Twenty-five years under the wind turbines in La Venta, Mexico: social difference, land control and agrarian change

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As wind energy investments expand across the globe, it is important to interrogate the unique socio-material arrangements resulting from this industry. La Venta town has hosted a wind farm since 1994 and allows us to analyse the effects of wind power on patterns of social difference, land control and agrarian change. By drawing on land data and on 40 interviews with landowners, this paper argues that wind energy investments shift patterns of land control, through fostering land-based incomes. The result is enhanced social differentiation benefitting landowners with more than 20 hectares and pauperising those with small tracts of land.

Keywords: Wind Energy; Social Differentiation; Land Control; Land Use; Isthmus of Tehuantepec

Introduction

Wind energy farms operate in such a way that agricultural productive activities can

1 Gerardo A. Torres Contreras is a Mexican final year doctoral researcher at the Institute of Development Studies, University of Sussex. His research interests lie on the intersection between Anthropology, Political Science and Economics and currently he is researching on the processes of agrarian change resulting from wind energy development in the Global South, especially in Latin America. In his work, he explores land struggles, indigenous politics, resistance and social differentiation processes associated with renewable energy projects in Mexico. He previously obtained degrees in Political Science and Public Administration at the National Autonomous University of Mexico and an MPhil in Development Studies at the University of Oxford. More recently, he has also worked with OXFAM Mexico on issues of inequality and wellbeing in southern Mexico.
coexist with the harvesting of wind, as the infrastructure only occupies between 5 to 7 percent of the leased area. Although scholarship has analysed the relationship between extractive industries, poverty and livelihood changes (Bury and Kolff 2002; Bury 2004, 2005; Gamu, Le Billon, and Spiegel 2015), papers touching on the intersection between agrarian change and renewable energy expansion are still scarce (Dunlap 2017; Franquesa 2018; Stock and Birkenholtz 2019). In the Isthmus of Tehuantepec Huésca-Pérez, Sheinbaun-Pardo and Köppel (2016), Hernández-Juárez and León (2014) and Dunlap (2017) have analysed the local impacts resulting from wind investments, such as asymmetric information and employment throughout the construction and operation of wind farms. However, although insightful, they neglect long-term effects of wind energy on land dynamics and social differentiation that are observable after 25 years of initial investment.

This paper seeks to address this gap by examining how patterns of social differentiation, centred on landownership, have evolved in La Venta as a result of wind energy investments. La Venta is the ejido² where the first wind farm in Latin America was installed in 1994. Wind energy investments in the town area have been so significant that, by 2020, they extend over 50 percent of the land by occupying 3,221.8 hectares (Nahman, Nahón, and Langlé 2014, 3). By drawing on ejidal land data and on

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² *Ejido* is land distributed amongst communities after the Mexican Revolution of 1910. Initially, *ejido* members could use and work the land, but could not use it as collateral nor sell it. A reform passed in 1992, known as Programme of Certification of Ejidal Rights and Land Titling (PROCEDE), enabled *ejidatarios* to lease or sell their plots if the majority of members of their *ejido* agreed (Payan and Correa-Cabrera 2014, 2).
semi-structured interviews with ejidatarios\(^3\), this paper argues that wind investments accelerated patterns of social differentiation amongst landowners, enhancing previous land inequalities. Landowners with more than 20 hectares are able to combine windmills with investments in agriculture and cattle grazing, while those with less than 20 hectares utilise income from wind energy for basic needs or may be obliged to sell their land because of economic needs. Furthermore, wind energy development in La Venta results in different material and social relationships between local people and wind energy, with actors benefiting - or not - in various ways according to patterns of social difference.

The remainder of this paper is structured as follows. The first part analyses the process through which original land allocations have changed due to processes of land concentration and a slow productive shift from agriculture into cattle grazing. Secondly, it investigates social differentiation patterns arising between four landholders groups: those with more than 20 hectares, those with less than 20, those who have sold some or all of their land and those whose land was not considered for the wind energy project. Finally, the paper concludes with a general reflection on renewable energy and agrarian change.

**Wind Power Expansion and Social Differentiation**

Because of its low energy density, wind power expansion requires land and its development will compete with many existing and alternative land uses, including food production (Calvert 2015; Huber and McCarthy 2017; Smil 2006; Naumann and Rudolph 2020). Renewable energy expansion, therefore, transforms livelihoods and

\(^3\) Member of an ejido.
brings about processes of social change (Stock and Birkenholtz 2019; Dunlap 2017; Rignall 2015; McEwan 2017). The socio-material arrangements of wind power intensify ongoing agrarian dynamic and its uneven impacts need to be traced in the long-term to identify winners and losers (Borras Jr. and Franco 2010; Fairhead, Leach, and Scoones 2012). Franquesa’s (2018, 14) monograph on Catalonia, for instance, shows how wind power has continued, if not exacerbated, a local trajectory of depopulation, impoverishment and agricultural decline. Wind expansion in rural areas and its effect on social dynamics, therefore, has to be analysed from locally-based dynamics of areas considered as ideal for wind harvesting.

Wind energy allows for the reproduction and restructuring of local-based patterns of accumulation and social relations of production. While the process of social difference brought about by these kind of investments have been associated with two separate and contradictory patterns – internal differentiation and proletarianisation - (Raikes 1978, 286) - these two processes are actually interlinked and configure hybrid class categories such as a semi-peasantry or worker-peasants (Bernstein 2010). The process of differentiation from wind energy has to be analysed through a double dynamic: the processes affecting those who traditionally sell their labour and the differences experienced by those who own the land.

While the agrarian question of labour concerning those who sell their labour as a consequence of renewable energy expansion has been explored by a handful of scholars (Stock and Birkenholtz 2019; Dunlap 2017; Torres Contreras 2018), the processes of difference affecting those who lease the land to wind enterprises have received little attention. As new livelihoods are established, investments initiated and relations of production start along with business and marketing opportunities, processes of differentiation also commence. This does not mean that differences will evolve into two
antagonistic classes: capitalists and proletarianised workers (Van der Ploeg 2018, 491); rather, it means that differences will unfold and exacerbate winners and losers associated with wind power expansion. It does so by enhancing the position of agrarian classes while fostering differential accumulation processes and political, economic and social relations.

In La Venta these processes of social difference can be traced back to original land allocations within the *ejido* that have been altered between various subgroups of landowners interacting with forces such as class, gender and ethnicity. How different people control land (Peluso and Lund 2011) -with land control understood as practices that fix or consolidate forms of access, claiming and exclusion for some time – is crucial to understanding the socio-material implications of wind power. In general, the more land one owns, the more money will be received from wind companies, generating differentiated patterns of accumulation. In effect, while those with big areas of land are able to accumulate, while those with less land struggle to meet their needs. This is similar to what is depicted by the scholarship on agrarian change and solar energy in terms of how large landholders have been able to capitalise from the transformation while smallholders peasants are obliged to sell their labour (Stock and Birkenholtz 2019, 18). The difference with wind energy is that *ejidatarios* with little land are not immediately obliged to sell their labour at first. For some time, they are able to sustain themselves based on their scarce wind rents and petty agricultural production. They face a process of pauperisation that could make them sell their land in case of an economic shock, as this paper shows.

Wind energy expansion in rural areas, thus, changes accumulation patterns and social relations of production. For each household able to establish and reproduce itself through expanded accumulation, there are others too poor to farm or that are unable to...
farm as their principal livelihood strategy (Bernstein 2007, 403). The consolidation of wind energy projects relies on a process of pauperisation, while it allows others such as landowners to continue to accumulate. The examination of uneven outcomes resulting from wind power expansion, allows us to explore how particular socio-material arrangements modify patterns of accumulation and class formation while interacting with patterns of landownership.

La Venta – A Town Engulfed by Windmills

La Venta is an ejido founded in 1951 with an area of 6,509 hectares (RAN 2018a; Nahman, Nahón, and Langlé 2014, 3; The World Bank 2006). The initial allocations of land took place in a two-fold process in the years of 1951 and 1954. When La Venta was founded in 1951, 149 plots of land were created (OGCEUM 1952, 12). 148 ejidatarios were provided with a maximum of 10 hectares of land (The World Bank 2006; Nahman Sitton 2014, 47). Three years later, in 1954, La Venta was granted with additional land that was divided into 110 production units with an area of 20 hectares each distributed between the same number of ejidatarios (OGCEUM 1954, 26). In addition to the first 148 ejidatarios who had rights over 10 hectares of land each, 110 ejidatarios with 20 hectares of land were added to the ejido.

These uneven patterns of land allocation were modified because of two dynamics in the ejido. First, as Michel (2009, 476) documents, the lack of clear procedures concerning the ejidal system allowed a local elite to control land transactions by expropriating or buying land from small-scale farmers and by enabling a process of speculation, pricing out poor landowners from the market. On the other hand, because of the harsh climatological conditions, land was used following the cycles of production and declining fertility. Most small-scale farmers simply cleared, fenced, cultivated and abandoned land as necessary, leaving it unploughed until another
ejidatario cultivated it once again. As Binford (1993, 88) puts it: “claims to land were transient, meaningful as long as the land was under cultivation”.

These dynamics have generated unequal patterns of landownership since the second half of the last century. According to official data, the average plot of land owned by individuals amounts to 5.1 hectares (RAN 2018b). This contrasts with the fact that 36 individuals own more than 10 hectares of land. In this small subgroup, land disparity is also high. Whereas four individuals own more than 20 hectares, the rest of the 32 individuals own an average of 13.2 hectares (RAN 2018b). To put it another way, 36 individuals own 36.8 percent of the ejido, while 249 individuals and seven groups of ejidatarios own the rest of the land (RAN 2018b). This shows that land had been concentrated in a few hands since the creation of the ejido.

In addition to land concentration, there are two trends that have modified the productive activities of the ejido (table 1). First, over the last 25 years there has been a slow shift from agriculture into cattle grazing activities. The proximity of the town to the Benito Juarez dam irrigation channels made agriculture the main activity of the ejido growing crops such as sugarcane, maize, beans, squash, watermelon, sorghum and sesame (The World Bank 2006, 3). However, after a fall in the sugarcane prices, the permanent closure of the sugar mill in the neighbouring town and the harsh climatological conditions of the region, cattle grazing activities have replaced agriculture (The World Bank 2006, 3). Between 1991 and 2007⁴ there has been a transition from crops for human subsistence to crops associated with cattle grazing now amounting to 81 percent of productive activities.

⁴ The 16-year difference between data obeys to the fact that in these years, the Mexican government conducted censuses that can be disaggregated to the local level.
Table 1. Agricultural land use in Juchitán 1991-2007

<table>
<thead>
<tr>
<th>Crops</th>
<th>Land area (hectares)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1991</td>
<td></td>
</tr>
<tr>
<td>Maize</td>
<td>10,835</td>
</tr>
<tr>
<td>Sugarcane</td>
<td>2,168</td>
</tr>
<tr>
<td>Sesame</td>
<td>304</td>
</tr>
<tr>
<td>Beans</td>
<td>257</td>
</tr>
<tr>
<td>2007</td>
<td></td>
</tr>
<tr>
<td>Grass</td>
<td>3,000</td>
</tr>
<tr>
<td>White Maize</td>
<td>2,093</td>
</tr>
<tr>
<td>Sorghum</td>
<td>971</td>
</tr>
<tr>
<td>Yellow Maize</td>
<td>757</td>
</tr>
</tbody>
</table>

Source: (INEGI 1998, 2018)

Similarly, there is also a trend to abandon agriculture. Over 20 years, the number of productive activities\(^5\) in town has decreased to more than half. While in 1991 there were 3,428 productive units, in 2007 the number was reduced to 1,990. The same pattern can be observed for the area under cultivation in the municipality, as it decreased from 19,000 hectares in 1991 to 9,018 in 2007 (INEGI 1998, 2018). This data illustrates, hence, the slow abandonment of agriculture by seasonality in the region (table 2).

Table 2. Agricultural Production by Season

<table>
<thead>
<tr>
<th>Season</th>
<th>Year</th>
<th>Cultivated Area (hectares)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring-Summer</td>
<td>1991</td>
<td>8,000</td>
</tr>
<tr>
<td></td>
<td>2007</td>
<td>3,172</td>
</tr>
<tr>
<td>Autumn-Winter</td>
<td>1991</td>
<td>4,179</td>
</tr>
<tr>
<td></td>
<td>2007</td>
<td>373</td>
</tr>
<tr>
<td>Perennial</td>
<td>1991</td>
<td>3,975</td>
</tr>
<tr>
<td></td>
<td>2007</td>
<td>3,168</td>
</tr>
</tbody>
</table>

Source: (INEGI 1998, 2018)

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\(^5\) Productive unit is defined as the economic unit integrated by one or more terrains in the same municipality with agricultural activities under the same administration (INEGI 2018)
Another aspect to bear in mind is that land is mostly owned by male *ejidatarios*. This is not only symptomatic of the agrarian context in Mexico where only 16.3 per cent of the *ejidatarios* are women (Katz 1999, 3), but it also points out to two specific elements taking place in La Venta. Firstly, until recently, female members of the *ejido* were not allowed to inherit land. The fist-born son would immediately inherit the land. Although the 1992 agrarian reform allowed women to inherit land, this did not happen at the local level because families would prevent men from other communities to marry female community members because they would become landowners themselves (Cotula 2007, 32). The regularisation of the *ejido* with PROCEDE disadvantaged women and had little impact on women’s ownership and land rights (Gay-Antaki 2016, 54). On the other hand, most of the female landowners are the widows of *ejidatarios* who have passed away. Even if they hold a valid claim over land, they have given the land to their families and usually the first-born sons are the ones who work the land. That is to say, in spite of their ownership, they have ceded the right to work the land to the family and usually, to the eldest son. The combination of these two elements have fostered a situation where only a handful of women have both the rights over land and happened to work and live off it.

Wind energy expansion has to be analysed in relation to land dynamics taking place in La Venta. Land concentration, an ownership context where males are the vast majority, a productive shift and the slow abandonment of agriculture are part of a double dynamic: they are the context as well as the elements with which wind energy expansion interacts. This paper will now examine how patterns of social differentiation vis-à-vis these trends are reinforced as a result of wind investments.

**Patterns of Differentiation between Landowners**

First, it is important to consider how the design of wind payments reinforce social
differentiation. When a landholder decides to lease their land, the amount of money they will receive depends on two aspects. First is the area of land under lease. The more land an *ejidatario* owns, the more money they will receive. Second, the wind power infrastructure built on their terrain, ranging from a windmill to a transmission line. Again, the pattern is the same: the more land one owns, the more likely they are to host infrastructure. Hence, it can be said that the effects of wind payments must be understood in interaction with a context of unequal landownership in La Venta.

In detail, wind energy rents for landowners can be divided into four categories: right of wind, payment for infrastructure, payment for windmills and payment for externalities resulting from wind infrastructure (Nahman, Nahón, and Langlé 2014, 142; Avilés Hernández 2008). The right of wind\(^6\) represents the only guaranteed payment to *ejidatarios*. It is a fixed quantity per hectare, ranging from 6,000 to 8,000 pesos – from USD 244 to USD 325\(^7\) –, to be paid on a yearly basis. The payment for infrastructure, secondly, has to do with the exact place where companies decide to build infrastructure or roads. It is based on the square meters of land the project is utilising and amounts to up to 150,000 pesos per hectare –USD 6,100. Considering that wind power groundwork only occupies a fraction of the leased area, the payment hardly matches the quantity for the whole hectare. Thirdly, the payment for windmills, amounting to up to 15,000 pesos –USD 610 –, depends on the exact place where the wind company decided to locate the turbine and on the generation capacity – from 850kW to 3 MW. Finally, the payments for externalities refers to monetary compensations because of problems caused by infrastructure such as oil spills or unevenness in the terrains. Payments,

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\(^6\) Colloquially defined as right of wind by *ejidatarios*, this concept refers to the usufruct received per hectare of land inside the wind energy farm (CFE 2012, 12).

\(^7\) The exact amount varies according to the enterprise leasing the land.
therefore, follow the same logic: the more land one owns, the higher the chance that the payment will be higher. As a result, the amount of money that each ejidatario receives varies according to their landownership.

The rationale inherent in the design of wind payments has accelerated the previously discussed productive trends taking place in the ejido. As Miguel mentioned, wind payments have allowed him to escape from the harsh climatological conditions of the region by investing in high-quality cattle, feedstock and cattle sheds. He emphasised that agriculture is not worth the time nor the effort when considering the money he makes from cattle grazing. While with agriculture he could aspire to make between 4,000 to 5,000 pesos – between USD 163 and USD 203 – per annum, cattle grazing yields ten times more: around 150,000 pesos – USD 6,100. From Miguel’s standpoint, wind energy rents enable landowners to embrace more profitable activities on their land. Similarly, the additional income brought by cattle grazing has allowed them to invest in education and training for their families. This has brought a new wave of solicitors, veterinarians and government officials that do not work the land as a means for subsistence. The person in charge of linking the community with Acciona Energy, for instance, is not interested in working the land. Even if she owns a tract of land, she just prefers to let wild grass grow every season in order to rent it to landholders with cattle; not only because she does not see the need to spend effort in time-demanding activities but also because wind payments are granted for the next 30 or 60 years. What these insights show is that wind power plays a defining role in reinforcing trends in production and livelihoods. Not only does wind energy enable an already existing shift

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9 Informant 7, 2018.
towards cattle grazing through the possibility of investing rents in more profitable activities, but it also fosters the creation of a group of certain professionals detached from agriculture that do not see themselves working the land in the future.

Although landholders acknowledge the role that wind energy plays in the *ejido*, not all of them benefit from wind rents in the same way. What *ejidatarios* can do varies depending on the size of their land. It is not the same to own 20 hectares of land while hosting three windmills than leasing four hectares of land, receiving only the payment for ‘right of wind’. *Ejidatarios* seem to agree that the amount of land needs to be around 20 hectares for wind energy rents to make a difference in terms both living standards and agricultural productivity. Experiences vis-à-vis wind energy, tend to be highly differentiated. Based on fieldwork observations, four groups of landowners with contrasting experiences resulting from wind energy development and land dynamics can be identified. This includes landowners with more than 20 hectares of land, landowners with less than 20 hectares of land, landowners whose land was not included in the wind farm project and landowners who have sold some or all of their land. Their experiences are insightful to understand how wind investments reinforce processes of differentiation and agrarian change in each of these subgroups.

**Landowners with more than 20 hectares**

A common thread amongst landowners who own more than 20 hectares is their ability to combine wind rents with investments in agriculture, cattle grazing and machinery. This allows them to re-invest their money and build resilience towards economic and environmental shocks affecting the productivity of the region.

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10 Informant 30, 2017.
Damián’s case illustrates patterns affecting this subgroup. He decided to rent over 40 hectares of land to the Eurus wind farm, out of which he cultivates 35 with sorghum and maize. On the remaining five hectares, he has over 20 heads of cattle that he feeds with his own sorghum. Damian’s income combines the payment he receives from 40 hectares of land, his levels of production of both maize and sorghum, and the milk he sells on a daily basis to cheesemakers in the region. In case of an economic shock affecting crop prices, Damián can rely not only on selling milk, but he can also sell heads of cattle to the best buyer, if needed. Ultimately, he can rely on the payments received from the wind power company, which amount to approximately 320,000 pesos – USD 13,013.¹¹

Cirilo’s case also shows how large landholders are able to capitalise from the energy transitions taking place in La Venta. Cirilo was part of the ejidal commissariat in 2004 when Acciona Energy sought to secure land in the south of the ejido for the wind farm. Since he was one of the local brokers promoting the project amongst the local community, he managed to lease over 40 hectares of land to the project. Just like the previous case, Cirilo has been able to branch out his income obtained from productive activities. He owns over a hundred heads of cattle, thereby obtaining around 70 litres of milk per day sold for 6 pesos per litre – USD 0.24. In addition, he cultivates five hectares of maize that he sells to other members of the community¹². Most importantly, however, is that Cirilo bought a tractor to work his land and when he is not using it, he rents it to acquaintances or friends in town. His income, as a consequence, incorporates multiple sources that allow him to keep re-investing in productivity. Again, and in line

¹¹ Informant 13, 2019.
¹² Informant 60, 2019.
with Damián’s insights, he is better equipped to face economic shocks and to continue investing in his land.

Migdalia’s case provides insights on the gendered patterns that prevents further capitalisation from the energy transition taking place in town. She started the paperwork to become an *ejidataria* almost 15 years ago. She was one of the first women to participate in the ejidal assemblies when Acciona Energy approached the town\(^\text{13}\). Because she participated in the regularisation of the *ejido* under the PROCEDE programme she recounted how the government officials visited the ejidal land to measure, delimitate and to expedite the property certificates of various tracts of land. This was a key moment in wind energy development in town, as wind energy investors require ownership certainty to develop their projects. Migdalia and her husband, in this context, titled 43 hectares of land in the north of the town where the company decided to install 16 windmills\(^\text{14}\). On this land, they would cultivate sorghum with a productivity of 3 to 5 tons per hectare. The income obtained from wind energy rents plus what she obtained from selling her sorghum allowed her to invest in machinery, high-quality seeds, pesticides and fertilisers. Migdalia’s family experiences a bonanza that was, nonetheless, interrupted by a divorce and the sudden death of his former husband. After this event, Migdalia entered into a legal dispute with her former husband’s partner in order to decide who had a legitimate claim over the land. The legal dispute has provoked a situation where the agrarian judge has put a hold on any productive activity on the land until the landownership claim is resolved\(^\text{15}\). This implies that Migdalia cannot work the land now and she has had to find alternative activities to diversify her

\(^{13}\) Informant 69, 2018.

\(^{14}\) Informant 69, 2018.

\(^{15}\) Informant 69, 2019.
income. To this end, she opened a small canteen on the highway, invested in a cybercafé and a place for Zumba lessons. Branching out into different ventures, however, also meant that her daily routine was modified and that she has to juggle her time between different activities. Her days usually start at five in the morning and finish at nine in the evening when she closes the cybercafé while working on household duties. Migdalia’s experiences shed light on the gendered patterns associated to female large landholders. Her ability to diversify her income was undermined by a legal case that prevented her from working the land. However, she was able to sustain her income by investing in the urban economy of La Venta.

Finally, Ernesto’s insights also shed light on the increasing differentiation experienced by this subgroup of landowners. While interviewing him, he recounted how he had been selected as the youngest sponsor for the local celebrations in the town’s history. He boasted he had been generous by spending approximately 1.2 million pesos -USD 48,800- for a music band and drinks for everyone\(^\text{16}\). As one of the wealthiest ejidatarios in town, Ernesto owns a total area of 38 hectares of land divided into two tracts: one in the south and one in the north of the town. On 18 hectares in the south, Ernesto has 20 heads of cattle and cultivates sorghum and maize on 4 hectares of land per annum with a production level of 2.5 tons per hectare. While he sells maize to other members of the community, he uses sorghum to feed his animals. On the other hand, in the 20 hectares in the north of the town, he cultivates sorghum only in 15 hectares because the rest are located upon rocky soil where productivity is low. While most of the landowners in the north of the town were affected during the last seasons by a sorghum plague, Ernesto was able to invest both in pesticide and fertiliser with the

\(^{16}\) Informant 79, 2019.
profit obtained from wind energy rents. Although not many people are willing to sell their land\textsuperscript{17}, Ernesto is one of the very few ejidatarios who have been able to buy land after wind power investments came to town\textsuperscript{18}. Recently, he was able to acquire a tractor that he uses to boost productivity during the harvest season and rents it to neighbours and friends when he does not need it. The ability to capitalise from steady income is, thus reproduced. Ernesto has been able to diversify his income from various sources. Not only is his income obtained from agriculture, but he is also able to get revenues from cattle grazing as well as from the machinery rents obtained from other ejidatarios.

This subgroup shows that the payment received from leasing 20 or plus hectares of land allows landowners to combine wind energy payments with investments in agriculture, cattle grazing and machinery. This not only enables them to re-invest in productivity, but it also has allowed a few of them to buy land inside the wind energy farm. These narratives, nonetheless, as Migalia’s case shows, present gendered patterns that prevents them from further capitalising from the wind industry. This paper will now explore how these narratives contrast with the patterns of difference experienced by those landowners with less than 20 hectares.

\textit{Landowners with less than 20 hectares of land}

While landowners with more than 20 hectares manage to diversify their income; those with less than 20 hectares barely manage to combine windmills with other productive activities in their terrain. Since payments resulting from wind investments do not make

\textsuperscript{17} When enquiring into \textit{ejidatarios} engaging in land transactions, I was only able to identify between 10-12 people in the town.

\textsuperscript{18} Ernesto did not reveal how many hectares he was able to buy since wind investments came to town.
a difference in their productivity nor in their livelihood, they are more vulnerable to
economic and environmental shocks affecting the town.

Jose’s case sheds light on the patterns of social differentiation taking place in
this subgroup. When the project started, he decided to lease four hectares of land to
Acciona Energy in the southern section of La Venta. Because of a mobility impairment,
he used to cultivate maize and sorghum with the help of his family until his father died.
Afterwards, he had no means to continue with such a laborious productive activity and
he found himself forced to let the land fallow. He recounted that the 20,000 pesos –USD
813- he receives on a yearly basis are seldomly enough to fulfil his basic needs. He has
not been able to make any investments in agriculture or cattle grazing and his tract of
land is completely untilled nowadays. José spends most of his time and money on
basic needs and transport between towns and depends on his neighbours and family for
secondary needs. As this case shows, for José wind energy rents barely make a
difference in terms of productivity or living standards because of his impairment and the
abandonment of his land.

Similarly, Raul’s experience illuminates further phenomena affecting this
subgroup. He owns 9 hectares of land divided into two plots: 6 hectares in the north and
3 hectares in the south of the town. In the north, he cultivates endemic maize and uses
some of self-consumption while the rest is sold to other members of the community.
He recounted that maize productivity in the region has decreased a lot over the last few
years because rain has been scarce. While in the past he would harvest an average of 8
carts of corn per hectare, in the last 5 years he has only been able to obtain a quarter of

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19 Informant 30, 2017.
20 Informant 52, 2019.
that original quantity. That amounts to an estimate of 2 carts per hectare. On the other hand, in the 3 hectares in the south of the town, he has 15 heads of cattle grazing in open air. This is because he has not been able to invest in a shed nor in electricity for his tract of land. As a consequence, his productivity is low. Given the circumstances, rather than being an investment, his heads of cattle somewhat function as an insurance in case of an economic or environmental shock. This is why he prefers to accumulate heads of cattle rather than investing in productivity or putting them into the market. In this vein and in line with previous insights, the income obtained from wind energy investments is seldomly enough to fulfil the basic needs of the family.

Raul’s land also hosts 3 windmills: 2 in his northern tract and 1 in the southern terrain. In his experience windmills have generated a set of negative externalities that affect agriculture through two elements\textsuperscript{21}. Firstly, there are oil spills coming from the windmill’s turbines. When oil drips from the turbine, crop turns yellow. According to him, it is similar to what happens when a plant catches a fire. On the other hand, there is also an issue resulting from dust coming from the roads built by the wind energy enterprise. Since roads are not paved, passing-by machinery creates a cloud of dust that affects the productivity of the adjacent terrains\textsuperscript{22}. To put it in his own words he replied: what would happen if you were in the middle of a cloud of dust? You would not be able to breathe, right? This is what happens to maize and sorghum\textsuperscript{23}. Raul’s low productivity, therefore, shows that smallholders are affected not only by the scarce amount of money received from the enterprise, but also by environmental externalities resulting from wind energy development around their land.

\begin{footnotesize}
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\item \textsuperscript{21} Informant 52, 2019.
\item \textsuperscript{22} Informant 52, 2019.
\item \textsuperscript{23} Informant 52, 2019.
\end{itemize}
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Victor’s insights also shed light on the process whereby those who own less land in the ejido are unable to invest in their terrains to boost productivity and, in some cases, they may be forced to sell their land. Victor recounted how his subgroup is more vulnerable to suffer from environmental externalities resulting from windmills combined with the uncertainty of climate change. He said that wind power development affects bird migration patterns and in ricochet, the agricultural activities of the ejido. In his years as a farmer, he has observed how windmills have decreased the bat population in the region because they get trapped into the turbulence generated by the blades and the turbines (Rapp, Aiello, and Ledec 2011, 199). Before the windmills, bats would feed on an aphid plague affecting sorghum. However, since bats are scarce, the plague runs freely nowadays. The problem is that, as Victor puts it, the plague affects landowners in differentiated ways. While those with vast areas of land can use some of the wind rents to eradicate this plague on their land by investing in pesticides and fertilisers, those with small areas of land can barely do anything to cope with this shock. Victor highlighted that the 20,000 pesos –USD 813 – he receives a year, are not enough to invest in high-quality sorghum as well as pesticides and fertilisers. Those with small areas of land, in consequence, are subject to losing most of their harvest and they may not have the means to re-invest in the future. Some of them, as we will see in the next subsection, may find themselves obliged to sell their land in case of contingency.

Finally, Juanita’s case also informs on gendered aspects of social differentiation affecting this subgroup. She inherited four hectares of land when her father died in 2007. She cultivates maize twice a year and her productivity hovers around 5 to 6 carts per hectare. She uses most of her production for self-consumption of the household.

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members: her mother, her sister and herself. Because the income from wind rents barely makes a difference, she has a grocery shop to cover for her basic needs. The hardship has augmented in the last years because of the volatility of the price of petrol and the uncertainty in weather patterns in La Venta. In order to overcome these challenges, she invested in a poultry project with over 100 heads that allowed them to graze them and to sell them to members of the community. However, after the September earthquakes that shook the region in 2017, all of them died. In her own words, the earthquake created a weird situation amongst the poultry: “they were lost, it was impossible to control them, they were stressed out and they died”. She was wondering whether she had the means to start from scratch or whether she was going to explore another business venture. However, she was too busy with looking after her elder mother and covering shifts in her grocery shop. Juanita, in this sense, provides insights not only on the hardship associated with owning a few hectares of land in the community, but also on the gendered aspects of differentiation that result from combining household duties with productive activities.

It is important to mention, nevertheless, that even if wind energy payments do not make a difference for landowners in terms of agriculture, productivity or life standards, they constitute a form of insurance that has prevented small-scale farmers from selling their land or from migrating to other regions or countries. The high variability resulting from weather uncertainty makes productivity levels decrease and if there is a plague or a drought, the wind rents prove to be essential for basic needs. As Raul puts it: “if it were not for the income received by the windmills, I would have been

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25 Informant 33, 2019.
26 Informant 33, 2019.
obliged to sell the land or to migrate to a different region in the country”\textsuperscript{27}. This is a key aspect for the process of social differentiation resulting from wind power because of the safety nets provided by the rents (Baka 2016). Rather than generating an open dispossession, wind energy brings about a process of slow pauperisation amongst landowners because the rents barely make a difference in terms of productivity and for some small landholders this hardship is reinforced by patterns of differentiation. This underscores the distinct set of socio-material arrangements resulting from wind farms and their uneven distribution of costs and benefits. Wind energy expansion, thus, allows the large landowners to combine investments in agriculture with machinery and technology, while pauperising those with small areas of land. This is not to say that land deals do not take place in La Venta, as the paper will explore in the next subsection.

\textbf{Landowners who have sold their land}

Since wind energy investments came to La Venta, land deals have been scarce because of two elements. On the one hand, wind energy companies are leasing almost all of the land in the \textit{ejido}. This means that people do not want to sell because eventually they will receive money from a wind energy farm. On the other hand, and related to this, the possibility to receive an income from wind energy companies has galvanised a speculative process that has made land prices to rocket. Before wind energy expansion, the price for a hectare of land would be around 50,000 pesos prices –around USD 2,033. After the wind energy rush, the same area of land would be around 250,000 pesos – USD 10,167. These two elements have generated a situation where land transactions are scarce in La Venta. According to the \textit{ejidatarios}, there are only 10-12 landowners who

\textsuperscript{27} Informant 52 2019.
have accepted to sell their land over the past few years\textsuperscript{28}. Most of these are either elderly people or they have been obliged to sell their land because someone from the household fell ill and they needed economic resources to cope with the shock. Although small, this subgroup sheds light on processes of land accumulation and dispossession resulting from wind energy expansion.

Eusebio’s case is insightful to this end. He is a landless peasant that widowed after his wife fell ill in 2013. He has three children, but two of them migrated to Los Angeles and to Mexico City. The other one decided to stay in town and worked briefly for the wind energy company during the construction stage. After his contract was rescinded, he started working as pawn for landholders. Eusebio owned 5.83 hectares of land in the north of the town. On this land, he was able to cultivate only on two hectares, as the rest of the tract was located on rocky soil\textsuperscript{29}. He would grow endemic maize, pumpkin, beans and watermelon in small quantities. Although his productivity was not as low as in other parts of La Venta, as he was able to draw between 5 and 6 carts of maize per hectare, most of it was used for self-consumption. Eusebio was obliged to sell his land after his wife fell ill with cancer in 2013. Although she had popular insurance\textsuperscript{30}, she could not get the entire treatment paid by the Mexican government. As a result, Eusebio found himself obliged to sell his land to pay for the treatment. Since he needed the money urgently, he had to sell the land through a middleman that sold it afterwards to the best buyer. This means that rather than selling

\textsuperscript{28} Informant 36, 2019.

\textsuperscript{29} Informant 71, 2019.

\textsuperscript{30} Popular insurance refers to a sort of social security provided by the Mexican government also known as Seguro Popular. This kind of social security only pays for some kind of treatments; for other procedures, the user is liable of the cost (SSP 2019).
it for the average price of La Venta, he had to sell it for one fifth of that price. That is to say, 50,000 pesos – USD 2,033- per hectare. Similarly, he had to sell all of his cattle and the maize he had stocked for the year. Most importantly, however, is that Eusebio also was obliged to sell his certificate to use the commons in the *ejido*. This means that he is not allowed to participate in the ejidal assemblies that take place in the town twice a year. Eusebio, therefore, epitomises what in La Venta is referred to as “landless *ejidatario*”.

Mardonio’s narrative is also insightful to understand patterns of difference arising from this subgroup. In 2017 he sold 3.15 hectares of land because his wife got cancer. Since the chemotherapies were expensive and took place in Oaxaca City – a seven hours coach trip from La Venta – he needed some extra income for the household. Furthermore, when he took his wife to Oaxaca City, there was a strike by popular insurance workers. This meant that Mardonio’s wife could not get treated by the public health system. In consequence and because of the urgency, Mardonio and his wife decided to follow the treatment with a private practitioner. Each trip to Oaxaca would represent around 7,500 pesos in accommodation and transportation –USD 305– and around 2,500 pesos –USD 102– in daily expenses. They only made seven trips to Oaxaca City because his wife’s health worsened in the final months of her life. She was in bed for 5 months and Mardonio spent approximately 2,500 pesos –USD 102- on medicines to keep her well. In addition to the economic shock, Mardonio was not able to work during this time because he suffers from a back condition that prevents him

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31 *Ejidatarios* have the right to use two different types of land. On the one hand, they can use a parcel of land over which they have the right of use and usufruct. On the other hand, they also have the right of use on a collective section of the *ejido*. This is also colloquially known as the certificate of common use.
from walking, carrying heavy loads, or even working the land. In this context, Mardonio had no option left than selling some of his land\textsuperscript{32}. However, unlike Eusebio, Mardonio managed to sell it to a relative. This suggests that he obtained a better deal for the transaction. This element, along with the fact that his wife was only ill for a short time and the transaction of a piece of land next to his dwelling, prevented Mardonio from selling his land and he managed to keep four hectares of fallow land\textsuperscript{33}. This case is insightful of the combination of factors, from deficiencies in public health systems to remoteness of rural areas, that can lead someone to sell their land.

Insights from this subgroup show that \textit{ejidatarios} that have sold their land have done it because they have faced economic shocks that are difficult to cope with. While some of them have managed to keep their land some other have had to sell their right to use the common area in the \textit{ejido}, turning them into “landless \textit{ejidatarios}”. Although small, this subgroup illustrates diverse processes associated with land deals and processes of accumulation and dispossession resulting from wind expansion. Now, this paper focuses on the insights from landholders whose land was not considered for wind energy projects.

\textbf{Landowners whose land was not included in the wind farms}

Landholders whose land was not considered for the wind farm were active members of Solidarity Group La Venta. This group was made up of approximately 120 landowners who protested against wind energy industry because of the low prices paid to landowners. Their demands were articulated around three key demands: a better payment for the concept of “right of wind”, payment for transportation of rubble outside

\begin{itemize}
  \item \textsuperscript{32} Informant 65, 2019.
  \item \textsuperscript{33} Informant 65, 2019.
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the wind farm and employment for their relatives. When contracts were first signed between ejidatarios and wind companies, they decided to reject the offer from the wind company as a way to protest against the low prices. In consequence, their land was not included in the projects. This means that, even if their tracts of land are inside the area leased by the wind company, they do not receive any of the payments if they suffer from externalities associated with this industry. Insights from this group highlight patterns of broader social differentiation affecting those who did not receive payments from wind companies yet still suffer from the externalities.

Sabino’s land illuminates on this process. While recounting the evolution of windmills in La Venta, he told me that he decided not to sign the contract with wind companies because the payment was not what he expected. Rather than 3,000 pesos – USD 122 – offered by the enterprise, Solidarity Group La Venta demanded a payment of 30,000 pesos -USD 1220. Sabino owns 11.5 hectares of land in the middle of the wind farm where he cultivates 10 hectares of maize with an average production of one cart per hectare\(^34\). On the other hand, in the northern part of the wind farm, he owns six hectares of land where he also cultivates sorghum. Just as other landowners, his production has been affected because of the weather variability and he only managed to cultivate less than one ton of sorghum per hectare\(^35\). Since his terrain is in the middle of the wind farm project, he suffers from environmental externalities associated to wind energy infrastructure. Sabino’s land suffers from the dust raised by wind machinery when transiting the roads next to his terrain. In the northern terrain, along the same lines, the enterprise engineers built a drainage system to help the water flow outside of

\(^{34}\) Informant 18, 2019.

\(^{35}\) Informant 18, 2019.
the wind farm in the rainy season. However, according to Sabino, the channel is too narrow to drain the average precipitation per year and, in consequence, his terrain is flooded every year\textsuperscript{36}. This ultimately undermines his agricultural productivity because he does not receive any money from the enterprises. As a consequence, he is obliged to find additional resources to cope with these challenges.

Vicente’s experience is also relevant for this subgroup. When the project started to negotiate land in La Venta, the enterprise was offering a quantity of approximately 3,000 pesos per hectare – USD 122 – for the right of wind. However, Vicente just like other ejidatarios, rejected that quantity. When interviewing him, he recounted the experience of another landowner who signed a contract with TELMEX (Mexican Telecommunications) to lease his land for the installation of an antenna. Even if TELMEX was only leasing 10 square meters, they were offering a payment of 60,000 pesos per year – USD 2,440. This contrasted with the offer made by the wind enterprise by offering a lower amount. This is why Vicente decided not to include more than 40 hectares of land in the project\textsuperscript{37}. His rationale for this decision was that he was making more money from his cattle grazing activities than from what he was expecting to receive from the wind energy project. However, environmental externalities during the construction phase would have hindered his productivity and this loss would have not been compensated by the payment offered by Acciona Energy. Accordingly, he decided to reject the offer made by the wind energy enterprise.

Just as in the case of Sabino, his terrain is inside the northern side of the wind energy farm. Nowadays, he has approximately 45 heads of cattle focused on milk production.

\textsuperscript{36} Informant 18, 2019.
\textsuperscript{37} Informant 36, 2019.
production. He obtains his income from selling milk to surrounding towns of the region and from selling male calves to other grazers. Although externalities from wind power industry are not significant for his productivity, he is still affected by dust. This is because there is a road approximately 150 meters to the north of his land and another one 70 meters south. As Vicente puts it, whenever machinery circulates, a cloud of dust raises from the roads and affects the terrains. Again, just as with other members of this subgroup, because Vicente did not sign the contract, the company does not pay for the damages caused by these externalities.

Finally, Alejandro’s case also gives us some pointers associated with this subgroup. Alejandro’s family owns 54 hectares of land divided into two tracts: 24 hectares in the north of the town and 30 hectares in the south. In both areas he combines agriculture, notably sorghum, with approximately 90 heads of cattle. While he cultivates in both portions of land, he manages to alternate the land upon which his herd grazes on a yearly basis. Although his sorghum harvest is similar to the levels reported by other ejidatarios, around 3 or 4 tonnes per hectare, he needs to invest in pesticide and fertiliser to increase productivity without having the additional income that other landholders obtain from wind power companies. In addition to these challenges, he decided not to cultivate in his terrain because his eldest brother passed away and his family did not have the necessary money to undertake cultivation. Alejandro’s productivity is affected by oil spills from windmills around his land. He recounted that in the rainy season some of the terrains in the north are flooded. When this happens, the water flows through his terrain making the oil flow towards his land. This ultimately

38 Informant 36, 2019,
39 Informant 26, 2019.
affects his sorghum productivity. During fieldwork, he was considering whether a legal demand against the enterprise would be worthy to obtain an economic compensation because of environmental externalities. Alejandro’s case, in this sense, shows how certain members of this subgroup, albeit with large areas of land, are subject to patterns of social differentiation associated with economic shocks and environmental externalities from wind industry.

To sum up, it is possible to observe three common threads arising from landowners whose land was not included in wind energy projects. Firstly, they used to be members of the group opposing wind energy projects in La Venta and they declined to lease their land to wind companies as a way to protest against the low prices. Secondly, members of this sub-group own large areas of land. The multiple activities and the assets in their terrain compensate for the lack of payment from wind companies. The three cases show that such landowners have been able to obtain an income that allows them to survive and continue with their investments. This does not mean, however, that they are exempt from economic shocks. Alejandro, for instance gave up cultivating for two years because of the death of a relative. Finally, their terrains are affected by environmental externalities resulting from wind energy industry. However, unlike landowners who decided to sign a contract with wind companies, this subgroup does not obtain a payment for externalities.

Conclusion

This paper has argued that wind energy expansion over the last 25 years in La Venta has exacerbated and reproduced patterns of social differentiation amongst landowners, allowing some to slowly consolidate forms of control over land according to their landownership while pauperising others. The key element with wind expansion, because of the leasing agreements, is that the more land one owns, the more likely one
is to receive a higher rent. In an *ejido* where land allocations were rapidly skewed towards a few hands since its foundation, this implies that large landholders have capitalised from wind industry by diversifying their income and separating almost exponentially their trajectories from those with less land.

However, unlike in other renewable projects, the socio-material arrangements brought about by wind energy have allowed small landholders to sustain their livelihood by relying on their petty agricultural productivity and by using wind rents as a safety net. This marks a stark difference between wind energy projects and other low carbon industries in terms of the agrarian question of labour, as it seems that pauperisation, rather than immediate displacement from land, is a likely outcome for this subgroup. On the other hand, although land deals have been scarce over 25 years, some *ejidatarios* have faced economic shocks associated with health scares, selling their land to intermediaries below market price or giving away their productive land. This has made them become ‘landless ejidatarios’: a group wavering between informal employment and petty agricultural productivity. Finally, for those whose land was not included in the wind projects, experiences around wind energy revolve around negative environmental externalities undermining their productivity without economic compensation. It seems, nonetheless, that they are able to compensate as they own large holdings of productive land.

This paper shows that wind energy expansion results in uneven outcomes in local communities that ought to be analysed in relation to arising patterns of social differentiation and how certain groups articulate access and control over land according to the agreements signed with wind energy enterprises. This allows for the reproduction, if not exacerbation, of certain patterns of accumulation, class structures and social
relations of production (Franquesa 2018) by enabling those landowners with more than 20 hectares to capitalise from the energy transition.

The social difference resulting from wind expansion in La Venta sheds light, thus, on processes interlinking renewable energies with agrarian change in the long-term. It draws attention to the need to incorporate debates on land control and social differentiation debates into the analysis of wind energy expansion. It also challenges the idea that land inside the wind farms in the Isthmus is unproductive by showing that there is a wide range of activities among landowners subgroups (Backhouse and Lehmann 2019, 107). Furthermore, it also analyses the uneven outcomes and different trajectories by providing insights into a so far understudied group in wind expansion in the Isthmus: landowners.

Tracing the social differentiation patterns and the way in which they are mediated by gender, with female ejidatarios facing additional challenges that limit investments and livelihoods, remains an important set of questions to be answered (Kay 2015; Akram-Lodhi and Kay 2010) and a potential line of research that could continue further illuminate on the process of agrarian change brought about in the long-term by the expansion of wind energy investments. As renewable energies expand across rural areas in response to climate crisis, it is important to track the uneven outcomes resulting from these investments and their interlinkages with local-based patterns of social difference and land dynamics.

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