

# Chapter 27

## Agrobiodiversity in Mexican Environmental Policy



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As an example of a multi-scalar analysis approach from Barcelona School of Ecological Economics, in this chapter we present a case study applied to Mexican agrobiodiversity policies. In Sect. 27.1, we explain the role of agrobiodiversity at different scales, Sect. 27.2 exposes the importance of maize in Mexican agrobiodiversity, and Sect. 27.3 analyzes multi-scalar agrobiodiversity policies in Mexico focusing in maize.

### 27.1 The Role of Agrobiodiversity in Rural Systems

In countries such as Mexico, different factors affect agricultural systems, such as: (i) international markets, which do not reflect the importance of most of the countries linked to maintaining food security; (ii) the biophysical performance of agriculture, which plays a special role in alleviating poverty; and (iii) the effect of market prices of agricultural products, which underestimate the indirect effects of agricultural growth.

Rural livelihoods have been incorporating new combinations of technological, discursive, commercial, and financial elements in recent decades (Hecht, 2010), along with the fragmentation of working classes and migratory flows in multiple directions between rural and urban, national and international, and in permanent and cyclical modes (Borras, 2009). For example, the agro-industrial model of maize expansion has induced changes in land use and production that generate severe negative impacts (i.e., sociocultural, ecological, biophysical) associated with

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malnutrition, migration, poverty, disease, lack of food, among others. There are also changes in monetary flows and energy inputs such as machinery, petroleum products, fertilizers, and transgenic seeds, which also result in negative social and environmental impacts (Arizpe et al., 2011; Holland et al., 2008). In traditional agriculture, both men and women participate in different activities, including what feminist scientists call “care work” (Jochimsen & Knobloch, 1997), “reproductive work” (Biesecker & Hofmeister, 2010), “domestic production,” or “subsistence,” as well as productive agricultural work. Likewise, traditional agriculture considers the diversity of crops, also called agrobiodiversity.

Agrobiodiversity involves various areas of knowledge (agronomy, anthropology, ecology, botany, etc.) and reflects complex human social relationships, influences conservation policies for cultivated ecosystems, and promotes food security, social inclusion, and sustainable development. In addition to taking into account the cultural processes, knowledge and practices of farmers as key elements in the maintenance of agroecosystems (Bergel, 2017). Agrobiodiversity includes all the variety and variability of animals, plants, and microorganisms that are used directly or indirectly for food and agriculture, including crops, livestock, trees, and fish. Created and managed by farmers, shepherds, fishermen, and forest dwellers, it encompasses the diversity of genetic resources (varieties, races) and species used for food, fodder, fibers, fuel, and medicine. It also includes the diversity of unharvested species that support production (soil microorganisms, predators, pollinators) and those in the broader environment that support agroecosystems (agricultural, pastoral, forestry, and aquatic), as well as the diversity of agroecosystems (FAO/PAR, 2011), which are considered to be constituted by all the biological elements in it, while agrobiodiversity refers to all the components of biodiversity that deal with food and agriculture (Salazar et al., 2015).

## **27.2 Maize, an Emblematic Case of Agrobiodiversity in Mexico**

Mexico is the center of origin and diversification of 15.4% of the species that are used as food sustenance worldwide, 62 languages are also spoken within its territory, and it is the country with the greatest cultural diversity in America. In this regard, the domestication of species is a biocultural event and therefore the conservation of agroecosystems is of great importance (Barrera-Bassols et al., 2011). Among the 130 crops of which Mexico is the center of origin, domestication or genetic diversity of maize, beans, chili, squash, chilacayote, amaranth, tomato, avocado, sweet potato, nopal, tobacco, cocoa, and vanilla stand out, crops that coexist with its wild relatives, for example, 7 species of teosinte have been identified, which are the ancestors of modern maize, 67 species of wild beans, 10 of squash, and 38 of amaranth (Casas & Parra, 2016).

Peasants not only contribute to maintaining the evolution of maize, but the scale at which this is done becomes by itself an irreplaceable evolutionary or ecosystem service. These ecosystem services arise because peasant maize agriculture combines in a single system, three of the main factors that are known to positively affect adaptive evolution: large effective population size, high-level genetic diversity, and environmental change (Bellon et al., 2018).

Peasants have created, or inherited, complex agricultural systems that, for centuries, have helped them meet their subsistence needs, even under very adverse environmental conditions (Altieri, 1999). The fundamental objective of the peasant economy is to satisfy the consumption needs of the family nucleus and to exchange the surpluses. Therefore, the knowledge and comprehensive use of the largest amount of biotic and abiotic resources in their environment is essential.

At least 9 million hectares dedicated to agricultural production in Mexico are found in mountain areas at altitudes above 2000 m above sea level, where it is frequent that many of the cultivated plots are located in hillside areas, on marginal soils, and with irregular rainfall regimes. These are generally poor producers, which have very limited means of production, and therefore make strategic use of the scarce productive resources they possess: labor, land, and seeds. Under the above conditions, maize seeds and the knowledge that producers have about them and their environment are two of the fundamental elements that guarantee the survival of the peasants and their families, which could number around 12 million people. Therefore, maize seeds constitute a vital resource for a very important segment of Mexican rural society.

### 27.3 Multi-scalar Policies on Agrobiodiversity Issues

Few studies have analyzed how agrobiodiversity is maintained in farmers' fields. Research on the subject, especially from South America and Asia, suggests that there is a connection between the conservation of agrobiodiversity in farmers' fields and the exchange of seeds (Badstue et al., 2007).

In 1983, FAO adopted an International Undertaking on Plant Genetic Resources for Food and Agriculture, which is a voluntary agreement signed by 113 countries, whose purpose is to promote international harmony regarding access to plant genetic diversity. In 2001, the 180 countries of the FAO Conference adopted an International Treaty on Plant Genetic Resources for Food and Agriculture. This Treaty represents a global agreement on a subject of primary importance: the management of the world's agrobiological diversity. The objectives are the conservation and sustainable use of plant genetic resources for food and agriculture, and the fair and equitable sharing of the benefits derived from their use, in harmony with the Convention on Biological Diversity, for sustainable agriculture and food security. The agreement covers all plant genetic resources relevant to food and agriculture.

In Mexico, until very recently, there has not been a policy to promote and conserve biodiversity, nor agrobiodiversity, nor in particular the diversity of its great

wealth of native maize. It is enough to point out that agricultural policies since the middle of the past century have been characterized by promoting agricultural productivity per unit area from the use of a set of inputs such as hybrid seeds, fertilizers, pesticides, and agricultural machinery. So, we have had policies that promoted the predominance of a few types of improved varieties with high productivity, which are grown in large areas, and which have undermined the preservation of the diversity of native maize. However, it is surprising that a relatively recent study published by the National Commission for the Knowledge and Use of Biodiversity (CONABIO, 2006) has documented that the diversity of native maize in Mexico is kept under cultivation in practically all of the territory of the country.

The T-MEC, continuation of the North American Free Trade Agreement (NAFTA), regarding the “Protection of New Varieties of Plants” (seeds), has an agreement where Mexico must ratify to the International Convention UPOV-91, which obliges Mexico to continue adhering to UPOV, better known by social organizations that resist GMOs, such as the Monsanto Law, which is nothing more than “privatizing seeds” and concentrating its ownership in transnational monopolies.

The Federal Law for the Promotion and Protection of Native Maize (LFFPMN) seeks to recognize the production, commercialization, consumption, and constant diversification of this species, as a national cultural manifestation. This new Law proposes that the State must guarantee and promote, through all the competent authorities, that the general population has access to the informed consumption of native maize, as well as to derived products, in conditions free of genetically modified organisms and other genetic improvement techniques. The current federal government, through the Rural Development Secretariat (SADER), seeks to promote a “long-term” policy, “more productive, sustainable, and inclusive,” with productive and commercial objectives. Two undersecretariats, Agriculture and Food Self-sufficiency, were created. The former is responsible for matters of agriculture productivity and rural development; the latter is in charge of 4 of the 25 strategic programs of the new government, all “socially oriented” and with the objective of paying for the purpose of achieving food self-sufficiency. The appearance of what would appear to be new programs is reduced to objectives and instruments very similar to those that have operated in the last 25 years. Between 72% and 82% of rural maize-growing households use their production for human consumption; that is, they do not market it. According to recent studies, the value of the maize that these households harvest for their subsistence is ten times higher than its price in the market. For the same reason, maize price subsidies do not benefit this majority; on the contrary, they generate adverse conditions, by definition, to their activity. The presumption that such prices will convert this population into surplus producers has no clear grounds. More than incentives to increase their yields, the subsidies create conditions for the concentration of land within their communities. By capitalizing on land rent, the proposed subsidies will be regressive. The big losers of the sector reform could well be the peasants, the rural population and agrobiodiversity, in the social sphere, and the native ecosystems and climate change in the environmental aspect (Dyer et al., 2019).

Although we began to have in Mexico the first laws that address the problem of conservation and promotion of biodiversity, and in particular agrobiodiversity, such as the Federal Law for the Promotion and Protection of Native Maize (DOF, April 13, 2020). In practice, there is no evidence that the legal framework is responsible for the conservation and promotion of the country's biodiversity, quite the contrary, there is clear evidence of how, for decades, "rural development" laws have agrobiodiversity of the country undermined.

In recent years, the Mexican federal government has implemented a set of programs that, at least in their objectives, consider the protection and promotion of agrobiodiversity. Such is the case of the "Sembrando Vida" program, in charge of the Ministry of Welfare, which, in addition to proposing as an objective the reforestation of 1 million hectares with native tree species in 19 states of the country, promotes the sowing of native seeds from each region and locality through the milpa system. The National Council of Science and Technology (CONACYT) has also implemented the National Strategic Research Programs (PRONACEs), including the one aimed at the recovery of Food Sovereignty and which also seeks to rescue native seeds and peasant knowledge. Within the Ministry of Agriculture and Rural Development (SADER), there is a Sub-secretariat for Food Self-Sufficiency that promotes a set of programs that also emphasize the promotion of native seeds and peasant knowledge as a central part of their strategies. Lastly, we can mention the Ministry of the Environment and Natural Resources (SEMARNAT), which also includes a set of programs aimed at protecting, recovering, and promoting agrobiodiversity in Mexico. One of the great challenges for the current federal administration will be to not only implement these policies and programs but also to interconnect them to enhance their effects and achieve the best possible results. However, we will have to wait, at least for the remainder of this government, to start evaluating its effects, it is still too early to assess its impacts.

Regarding local policies, we find that different movements and organizations that promote agrobiodiversity emerge from below, mainly rejecting the entry of transgenics, such as the Regional Organization of Purhépecha Farmers in Defense of Criollo Maize (ORAPDMC). Thus, it gave rise to a *sui generis* indigenous resistance movement by promulgating a precautionary policy in the face of the possible arrival of GMOs in the open field, with repercussions at the national and international level and by articulating with other resistance movements in the country. For the time being, a joint program began that involved a dozen indigenous and mestizo communities of the basin, academics, non-governmental organizations (NGOs, hereinafter), government agencies, donor foundations, artisans and artists, and the public from the city and the countryside. The above-mentioned program is articulated through several components that allow it to be comprehensive: (i) the revaluation of local agronomic knowledge, including agricultural rituals, the exchange of seeds between producers, and the return of native germplasm to its original places; (ii) the launch of agroecological projects and training together with academics, technicians, and NGOs; (iii) the revaluation of maize as its own cultural icon in the media (radio, press, and television); and (iv) political work based on conferences, regional fairs, and local maize festivals.

In Mexico, we find other movements of a sociopolitical nature that emerge with this cause and that adapt their own cultural and natural contexts, and that in their petition documents have points such as (i) rejection of aggressive agricultural technologies such as biotechnology, (ii) rejection of the local effects of the global market, (iii) rejection of the health effects caused by both, and (iv) defense of food sovereignty against the loss of agrobiodiversity, among others. For example, some of them are The Totonaca Nahuatl Indigenous Unit (UNITONA), The Vicente Guerrero Comprehensive Rural Development Project (GVG), The Union of Organizations of the Sierra Norte de Juárez in Oaxaca (UNOSOJO), among others.

## 27.4 Conclusions

Contrary to what public policies for agricultural development have been, the native maize of Mexico remains a clear expression of the resistance of indigenous and peasant people, who have been ignored for years by such policies.

Different movements and organizations emerge to revalue or fight for agrobiodiversity. In this chapter, we find that beyond the fact that agrobiodiversity is important for the current Mexican government for its incorporation into its strategic lines, these policies are not yet implemented. However, we find that communities continue to resist along with the support of other national–international organizations, local governments, or experiences of other peasant movements.

In this regard, there is a continuous struggle to preserve agrobiodiversity and associated biocultural processes, both by peasants as well as by urban areas that consume agrobiodiversity products. According to our analysis, local policies are more successful in activities that promote and preserve agrobiodiversity. National policies in many cases are conflicting between programs. It is important that top-down and bottom-up policies are integrated, in addition to considering the entire Mexican territory.

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