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Tequila, Heritage and Tourism: Is the Agave Landscape Sustainable?

Martín P. Tena Meza, Ricardo Ávila and Rafael Mª Navarro-Cerrillo

Introduction

In these pages, we briefly describe the origins of tequila, Mexico's most emblematic alcoholic beverage, before going on to analyse the current state of the tequila industry. Both aspects are considered in relation to the tourist potential of tequila in light of the declaration made by the United Nations' Education, Science and Culture Organization (UNESCO) that certified the *Agave Landscape and the Ancient Industrial Installations in Tequila, Jalisco* as elements of the Cultural Heritage of Humanity in the category *Cultural Landscapes*. Our observations conclude with a series of proposals that hopefully, will broaden and enhance the quality of tourist-related activities around the artisanal production of tequila and the Agave Landscape from a perspective of sustainability.

The Agave Plant

The genus *Agave* L. includes over 200 species, three-quarters of which exist in Mexico, the country that can be considered the birthplace of these plants. Of these species, at least 74, together with 28 infra-specific *taxa*,[1] have been documented as forming part of human diets, as the raw material for elaborating fermented and distilled drinks, and as well as a source of fibre and forage (Colunga-García Marín *et al*., 2007). In the state of Jalisco, specifically, 23 species of the genus *Agave* have been registered (Hernández *et al*., 2007), many of which have developed from archaic times, especially in the Santiago River Canyon

[1] *Taxa* (plural of *taxon*) is the taxonomic unit of any hierarchy.

(*Barranca*) north of the city of Guadalajara, the state capital, where they are favoured by the warm climate and dry forest vegetation.

Industrialized tequila production originally used various types of agave (Pérez, 1887),[2] selected for their short stems and tough fibres commonly known as *piñas* or *cabezas*. Those stems and the bases of the leaf (called *pencas*) contain high concentrations of polysaccharides and are very palatable. In fact, the area around this Canyon is considered the birthplace of the species *Agave tequilana* Weber, which was selected over a hundred years ago for tequila production because it grows relatively quickly, has properties suitable for industrial exploitation and generates more offshoot (*pencas*) than other species (Valenzuela-Zapata, 1997; 2003).

The first Official Quality Norms for Tequila (NOM, 1949) defined this beverage as an alcoholic drink elaborated from *Agave tequilana* and other species of that genus. But those terms were modified in new Norms issued in 1964, which specify *Agave tequilana* Weber var. *Azul* exclusively, though no justification was given for introducing this change. This measure provoked the marginalization of other species that had been widely used to produce the drink called *mezcal* –tequila's original name– to such a degree that supplies were depleted, and some types may have become extinct in the study zone after falling into disuse (Valenzuela-Zapata 1994; 1997).

In this regard, it is worth noting that no wild populations of *Agave tequilana* or *Agave angustifolia* Haw have been found recently in the Santiago River Canyon, the area where agaves developed archaically, as mentioned above.[3] The reason for it could be that the study area lies on the margins of the natural distribution zone of those species, it might also be due to their extinction in this zone, in contrast with areas in southern Jalisco where the introduction of *Agave tequilana* and the development of the tequila industry has been less intensive. In this latter region, distilled drinks are produced from over 20 types of cultivated agaves (Colunga & Zizumbo, 2005).

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2 «There are several classes of this precious Mexican plant that are cultivated for the liquor industry of a drink called *mescal* […]. Their names are: *chino*, *azul*, *bermejo*, *sigüín*, *moraneño*, *chato*, *mano larga*, *zopilote*, *pie de mula*, etc.»

3 A species related to *Agave tequilana* that is also used to produce agave distillates.

Tequila Production

Like many other crops exploited on an industrial scale, many of them linked to international markets, *Agave tequilana* is known to cause the deterioration of local agroecosystems because it is mono-cropped and requires huge investments in agricultural inputs to obtain high yields. This induces the following pernicious effects, among others that could be mentioned:

Loss of genetic diversity. Because agave cultivation depends on the abundant asexual propagation of ofshoots, mono-cropping reduces the genetic variability of populations (Hurtado, 2008). This, in turn, increases the plants' susceptibility to plagues while reducing their ability to adapt to the environment (Abraham-Juárez *et al*., 2009).

Vulnerability to plagues and diseases. Planting the same species of agave (mono-cropping) over broad extensions, which is highly-characteristic of the Agave Landscape, contradicts the principles of agroecology since, as this method of cultivation is well-known to foster the development of plagues and diseases.[4] To give but two examples: in 2007, one-fourth of the 120,000 hectares of cultivated agave were affected by diseases and plagues,[5] while for over two decades –between 1990 and 2010[6]– agave farming suffered a phytosanitary crisis that severely affected plantations.

Intensive use of agrochemicals. High-density, monocrop plantations require ever-greater dosages of fertilizers and biocides, whose application contaminates soil and water. This has caused devastating changes in local ecosystems and damaged the health of nearby populations. The latter occurs because most of the farm workers who carry out activities are of a low socioeconomic level who do not adequately handle agrochemical products because they rarely receive the necessary training and qualified technical assistance is not usually available. Furthermore, a particularly common practice consists in keeping

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4 The most common diseases that affected agave were: anillo rojo (*Erwinia* spp.), stem rot (*Fusarium oxysporum*), and shoot rot (*Erwinia* spp.) (Vicente, 2002).

5 Ulises Zamarroni (correspondent): «Agoniza la producción de agave azul, alertan». *El Universal*, *Sección Estados*, August 9th, 2007.

6 Javier Trujillo Arriaga, *Director General de Sanidad Vegetal*, *Servicio Nacional de Sanidad*. Discourse at the *I Foro de Discusion Fitosanitaria en el Cultivo del Agave Azul Tequilero*, May 31st, 2011.

agave fields free of other types of vegetation that could compete for environmental resources, though this entails applying enormous quantities of herbicides and glyphosate, a particularly toxic pesticide (Seneff, Swanson & Li, 2015; Watts *et al.*, 2016).

Soil erosion. Mezcal cultivation takes place in various environmental niches (topoforms) that make up the Agave Landscape, including: *a*) the slopes of the Tequila volcano; *b*) plains in the El Arenal, Amatitán and Tequila valleys; and *c*) the banks of the Santiago River Canyon. This latter zone has suffered a significant loss of the fertile layer of soil because the furrows formed for planting run parallel to the downward slopes, soil conservation practices are notably absent –despite the fact that fields are quite steep– and the intensive application of herbicides eliminates other types of vegetation cover.

Agave growers. The method of *Agave tequilana* cultivation (*i.e.*, quality, attention and management) largely depends on the kind of producer involved, but above all on the per-kilo price of the product on the market. The first group of growers consists of large companies that cultivate some of the agave they require in their own fields. Second, come producers who have sufficient access to capital to specialize in agave production, either on their own fields or rented land, in order to sell their harvest directly to industries that produce tequila. In third place, we find small producers who practice more diversified agricultural activities. Their agave fields rarely exceed one hectare in size, and they often plant in one or more agroecosystems, including under the following conditions: rain-fed fields, irrigated fields, sloped fields shared with corn, squash and beans in different proportions, and plantings in fallow fields that may or may not have irrigation. These producers are usually active in other economic practices, such as commerce or as paid agricultural labourers on other farms. Finally, a fairly high proportion of these growers produce their own tequila, or negotiate contracts with taverns to process their agave plants.

Here, it is important to note that, strictly speaking, growers are not obliged to register their agave plantations with the Tequila Regulating Council[7]

[7] The *Consejo Regulador del Tequila, A.C.* is the organism in charge of verifying and certifying compliance with the NOM for tequila. It also oversees the quality, culture and prestige of this drink. It is an inter-professional institution that since 1993 has brought together all the producing actors and agents linked to tequila production. 'Actors' and 'agents' can also be understood as large tequila distilleries.

(*Consejo Regulador del Tequila*, CRT), which exists, in part, to guarantee product quality. This is because when agave is scarce, available volumes can easily be traded at attractive prices, but when supplies of *Agave tequilana* dwindle, «tequila» production is maintained by expressing the juice from other species of agave and distilling it, even if those plants were harvested outside the boundaries of the certified «region of origin». Sometimes, immature plants may be boiled and pressed to obtain the raw material for tequila production. Although they do not contain all the sugars required to produce alcohol, they do contribute to the typical 'tequila flavour'.

Agave crises. Shortages of raw material for tequila production have frequently occurred. One key cause of scarcity is the poor health of plantations. In the mid-19th centurya disease called «gangrene», or «drying» (*secazón*) damaged agave production to such a degree that in 1868 a reward was offered to anyone who succeeded in eradicating the terrible scourge. Another outbreak of this disease occurred in the late 20th and early 21st century, when much broader extensions of land had been sown with agave (Valenzuela-Zapata, 2003).

Another important and recurring aspect that affects how agave is produced and commercialized nowadays involves situations of excessive supply and it's opposite, severe shortages. These oscillating periods can cause enormous economic losses for producers and represents a particularly contentious issue since growers are limited in their ability to manage these conditions because Mexico's Department of Agriculture, Cattle-Raising, Rural Development, Fishing and Alimentation (*Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación*, SAGARPA), National Chamber of the Tequila Industry (*Cámara Nacional de la Industria Tequilera*, CNIT), and the aforementioned Tequila Regulating Council (CRT) can neither prohibit agave production, nor oblige farmers to plant agaves. Clearly, existing technology for the instantaneous diffusion of data would allow these organisms to continuously generate and disseminate information on supplies of this raw material and so forecast supply-and-demand for the tequila industry in any given period. Unfortunately, these practices have not been implemented.

When growers decide to undertake agave cultivation, like any other economic agent they are motivated by the high per-kilo price that this product can demand in the market (up to 17 Mexican pesos), and by the —often— illusory hope that this will continue *sine die*. Obviously, these conditions can

generate overproduction of this raw material[8] with the consequent rapid price decreases that can go as ridiculously low as 30 or 40 *centavos* per kilo. As Tena, Ávila and Jiménez (2015) point out, fluctuations between periods of scarcity and overproduction of mescal plants can be traced back to one basic fact: that the market is determined by *buyers*, not *producers*. Some observers argue that periods of abundant raw material are induced deliberately by industrialists who offer high per-kilo prices for agave to increase cultivation, well aware that this will eventually generate overproduction that will automatically force prices to fall, perhaps drastically; obviously, to their advantage.

Other important factors that determine prices and orient agave commercialization are the presence of intermediaries (called *coyotes*) who operate between producers and industrialists and usually end up obtaining the highest profits from this part of the tequila production, and the fact that the nom for tequila authorizes mixing agave sugars with those extracted from other plants —especially sugarcane— in proportions as high as 49 per cent. This occurs especially when agave is more expensive than other sugar-producing plants and can be used as a substitute for agave up to almost 50 per cent.

The tequila industry. Once mature agaves are harvested (*jimado*)[9] in the field, they are transported to a tequila distillery, where the ball-shaped hearts (called *piñas* or *cabezas*) of the plants are cleaved into pieces, roasted in ovens, and then crushed in order to extract their substances (*mieles* in Spanish) that are then fermented in huge vats to transform the agave's sugars into alcohol.[10] Finally, a double distillation method in stills produces the separation and concentration of the degree of alcohol desired for the drink in question. As in the production of sugarcane alcohol and similar distilled drinks, tequila production generates huge amounts of bagasse that —if not suitably disposed of— represent a serious problem of environmental contamination. In the specific case of

8 We should point out that mezcals must be harvested once they mature, a process that takes, on average, about eight years from the time of planting.

9 In Mexico, especially in traditional tequila-producing areas, *jimar* refers to field labors where men (*jimadores*) cut the leaves (*pencas*) off the heart of the agave, which is the part of the plant used to produce tequila.

10 A second procedure for obtaining sugars from agave plants consists in splitting the hearts and injecting high-pressure steam. This technique makes extraction more efficient.

tequila production, this problem has not been dealt with adequately and is still far from being resolved.

Producing one litre of tequila requires 7.5 kilos of mature mescal, but 40 per cent of the weight of this raw material must be disposed of after extracting the sugars. This amount to 3 kilos of bagasse per litre of tequila elaborated. But the depicted distillation process also produces a second waste product, called vinasse, which has a negative impact on the biota of the ecosystems where it is discarded. The amount of vinasse produced per litre of tequila varies from 7 to 11 litres (Cedeño, 1995; Ibarra *et al.*, 2010).

In the so-called Agave Landscape, properly-speaking, there are 50 registered companies devoted to tequila production. Unfortunately, the volume of waste products that they generate is unknown, as is their final destination.[11] But what is visible is the perennial and increasing contamination of streams and aquifers, a reality that has caused water scarcity for human use in the area, as well as the disappearance of orchards and gardens that require irrigation. Finally, environmental norms demand that tequila distilleries dispose of their waste products adequately, but only the largest companies have the economic capacity to support the investments that compliance requires. In reality, the few industries that apply those norms do not necessarily follow environmental dictates to the letter; that is, they fall short of 100 per cent compliance.

Artisanal Tequila Production

Tequila production originally took place in taverns established on lands around the Santiago River Canyon so that producers did not have to transport their *mezcals* outside the area. Also, the zone had abundant supplies of the good-quality water that elaborating distillates required. But another reason for this *modus operandi* was to keep production in clandestine conditions to avoid paying taxes to the fiscal authorities.

[11] Response to the request for pertinent information submitted by the authors to the Department of the Environment and Territorial Development of the State of Jalisco (semadet), supported by the «Policy of Transparency of the State of Jalisco»; file 3s96/2017, 19 September 2017.

Though in past decades those small taverns were harassed by the State and tequila entrepreneurs, now that «this tradition is back in style» and consumers enjoy distillates made from other agaves, the few taverns that survived inside or on the outskirts of the Agave Landscape still operate 'clandestinely', but apparently problem-free. Indeed, some are employed to promote and disseminate the origins of tequila production.

Today, most small tavern-operators who are devoted to producing agave distillates also perform other typical farming activities, sometimes on lands close to their homes, and not so much on the places where their tavern lies. But because of the volatility of agave prices, very few produce tequilas year-round, since it is not economically viable to depend on one sole productive activity. In fact, most continue distilling simply because they enjoy it, while others never lose hope that their business will one day produce profits and «pull them out of poverty…»

These tavern-owners usually learned their trade from a relative —father, father-in-law, uncle, etc.— or by working as young men in taverns in their hometown or nearby villages in the surrounding sierra, where they learned the art of distillation, though not through any kind of formal instruction. They often refer to their masters (*maestros*) as men who had extensive experience and the ability to produce unique, special, distillates. Though they learned as best they could, they feel they cannot match their *maestros'* achievements because they never learned what they call «the secret». They cannot distil tequila like those men did, though they do asseverate that their products are «more-or-less» the same.

The smallest taverns, those with limited production volumes, are not significant competitors for the large, long-established tequila-distilling companies, so they market their products on a small scale, usually selling in bulk to relatives and friends. Thus, for example, numerous small operators may be contacted to sell their products —always at prices below those of the formal market— when people organize family parties or neighbourhood festivities, which always involve small budgets. However, some tavern-owners (surely, a small minority) who enjoy broad recognition in the trade have been sponsored, semi-officially, by promoters of 'agave culture' to demonstrate the roots and history of tequila production. They may succeed in commercializing their products at prices that rival those of the best distillates sold by the large, commercially-consecrated companies.

Although these artisanal producers usually ply their trade individually or perhaps with family labour, some occasionally hire neighbours or friends to help with the tasks involved in the distillation process. This provides jobs (though usually temporary) and a modest monetary remuneration, which in rural areas of Mexico are rarely unwelcome. Through these processes, some artisanal distillers produce considerable quantities of tequila and so decide to establish their own small-scale businesses, though this does require registering their operations with the CRT and receiving authorization to distil special editions of tequila requested *ex profeso*, or perhaps to elaborate certain agave products for other companies on a by-order basis (called *maquila*). There are even cases of growers who, like landowners of the past, have set up their own small taverns where they can produce and consume their favourite tequilas, extracted from their own agaves production, or others that might not belong to *Agave tequilana*. For example, they may incorporate agave *masparillo* (*Agave guadalajarana* Trel.), or a species called *sigüín* (*Agave angustifolia*), which grow wild in the sierra beyond the borders of the Santiago River Canyon. Even more, these tavern-owners may be hired to process agaves that are transported from far-off places, like semi-desert zones of Zacatecas.

As in other cases of artisanal production, it is the price of the raw material (agave) that determines the activity of the more traditional tavern-owners. Thus, when agave is cheap, those who possess some stocks prefer to invest a modest sum of money to give their harvests added value, instead of selling at low prices, so they distil their agaves themselves or pay to have them processed. Likewise, other tavern-owners, meanwhile, try to take advantage of such circumstances by taking the risk of buying agave at the low price and having it distilled, in the hope of turning a high profit. But when agave price is high, they stop purchasing it because they would almost have to sell their taverns just to acquire enough raw material.

It is important to emphasize that the knowledge of the agave distillation process that characterizes the traditional tavern-owners is quite broad. For example, they recognize the properties of the different types of agave that can be used as raw material and, although many insist that *Agave tequilana* is the best species for elaborating tequila, they are quite familiar with the knowhow and techniques required to produce distillates from other agaves.

Our final point regarding these producers is that because of the low level of tequila production they achieve and maintain, the discarded bagasse does not impact the environment to any great degree, as it is simply incorporated into surrounding agricultural soils.

The Denomination «Region of Origin» of Tequila

Up to 1940, tequila production in Mexico was largely a domestic operation, but around that time some economic actors made applications to the Mexican government to protect the name of this alcoholic beverage –which, in reality, derives from the town of Tequila, where tequila production and commercialization has been concentrated throughout history– and so obtain exclusive rights to use the label 'tequila' (CRT, 2007). Their arguments centred on the long history that associate the town of Tequila with the production of this Mexican spirit, on the region of origin, and on the fact, that, by that time, tequila was being considered Mexico's «national drink». Through their efforts, as mentioned above, in 1949 the Official Mexican Norm (*Norma Oficial Mexicana*) for tequila was established to describe the process that tequila producers had to follow, and the characteristics of the drink itself in terms of body, flavour and aroma. This Norm stipulated that for a product to be legally labelled «tequila» it had to be produced with *Agave tequilana* and other species of the same genus cultivated within the boundaries of the state of Jalisco. This meant that only agaves so identified could be used to produce this alcoholic drink, and that no other sugars could be added to enrich it.[12] In addition, striving to complete this original protection, the Norm specified the criteria for bottling, labelling and transporting tequila once it was distilled (*Norma Oficial de Calidad para Tequila*, DGN. R9-1949).

Despite the solid argumentation just outlined, the declaration of Region of Origin of tequila formulated years later and published in the Official Bulletin of the Mexican Federation (*Diario Oficial de la Federación Mexicana*) on March 12, 1964, recognizes as tequila only the alcoholic beverage exclusively made with *Agave tequilana* Weber var. *azul*, while omitting consideration of all

[12] In those years, the tradition dictates that the elaboration of tequila *only* used the hearts of agave plants as raw material, so no denomination that ensured its use at 100 per cent was necessary.

other species. Moreover, it allowed tequila to be enriched with sugars from other sources, up to a maximum proportion of 30 per cent,[13] broadened the geographical area to include other states of Mexico in the Region of Origen, and authorized its exportation in bulk to be bottled and labelled abroad.

These developments seem to justify the argument that the area now included in the Region of Origin of tequila has been moulded in accordance with the interests of the tequila industry. In this process, the declaration abstracted its norms from the ecological, historical and cultural evidence that should have constituted its formal basis. This scientific perspective has been argued by Pérez, Villa and Balderas (2012), revealing the contradictions involved in including municipalities in the state of Tamaulipas within the Region of Origen of tequila, since they have no antecedents in tequila production whatsoever. Indeed, it is well-documented that those municipalities use agaves from the state of Jalisco to produce tequila and, worse yet, only bottle tequila distilled in that state.

In this new context, we find that 9 of the 10 leading brands of tequila in terms of quality, price, prestige and age are now the property of foreign companies (Olmedo-Carranza, 2010) that, therefore, are the principal beneficiaries of the natural and cultural conditions (read: patrimony) of the Region of Origin of tequila and of the official Mexican norms that rule its production.

The Agave Landscape

Heritage (or patrimony) is the legacy obtained from the past that is lived in the present and will be transmitted to future generations. Cultural and natural heritage is an irreplaceable source of life and inspiration, our touchstone, our point of reference, our identity (UNESCO, 2008a). In 2006, the UNESCO declared the Agave Landscape and the old industrial installations in Tequila, Jalisco, Cultural Heritage of Humanity in the category *Cultural Landscapes*. Their decision was justified by the argument that their peculiarities provide evidence of a harmonious and sustainable adaptation of the use of the soil in a natural

[13] Since then, the declarations of 'region of origin' in 1974 and 1977, as well as the changes made to the official norms for tequila production in 1970, 1976 and 1978 permit the incorporation of other sugars up to 49%, while also broadening and reducing the zone of the 'region of origin' of the plant, according to the interests of the large companies.

context that should be recognized in order to preventing modifications of their traditional essence.[14]

The environment now known as the Agave Landscape consists of a nuclear zone that covers some 34,658 hectares located between the Tequila volcano and the Santiago River Canyon. These lands include the scenarios proper to, and characteristic of, agave cultivation. A second, much smaller nuclear zone (only 360 hectares) includes the *Los Guachimontones* archaeological zone. These two areas are surrounded by a buffer zone of 51,621 hectares where some of the old industrial installations that once produced tequila, the Tequila volcano itself, and the Santiago River Canyon are located.[15] Gómez (2008) mentions that this latter zone conserves, intact, a natural wildlife corridor where over 800 vegetation species have been identified.[16]

Today, we would say that fulfilment of the goals of the management plan for the Agave Landscape is a simulation, at least in the following regards:

- The balance among the natural, agricultural and urban environments required to improve the quality of life of the area's inhabitants is still far from being achieved.
- The water used by tequila industries, which inevitably becomes contaminated, has reduced the availability and quality of this vital liquid for large numbers of inhabitants. The Santiago River Canyon, especially, receives residual waters from towns upstream, as well as the vinasse generated by agave processing, while various sites in the zone have been transformed into sanitary landfills. As a result, the Santa Rosa Dam, which forms part of the Santiago River system, has reports of high indexes of pollution and is a focus of infection and fetid odours, especially in the dry season.
- Few rural towns have adequate health services.
- There are no sustainable development projects that foment traditional agricultural systems.
- Outside the administrative head towns (*cabeceras municipales*) and the *Los Guachimontones* archaeological zone, signs that identify the Agave Landscape are scarce; many have been destroyed or are deteriorated, while the most striking aspect of tourism infrastructure may well be its absence.

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14 La Crónica.com: «Patrimonio Mundial: Paisaje agavero e instalaciones de Tequila»; published on July 12th, 2006.

15 It is important to note that the *Los Guachimontones* archaeological zone, the Santiago River ravine, and the Tequila volcano functioned as tourist attractions in the study area long before the declaration of the Agave Landscape and the development of tourism programs like the «Route of Tequila» and «Tequila, a Magic Town».

16 Unfortunately, the author does not cite the source of the number of species mentioned.

- Only some old tequila-producing haciendas in municipal head towns are open to visitors. Those farther away rarely have efficient access roads, or are simply closed to the public.
- Many tourism services, including helicopter and hot-air balloon rides over the Agave Landscape, are too costly for low-income families. All jewellery stores are high-end, as are the spas, gymnasiums and hotel boutiques; while practicing extreme sports and horseback-riding are also prohibitively expensive for most visitors.
- The expansion of tourist activities around the Agave Landscape, though modest, has increased the cost of basic products significantly for local people.
- Agricultural fieldworkers, whose manual labour sustains agave cultivation, earn low wages and are denied other work-related benefits. Also, they are hired in the outsourcing modality, so they do not enjoy seniority or other fundamental rights.

Heritage and Sustainable Tourism

Over the past five decades, as the aperture and improvement of means of communication have enhanced mobility in the valley region territory around the town of Tequila, residents of neighbouring municipalities and of the town itself have become frequent visitors to numerous natural sites in the recently-recognized Agave Landscape, including the Tequila volcano and the Santiago River Canyon. In the canyon, they enjoy natural spas and orchards that dot the countryside and provide a wide variety of fruits typical of tropical zones. Of course, the main attraction there has long been the opportunity to purchase, at reasonable prices, a few decilitres of the famous beverage. And this practice continues to give travellers a good pretext to stop along the Pan-American Highway that passes by Tequila to taste these celebrated spirits —despite doubts about their quality— and perhaps purchase a bottle or two of this prestigious distillate of the agave plant.

Because of its clear potential for attracting tourism, in 2003 Tequila was incorporated into the Mexican government's tourist program called Magic Towns (*Pueblos Mágicos*), which allows them to apply for federal government funding so that local authorities can carry out projects to enhance the image of their hometowns, especially urban zones. In the case of Tequila, the application for public funds was not initiated by local government (*ayuntamiento*), but by the owners of leading brands of tequila: *Cuervo*, *Sauza* and *Herradura* (Hernández, 2009). The UNESCO's declaration of Tequila as Cultural Her-

itage of Humanity in 2006, mentioned earlier, is also a result of this process. That announcement helped formalize and consolidate tourism activity in the region, while also providing access to more public resources to stimulate tourist activity and establish better-quality businesses, especially for the main tequila entrepreneurs.

As noted previously, the UNESCO's declaration with respect to Tequila and its surrounding area entails implementing specific *in situ* intervention programs that include a plan for a territorial ecological organization; in this case, of the zone where agave and the drink derived from it are produced. Additional commitments stemming from the declaration are elaborating an inventory of local flora and fauna to aid in their conservation, and a project to re-establish previously altered habitats, which means ameliorating conditions for the species that live there (Gómez, 2008). To date, however, evidence of efforts in these directions is scant.

In this respect, it is worth mentioning that the deterioration of the biocultural heritage of the Santiago River Canyon has continuously worsened. Significantly, much of the biodiversity of the different ecosystems it harbours has been lost, including various edible species of fish and crustaceans that once inhabited the river and its permanent tributaries, as well as numerous edible plants, birds and mammals that used to live in the deciduous forest that covered the slopes of the canyon.

Traditional methods of appropriating and producing foods have succumbed almost entirely to this onslaught, especially the now-predominant mode of industrial production. This not only limits the material possibilities of residents, but also has forced many people to migrate to large urban centres, especially the metropolis of Guadalajara.

In light of the phenomena described herein, it is of utmost importance to rethink the actions included in the current management plan for the Agave Landscape in order to correct the current, 'simulated' recovery of the tradition of tequila production that benefits primarily large companies with global economic interests. This reorientation is required to guarantee observance —to the letter— of the principles of the Declaration of Cultural Heritage of Humanity granted by the UNESCO, which privileges sustainable tourism.

According to the definition of the World Tourism Organization,[17] sustainable tourism is the form that takes into account «the current and future economic, social and environmental repercussions [of the sociocultural environment in question], in order to satisfy the needs of visitors, industry, environment and host communities». Thanks to the diversity of relations included in sustainable tourism it has the potential to act as a catalyst of social change, since it can help fight hunger and poverty, while promoting peace and safety and as well as stimulating local economies.[18]

In this regard, the original aim of the Agave Landscape management plan was to foster sustainable development, but it turns out that only micro-tourism excursions in the zone around the Tequila Volcano have been fomented. The same is true for hiking, and tours on horseback or bicycle, which are not the services most often requested by tourists. Given the scenic richness of agave plantations, we would recommend enlarging installations that would allow visitors to enjoy the visual and natural sights that characterize the Santiago River Canyon. These could be complemented by descriptions and explanations by guides on the local physiography. By the same token, the modest efforts at tourism promotion that emphasize sedentary activities like eating and drinking could be broadened and enriched. For a greater impact and success of the Agave Landscape management plan, the promotion of tourism initiatives focused on sustainable development should be implemented in order to benefit local people and not only the global economic interests that develop in the shadows of tequila production.

In addition, it would be of paramount importance to promote visits to traditional taverns, where visitors could witness the early forms of tequila production. It would also be interesting and important to inform visitors and travellers, as well as the general population, of the different types of agave that can be used to obtain distilled beverages. Promoting knowledge of the distinct varieties of agave could be a nucleus that leads to the establishment of true ethnobotanical gardens based on scientific and cultural knowledge.

It is important to understand that plants are the most conspicuous elements of ecosystems; indeed, they constitute their very basis. This consider-

[17] See: http://sdt.unwto.org/content/about-us-5

[18] See: https://www.biospheretourism.com/es/blog/22-beneficios-del-turismo-sostenible/94

ation is of the greatest importance in the case under study, because the following studies, research and activities could be fomented from botanical, ethnobotanical and alimentary culture perspectives: analyses of the plants that sustained the Mesoamerican alimentary system, of the plants that, aside from agave, contributed to the identity of the Agave Landscape, of the consumption of edible, wild plants, of recipes of traditional cooking, of the applications of medicinal plants, and of horticulture and the commercialization of ornamental plants.

In the same vein, it is key to improve our understanding of the ecological value of the 'dry', or deciduous, forest; a habitat that produces numerous plants that are utilized in Mexico and, more specifically, in the area examined herein. Such studies could be complemented by research on forest fauna. Similarly, we need to determine the diversity of species managed by farmers in the agroecosystems of the Santiago River Canyon, and the nature of their rain-fed or irrigated orchards and gardens, where a great variety of wild and cultivated plants can be found whose potential is not yet exploited. Finally, it would be worthwhile to collect edible, wild and medicinal plants that are native to these sites, as such initiatives would be of great pedagogical, gustative and culinary value.

Without question, the potential of a declaration granting the status of Heritage of Humanity –in our case, the Agave Landscape cultural landscape– presents many more aspects than just the disproportionate and discarnate economic benefits that may accrue to a few individuals, to the detriment of many others. Clearly, identifying and then promoting these other perspectives is feasible in the case analysed in this article.[19]

[19] NB. *A proposal*. The results of the author's research project on phytogenetic resources for alimentation in the Santiago River ravine include a database with 172 species of marginal wild and cultivated plants, grouped in 50 botanical families that represent 11 per cent of all alimentary species that exist in Mexico, according to estimates. Of these 172 species considered edible, over half (96) are trees and bushes, the most conspicuous part of the vegetation. These results can be incorporated into proposals for sustainable tourism projects, as mentioned (Tena Meza Martín P., Rafael Mª Navarro-Cerrillo, Ricardo Ávila and Raymundo Villavicencio Garcia. *Wild phytogenetic resources in the Barranca of the Río Santiago*, in press).

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