as the managers of the

collective wishes and needs of the group. Leaders are only proposed by the assemblies based on their previous work and skills, and beyond commanding, they all understand that their job is to manage the organization. This has avoid conflicts.

Tosepan local assemblies system have grown at a sustained rate since the beginning. In 1991 there were 52 (Martinez Borrego, 1991), and nowadays there are 80 local assemblies of active partners and 430 local assemblies in total for associate members, which says a lot about the preference of this specific way of organization.

Vision of nature

The organic way to conceive nature in the political actors is predominant. They have had the flexibility and ability to integrate some aspects of the capitalist nature and techno-nature regimes, in order to enhance some governance aspects and the agricultural management programs towards sustainability.

In the first place, the fact that they consider themselves as 'guardians of their territory' in a spiritual sense, have provided a collective mindset that has protected their access to natural resources. Tosepan participation in joint civil actions since 2010 stopped the implementation of several extractive projects that were not adequate for the social and environmental characteristics of the region. For example, the environmental consequences of fracking for shale gas extraction risk dramatic transformation of the current visual landscape, but also accelerate soil degradation, landslides and water pollution (Varguez-Urbano et. al., 2015). This is especially relevant considering that more than one million people live in the area and depend on the vital resources of water and land as agriculture is the main economic activity of the region.

Furthermore, the most important finding regarding the strictly environmental aspect of Tosepan's governance, is that 95% of their producers in 2001[92] were already providing environmental services with their agricultural practices. Their highly diversified[93] plantations were a combination of commercial and auto consumption crops, and 70% of them did not use agro-chemicals at all, so they were called 'passive organic' producers. The other 25% used only fertilizers once a year, whenever public subsidy are offered to small-scale producers. Only the remaining 5% of the producers had engaged in a more technified management that included the use of agro-chemicals and were less diversified on trees and plants for shade production in order to increment their coffee production.

However, in 2017 only 14% of the producers are enrolled to the organic program, and they have the most sustainable agricultural strategies and practices of all the producers. Their particular agricultural system is a hybrid based on the oldest commercial way to produce coffee; the indigenous agricultural systems; and the newest techniques in organic production brought by diverse external advisers.

[92] The only assessment that has been done about the topic, it was made by Tosepan itself.

[93] The level of diversity or biodiversity is an indicator of sustainability in MESMIS (2017).

Here the levels of conservation, agro-biodiversity and self-sufficiency are the highest and are all enhanced by the innovation capacity of the cooperative, which is not present in other agricultural management programs. These systems provide the best level of productivity[94] for Tosepan, considering that 847 farmers produce approx. 700 tons of coffee, in addition to honey and pepper for commercial purposes. Compared to the productivity of 4953 conventional farmers that produce 900 tons of pepper and 80 of coffee.

Regarding the second most important program, the nutrition strategy of Tosepan patji, it enhances pre-existent subsistence strategies of the members. Tosepan producers already cultivate around 10% to 30% of the food that they and their families eat. There are 461 families in this program, which means around 1900 people that are currently increasing their self-sufficiency in food production with new organic techniques. This is done with the use of traditional medicinal plants and native vegetables based in the agro-biodiversity of the region.

8.2 Limitations

Identity

The organization is identified with the indigenous movement ideals, but I did not find in my sample a limitation to this, since there has not been any internal or external conflicts among the political actors due to this feature. Moreover, since their socio-economic project is not exclusive, they have had good relations with the government[95], with diverse external actors, and they are also recognized by the population of the region.

Nevertheless, the possibility that the indigenous identity of Tosepan has made other people and producers refrain enrollment to the organization. Mostly because Tosepan visions and goals are different from the mainstream Mexican and western cultures, which are more individualistic and consider that reproduction and money accumulation is vital or might be the only way to access a better quality of life.

Furthermore, indigenous identity is still associated with negative ideas that are based on uninformed assumptions about them, such as their ignorance for not being fully bilingual in some cases, their profound spirituality, etc. There is a persistent discrimination based on race that indigenous groups still have to face from most of the Mexicans that do not support them.

Overall, Ostrom considers cultural diversity in common resource management systems a positive aspect, since each culture offers diverse ways to approach nature, and that offers 'hope' for finding new ways of organization. However, this cultural diversity could 'decrease the likelihood of finding shared interests and understandings' among the members of a community (1999; 289). Which could be the case of the entire region of the Northeastern Mountains of Puebla and Cuetzalan area, where 50% of its population are non-indigenous.

[94] Productivity is an indicator of sustainability in MESMIS (2017).

[95] Even in the territorial conflicts they always negotiate with the government based on legal means.

Cooperation in community based interaction.

Although, the mindset and practice of cooperation in community based interaction is highly efficient for the most part, this value is unable to compete in some fundamental cases with the current broader social settings. Ostrom (1999) warns how governments and the economic system can hinder communal organizations, regardless of their internal organization and management towards sustainability.

First, the current economic and agricultural policies of Mexico are hindering all types of small scale farming in the country. This affects Tosepan in several ways. The agricultural policies of Mexico concentrate most of productive subsidies for large-scale and conventional farming, and the economic policy is highly supportive for transnational companies operating in Mexico. The direct consequence in the case for Tosepan is that there are only 3 companies that control 90% of the coffee trade in Mexico, which makes it almost impossible for Maseual Xicaualis to access fair prices for their coffee in the national market. That is why Maseual has concentrated on exports of organic raw coffee beans and conventional pepper, which accounts for 70% of their production.

As mentioned before, there are almost no public subsidies for organic production, and most of the few subsidies for small scale farming are still based on direct transfers of conventional fertilizers and pesticides on irregular basis. Although Tosepan has been able to negotiate many public subsidies for their diverse programs, those are contextual achievements which are not enough, especially where the producers have to cover almost all costs related to their production in the organic program.

Second, the dominant economic system, from the local to the international level, together with a deficient social protection from the Mexican State (low salaries, no pension systems, deficient access to health and education, etc.), forces all Tosepan producers to integrate their livelihoods to these dynamics, and this poses fundamental limits to what they can accomplish inside of the organization.

I posed the questions: Why have not all producers joined the organic program or the nutrition strategy? From interviews and text-based sources, the reasons were mostly economic. Due to lack of time to dedicate to the labor intensive activities of these programs. Production for Tosepan only provides with a partial income[96], so all members have other economic strategies and priorities regarding their families.

Moreover, the low membership to the organic program from the total number of producers is also caused by the inability to pay for the machinery and conversion arrangements for certified organic production. Although the organization have managed to negotiate some public subsidies and collaborations among the members to pay for their certifications, the cost for the conversion is approximately 400 USD. But producers don't seem to have this money in savings to what they can apply for the productive credit offered by Tosepan Tomin. But then they would have to endure three year period in which they cannot sell as organic, and their

[96] Ostrom (1999) states that the more a person depends on a resource, the most likely she/he will fully commit to organize with the community for its management.

productivity momentary declines due to the arrangements, but the labor in the plot has to increase exponentially.

Although I mentioned in the strengths that cooperation supports technology, contextual subsidies, access to credit, improved access to markets, and provides with some economic strategies of voluntary work that saves money. Even with all that, none of the producers get to fully support themselves out of commercial agriculture or with their subsistence strategies.

Regarding many of the active partners and their families, they have the privilege or the right to have positions within the organization, which actually provides them with a stable complementary salary. That is not the case of any of the associate members of Tosepan. This low level of self-sufficiency in agriculture of the associate producers is a major limitation for the sustainability of Tosepan. Low self-sufficiency in most of the producers damages the memberships increase to the organic program and to the nutrition strategy, the two most important programs that deal with agricultural management of the organization.

Indigenous political systems

I conclude that these type of political systems are highly efficient when functioning at the local level, as in the case of the 80 local assemblies of active members. However, it becomes a limitation when they try to accomplish the same level of efficiency and flow of information between 430 local assemblies of associate members in 28 different municipalities, and the administrative council, together with the cooperatives that are all established in Cuetzalan municipality.

Although this is an issue that both the general assembly and the administration have kept in mind as an aspect that they have to improve, they have not been able to fully solve it. Therefore, the quality of the services from the cooperatives tends to concentrate only in the local assemblies of Cuetzalan area and the nearest municipalities.

As mentioned in section 6.1, Martinez Borrego (1991) and Bernkopfová (2014) observed some cases of disconnection, lack of information, and misunderstandings between remote local assemblies and the general administration together with the cooperatives. This happened both in 1991 and in 2014 with the same outcomes, but this time also included the work of the promotores. With those two observations made at two different times, I conclude that the problem has been persistent. This shows a clear limitation to growth, and a challenge to the actual satisfaction and engagement of the current Tosepan associate members.

Although it was thought that the promotores could support Tosepan activities in all the local assemblies, this innovation in their governance became highly efficient only in Cuetzalan area. The reason behind this is because promotores are paid with public subsidies and few funds from Tosepan. At the moment the 60 promotores are not enough to cover the different needs of 430 local assemblies and 35,000 people. So nowadays they prioritise Cuetzalan area.

Bernkopfová (2014) observed many remote local assemblies where the work of the promotores is not efficient enough, and many members end up being uninformed and feel unlisted or helpless. Tosepan does not generate enough income to increase the number of

promotores to support the social and environmental actions of the organization beyond its area of influence. Hence, the efficiency of promotores is high in Cuetzalan area, but medium outside this zone, and quite low in the most remote ones.

Finally when it comes to the specific programs that deal with agricultural management, the idea of the limit to growth of a system of local assemblies with their promotores is even more applicable. The implementation of these programs in remote areas outside of Cuetzalan area is unlikely to happen due to the associated costs of hiring more promotores for both programs, and establishing more picking up points of Maseual for the producers harvest, who cannot afford to ship individually their products to Cuetzalan. Nowadays the organic program and the nutrition strategy are concentrated in Cuetzalan area with 8 promotores each.

Vision of nature.

There are some elements in each of the nature regimes, or rather in their articulations that represents limits to support sustainability.

In the first place, the collective mindset regarding the defense of the territory has important limits when facing extra-judicial methods from the government and some economic actors to accomplish their goals. As explained before, in 2012 the federal government granted concessions to private mining companies to use 18% of the territory of the Northeastern Mountains of Puebla for their extractive activities. When these projects stopped due to civil action from Tosepan and diverse actors of the region, in 2016 the State power company also tried to build a power plant station to prepare energy provision to the mining companies. Although these conflicts have been won mostly by the indigenous organization of the area, the introduction of criminal groups, as denounced in the public assemblies about the matter, is a very challenging threat to overcome. Criminal groups supported by the government and some economic interests to physically threaten the life of the population is an historical practice that has ended in violent resolutions favoring the State.

Besides this aspect where the predominance capitalist regime of nature at the national level is actually threatening Tosepan and all indigenous populations, as well as the environment of the region. The integration of Tosepan to this regime has not been easy and although before Tosepan the conditions for the producers were worse, political and economic actors of the organization have to decide and act strongly based on the visions and rules of this economic regime. I mentioned that in 2002 Tosepan's referred *Conversion plan of organic production of coffee and pepper* called 'passive organic producers' to 70% of its produces that were not using agro-chemicals at all and were highly diversified. Nevertheless, nowadays not even 14% of the producers are enrolled to the organic program. This influences the trade tendencies of Tosepan towards conventional pepper as the most sold product of the organization. Even when the entire organization declared sustainable development as one of their strategic goals, and the idea of Yeknemilis [good life] in their main goal aims at constant balance with nature.

This preference of most of the farmers to remain conventional do to economic reasons says a lot about the poverty degree in which the indigenous farmers still live. Which is mainly caused by the economic system and the vision of its most powerful economic actors to consider profits before anything, especially in the coffee value chain.

Although certified organic and Fairtrade are relevant market channels that acknowledge social and environmental importance of organic production and better prices for producers, they do not dominate the markets. Besides, most of the profits of this type of trade still remains in the final retailer. An increase of 30% on the price paid to the producer for their harvest seems not sufficient enough for most of Tosepan producers to engage in the conversion.

Finally, during the analysis I considered the techno-nature regime of Tosepan as a positive aspect. But the level of technology and innovation capacity in agricultural management of Tosepan has not solved important economic aspects of the livelihoods of the producers. Moreover, as mentioned before, most of the producers are not able to afford sustainable technologies for their conversions to certified organic, regardless of some public subsidies and the good intentions of the external advisers and some active members. Technology in general is deeply related to capitalism, and it is a real challenge to break the link between the two.

9. Conclusions

The findings from this case study show a clear influence of the culture of the political actors of Tosepan over their governance and the programs that deal with agricultural management, and how this has clear implications for the sustainability of the organization.

Identity was the clearest cultural feature that I found when I approached the organization from all possible sources and its angles. However, here identity is not restricted to an ethnicity. In this case, the political actors are more identified with the indigenous movement with wider goals related to all indigenous people in the country (territory, culture, autonomy). Moreover, this movement is not exclusive, it is more concerned with recognition and preservation of indigenous values and cultures. Thus, based on these goals is that both Nahua and Totonaca identify themselves and are willing to work together. That is how they have endure and continue reproducing.

Identity was the foundation that allowed me to get immersed into those cultural features of Nahua and Totonaca where both ethnicities coincide.

Perhaps the most relevant cultural feature was cooperation when it comes to the accomplishment of the particular goals of Tosepan of its social and environmental actions. The political actors of Tosepan have managed to stay together and organize not only by identifying themselves with the indigenous movement, but also because cooperation is a millenarian behavior of indigenous communities that have helped their individuals to recreate their lives in every single dimension; social, economic, cultural, spiritual and environmental. This value has supported widely internal and external interaction, and the positive outcomes of their social and environmental governance. However, in the current Mexican and international contexts, they find great limitations to this cultural value. The fact that Tosepan producers cannot keep them out of the line of poverty limits an ideal sustainable management of their agricultural systems.

Then, and related to the last cultural feature. Nahua and Totonaca political structures and understanding of power influences directly the governance structure of Tosepan at all levels. Here the strengths are that all members are familiar with the dynamics of communal assemblies. Discussions and decisions making of 1,600 political actors and communication to 35,000 economic actors is possible in a democratic way. Moreover, the political actors perceive that leadership is not only an honor or a privilege granted by the assemblies, but it is also a duty and hard work for the benefit of all the members.

The concrete political system of local and general assemblies of Tosepan is highly democratic and their ability to analyze issues together to find common solutions is remarkable. However, there is a limit to how much they can grow as an organization with this governance system. The proof is that the scope of action of all Tosepan programs and actual political system is operating in around 80 local assemblies of 9 municipalities, and the remaining 350 local assemblies and 19 municipalities are only for the financial services of Tosepan Tomin client-members.

However, in my consideration the limit to grow is not necessary a negative aspect, it just shows the importance of organization at the local and/or communal level.

Finally, the political actors of Tosepan hold a vision of nature that is not anachronic at all. It is full with influences and syncretism. Their spiritual attachment to land, together with their thought of man being responsible for balance in nature have influenced and motivated them to face the diverse land-related conflicts through the centuries. Another valuable aspect is their traditional economic subsistence strategies based on the use of agro-biodiversity that aims at avoiding excessive accumulation, contributing to protect their environments.

Besides, they have had a good ability to insert themselves and the organization not only into the capitalist vision of nature but also in its economic regime to try to work to their own goals and needs for the first time since its imposition in the XIX century. With strategies such as certified organic agriculture and fair trade, as well as with their ability to engage in the New York stock exchange for organic production, and getting export deals for the conventional one too. All of that to stabilize the prices at the regional level. Furthermore, they have immersed themselves also into the technological vision that acknowledges continuous innovation as fundamental for the sustainability of the organization. They have improved their own productive and processing equipment for natural resource use efficiency, and have made, to a medium degree, technologies available for the poorest groups of the population.

However, the individual economic situation of each of the producers makes impossible for them to fully concentrate in their agricultural tasks, and this hinders the full potential of the organic and nutrition strategy programs, the core of Tosepan environmental governance. On the other hand, at the wider macroeconomic level, the plans from extractive companies threaten the sustainability of the organization and its producers even more. These companies have a strong political influence and economic power at the national level, which makes Tosepan and indigenous participation in this conflict very uneven. However, and for now, *Tosepan Titatansike* [together we overcome].

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11. Annexes I, II, III

I. Interaction based data collection: interview guides

Governance: political and economic aspects

1. Can you talk about the goals of the organization, how did you define them and how have they changed through the years?
2. For how long have you been working under the current political structure of Tosepan?
3. Did Tosepan follow any previous model for organizing? Or which influence(s) did you consider to develop the current structure of the Union of Cooperatives?
4. Did you have any external advising about communal organization?
5. Can you tell me the general and specifics about how the general assembly works?
6. How does decisions are made and who execute them?
7. How has been the experience of decision making in the organization? Where, or how is leadership expressed in Tosepan?
8. Can you talk about the strengths and weaknesses of the political structure of Tosepan as a Union of cooperatives?
9. Can you describe the goals and tasks of the surveillance and administrative councils?
10. What about conflicts? Does Tosepan have a special tool for conflict resolution? How does it work?
11. What is the experience with internal conflicts or disagreements in the organization?
12. What is the role of the promotores?
13. How has been your relationship with the mexican government at all levels? Supportive or *viceversa*?
14. Can you talk about the experience of Tosepan as a political actor in the region?
15. What is the exact relationship of Tosepan with COEC?
16. Can you talk about the strategic importance of each of the Cooperatives? Is there one or more of the programs or cooperatives that you are prioritizing right now? If so, what are the reasons?
17. Which one is the main source of income of the Union of Cooperatives, and what is the importance of monetary income for Tosepan in order to fulfill its goal of living with dignity?
18. How are financed the social projects and cooperatives?
19. Can you describe the goals and tasks of the Training Center?
20. How has been the process and the overall experience to acquire, develop and use all kinds of technologies for your productive processes, and for agricultural management?
21. How would you evaluate the possibilities to access and use of technologies in Tosepan?
22. In which part of the organization can I find the protection and conservation of the environment?
23. Are there any environmental commitments that the members or producers have to fulfill for environmental protection?

Agricultural management

24. What are the rules for the productive processes? If for example, producers are both organic and conventional, do you have specific guidelines or practices that the producers have to follow in both cases in order to sell their production to Maseueal X.?
25. Where/how are those rules coded or expressed? Can you explain those rules?
26. Is production of coffee and pepper a complementary income of the producers? What is their main income?
27. Does Tosepan families can provide themselves with the food that they grow?
28. What have been the results of Tosepan in order so that the producers can produce their own food?

29. In commercial production, does Tosepan or any of its cooperatives aware of the state of the nutrients of the soils of the plots of the producers?
30. Does Tosepan supports of manages application of fertilizers of the producers?
31. What is the main energy source to cultivate any of the commercial crops?
32. What about electricity in the processing of agricultural products, when is it used?
33. How Tosepan or Tosepan producers did got the knowledge for organic and conventional production?
34. How much does Tosepan producers produce on average a year? Tons of coffee, tons of pepper, other crops, honey.
35. Does Tosepan measure the environmental impacts of its producers?
36. How does Tosepan measure those impacts?
37. What are the marketing strategies of the commercial production of Tosepan at the local, national and international level?
38. Can you talk about the economic and environmental outcomes of the production of conventional coffee and pepper for Tosepan?

Eco-touristic project (find out If it is related to agricultural management).

39. The decision process to start the eco touristic project.
40. Who are the concrete members of this project?
41. Who owns the land and where is the eco-touristic project established?
42. What are the guidelines of the eco-touristic project for building, water use, and energy use and so on?
43. Can you mention impacts, both positive and negative of the eco touristic project? (economic, environmental)
44. What about the income generated by this project, where does it go?
45. What about the possibility to expand in the communities where the producers live, is that possible?
46. Have you started with concrete actions for the dissemination of eco-tourism?
47. Do you have any environmental protection or conservation plan?
48. How do you promote eco-tourism in the region?
49. How tied are you to the programs of Tosepan?
50. What about subsidies, of any kind?

Vision of nature/Culture

51. How do you (personally) take care of the environment?
52. Are there any projects or guidelines in Tosepan for environmental protection or conservation?
53. Do you have specific guidelines, norms or projects for environmental protection of your forest areas or non-productive areas?
54. Some indigenous communities organize the ownership of their lands in the *ejido* (communal way), what does it mean for you to be small owners but organized in a communal organization?
55. Would you say there is one most important economic activity of Tosepan? Which one would it be?
56. Do you see economic activities by hierarchies at all, or would you say they are all at the same level?
57. What's your opinion on the level of biodiversity of the producer's plots of Tosepan?
58. What is the traditional way to manage the lands, what do you think about it?
59. Do you keep any records of biodiversity in the area? How?

Participant s to the interviews:

Paulina Garrido (President)

Octavio Zamora (Worker from Maseual Xicaualis cooperative)

Antonio X (Worker from Tosepan Kali cooperative)

Nestor Chavez (Former external adviser of COEC and professor at UNAM)

Daniela Ruano (Worker from Tosepan Patji cooperative)

Wished to remain anonymous:

Worker from the honey cooperative

Worker from Maseual Xicaualis

Active partner

II. Institutionalized indigenous movements in Mexico

Below it is presented a short list of some institutionalized indigenous movements at the local level in Mexico:

EZLN (1992): After 1996, and the failure to reach an agreement for a national law on indigenous peoples that could approach their demands. What did happen was the strengthening of the internal governance of the affiliate EZLN communities regardless of its military organization. In 2003 the insurgent communities transitioned into autonomous municipalities named 'caracoles' ruled by 'juntas de buen gobierno' or good government boards. In this evolutionary process, the communities managed their political reorganization with the implementation of the EZLN goals into their traditional customary rules, and declared that the new autonomous municipalities would be in charge of:

> *The justice; communitarian health; education; housing; land rights; employment; food security; trade; information and culture and the local transit (Enlace civil A.C, 2017).*

In addition, they broke their tendency to be externally isolated, and their renewed social and environmental projects were made more visible for the global civil society in order to get a better understanding and support for their causes.

In regards to the environmental aspect of their renewed governance, in the 2000's Zapatista communities started agricultural projects based on 'agroecological' approaches, as well as organic production for auto-consumption, regional and even international distribution through producers' cooperatives (Enlace Civil A.C, 2017). Zapatista autonomous municipalities currently have an environmental protection work area where they state:

> *Each village, ejido, ranch has its own reserve where by agreement of the assembly, nobody can cut, nor burn, nor remove wood from there. The old cultivation method of slash-and-burn is already far from the current agro-ecological techniques that are being implemented in the five 'caracoles'. Also, in the five zones is prohibited the use of chemical agents for agriculture, thus protecting the land (Enlace civil A.C, 2017).*

Wirikuta (2010): The huichol people developed a strategy with the cooperation of civil actors such as NGOs, artists and academics to fight against the governmental decision to grant mining rights to a Canadian company in their sacred desertic territory in the north of Mexico. In 2011, the social movement represented by the Traditional Regional Council managed to get the federal suspension of the mining project. The Traditional Wixarika Council created in 2010 is still working on social and environmental projects in the Huichol territories with seven working areas that include environment, communal development, politics and culture.

Cheran (2011): The Purepecha people, organized mainly by women, fought against the illegal logging of their communal forests and the persistent crime in their town. They managed to expel both the organized crime and the previous municipal government in a riot that lasted for many days in April of 2011. Currently, they are an autonomous indigenous municipality in the state of Michoacan. Their most recent project is the petition to be able to get the direct state budget into the autonomous municipality. They have environmental projects such as surveillance systems for the communal forests and the program 'Zero waste', were they managed to recycle 90% of the households waste through their own sorting system.

Istmo of Tehuantepec (2012): Zapotecocommunities used both legal and civil resistance procedures to fight against the wind power project from diverse public and foreign private companies such as Coca-Cola. The project was finally suspended by a federal court until it can benefit and consider the affected communities according to a court decision.

III. Glossary of agricultural practices

Glossary of agricultural practices.

> ***Bocashi method****. It is a japanese methodology to elaborate organic fertilizer. It is rich in nutrients that are necessary for the development of crops and it is obtained from the fermentation of dry materials conveniently mixed. The nutrients obtained from the fermentation of the materials contain major and minor elements, which mixed together produce a fertilizer superior to most chemical fertilizer formulas. The greatest possible diversity of materials should be used to ensure a better nutritional balance of the fertilizer. The basic ingredients are: manures, broken coal in small particles, grain bran, rice husk or coffee or straws well chopped, fire ash, molasses or honey from sugar cane or juice of the same, yeast for bread, clay soil well sifted, water (only once and when preparing it)* (FAO, 2018 a; 7-8 pp.)
>
> ***Coffee pulp*** *or husk is a fibrous mucilagenous material (sub-product) obtained during the processing of coffee cherries by wet or dry process, respectively. Coffee pulp/husk contains some amount of caffeine and tannins, which makes it toxic in nature, resulting the disposal problem. However, it is rich in organic nature, which makes it an ideal substrate for microbial processes for the production of value-added products. Several solutions and alternative uses of the coffee pulp and husk have been attempted. These include as fertilizers, livestock feed, compost* (Ashok, et. al. 2000; n.p.)
>
> ***Contour plowing.*** *The practice of tilling sloped land along lines of consistent elevation in order to conserve rainwater and to reduce soil losses from surface erosion. These objectives are achieved by means of furrows, crop rows, and wheel tracks across slopes, all of which act as reservoirs to catch and retain rainwater, thus permitting increased infiltration and more uniform distribution of the water.The practice has been proved to reduce fertilizer loss, power and time consumption, and wear on machines, as well as to increase crop yields and reduce erosion. Contour farming is most effective when used in conjunction with such practices as strip cropping, terracing, and water diversion* (Encyclopædia Britannica, 2018 a; n.p.).
>
> ***Living barriers.*** *Vegetative barriers are permanent strips of stiff, dense vegetation along the general contour of slopes or across concentrated flow areas. Vegetative barriers are used to reduce sheet and rill erosion, reduce ephemeral gully erosion, manage water flow, stabilize steep slopes, and trap sediment. Vegetative barriers are normally established as part of a conservation management system to address natural resource conservation needs and*

landowner objectives. For this practice to be fully effective, it should be installed with other components of a resource management system that reduces sheet and rill erosion, such as conservation crop rotation, residue management, and contour farming (NRCS, 2010; 1-2).

Organic agriculture. *it is a system that relies on ecosystem management rather than external agricultural inputs. It is a system that begins to consider potential environmental and social impacts by eliminating the use of synthetic inputs, such as synthetic fertilizers and pesticides, veterinary drugs, genetically modified seeds and breeds, preservatives, additives and irradiation. These are replaced with site-specific management practices that maintain and increase long-term soil fertility and prevent pest and diseases.*

It is an holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity [...] *taking into account that regional conditions require locally adapted systems. This is accomplished by using, where possible, agronomic, biological, and mechanical methods, as opposed to using synthetic materials, to fulfil any specific function within the system* (FAO, 2018 b; n.p.).

Terracing. *Method of growing crops on sides of hills or mountains by planting on graduated terraces built into the slope. Though labour-intensive, the method has been employed effectively to maximize arable land area in variable terrains and to reduce soil erosion and water loss. In most systems the terrace is a low, flat ridge of earth built across the slope, with a channel for runoff water just above the ridge. Usually terraces are built on a slight grade so that the water caught in the channel moves slowly toward the terrace outlet. In areas where soils are able to take in water readily and rainfall is relatively low, level terraces may be used* (Encyclopædia Britannica, 2018 b;n.p.).

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