

FOREST AND POVERTY: A HISTORICAL EVIDENCE OF THE RELATIONSHIP BETWEEN SOCIAL INEQUALITY AND ENVIRONMENTAL HARM¹

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Introduction.

This paper examines the sustainability of the natural resources of public property, which is an issue that it has been studied persistently by social sciences over the last 40 years. The public forests of Tenerife belonged to the island Council with the legal title of “montes de propios”. This means that the “montes de propios” were private property of the corporation, serving preferably as a source of income to finance the municipality. Therefore, forests management was in the hands of the Council, an oligarchic institution composed of hereditary aldermen from the richest families of landowners of Tenerife. Although the primary function of the “montes de propios” was its commercial exploitation in order to finance the Council, the municipal ordinances conferred certain rights of use of forests resources to the inhabitants of these areas. Despite the fact that this right of use appeared to be a common right, in practice the use made of these common pool resources was an open access system, because the Council control system on the resources exploitation and distribution made by the inhabitants was very ineffective, especially at a small-scale uses (COLE & OSTROM, 2012).

The historic evolution of the forest-community interaction in Tenerife during the 16th -18th centuries culminated in an environmental crisis, which was a direct cause of the forest overexploitation. This problem remained as a constant during the 19th century and the beginning of the 20th. This case seems to confirm the theory proposed by Garrett Hardin on his famous work *The tragedy of the commons*, (HARDING, 1968), but as it was contested many years ago, Garret. Hardin used the term “common property” too freely and against its true meaning, assimilating it to an open access situation (CIRIACY-WANTRUP & BISHOP, 1975; FORD RUNGE, 1992). In the particular case of the “montes de propios” of Tenerife, the ordinances defined the exploitation rights for inhabitants as common property rights, although this was only apparently,

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since local communities were never responsible for forests management. Furthermore, there were never any conditions of information, autonomy and control by the community over the use of these common pool resources. These conditions were set out two decades ago by Elinor Ostrom (OSTROM, 1990) who pointed out that the common pool institutions that managed to find a lasting solution to the efficacy problem of the community resources management were those robust institutions able to set restrictions on the exploitation, with an active participation of users, with an effective system of surveillance, and with a gradual sanction mechanism for those who did not respected the rules. In other words, the efficient institutions were those that had a strong system for overcoming conflicts.

Over the last 50 years, studies on the deforestation issue have been developed based on two different approaches. On one side, the “Naïve” theory of the property rights that presupposes the reason behind this problem is the inefficiency of an archaic property system, and considers that in the long term the property rights tend to become more and more exclusive as the resources become scarcer, a simplistic vision that has been widely criticized (KLINK, 1991; RAMOS GOROSTIZA, 2012). On the other side, deforestation has been measured by the analysis of structural factors at a macro level, such as the demographic pressure, technology and government policy. However, during the last two decades it has been extended the notion that in order to explain such phenomena, it is advisable to move away from the national analysis used in conventional studies and make “efforts to identify the relationship between forest conditions, individual, and institutions at local level” (GIBSON *et al*, 2000). The interests behind the institution that manages the common pool resources are considered to be a determining variable in understanding the evolution of the resources and the success or failure in its sustainability in the long-term (MOOR, *et al*, 2002; VIVIER, 2007).

In this regard, this paper intends to demonstrate that the forests management in Tenerife during the 16th and 18th centuries was driven by the interests of the landowning class represented in the island Council, and that the pressure made on the resources by the inhabitants who lived off these forests was the outcome of their own poverty and misery and not the result of a free decision-making process, guided by the pursuit of maximum profit.

Institutional context.

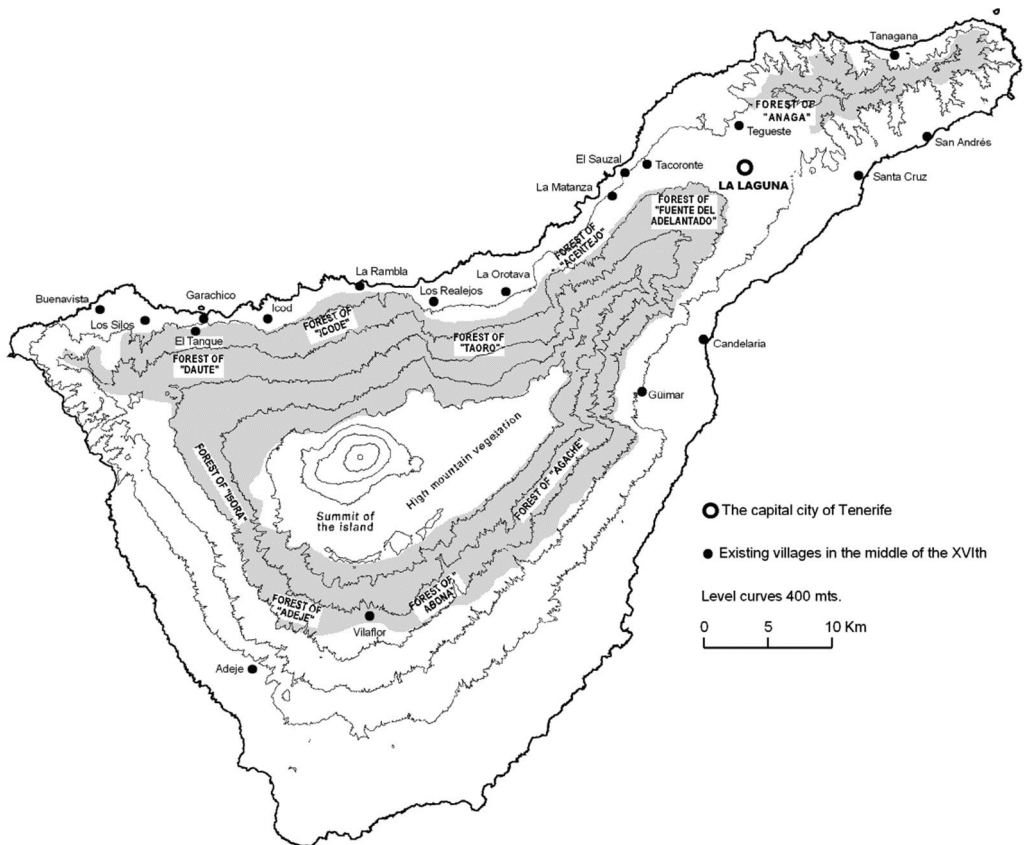
The granting of the “montes de propios” and the regulation of forest harvesting.

Several descriptions of the 15th century explorers suggest that Tenerife was a forested island at the time, where the forests stretched to the sea. Little is known about the impact the aboriginal population had on the forests, but some archeological evidence suggest that the natives “guanches” had altered the natural environment through burnings in those more populated areas, in order to produce better pastures for their herds. It seems that the aboriginal action was focused in the thermophile forest, located between 300 and 500 meters above the sea level (palms, sabinas, dragon trees), hence the laurel forest

was affected to a lesser extent and it had little impact on the large pine forests (YANES *et al*, 1997; FERNÁNDEZ-PALACIOS, *et al*, 2008).

After the conquest of Tenerife, which ended in 1496, the partitioning of lands between conquerors and colonists lasted until 1525. Since the beginning of the castillian colonization, the council appropriated the pine forests of the island, imposing a tariff on tar production and enacting ordinances regarding forests exploitation. The domain of the council over the forests was reasserted in 1512, when the governor summoned the aldermen in order to allot new lands and rents to the corporation, as it had been requested by the Castilian Crown. This agreement granted the forests of Tenerife to the corporation under the legal title of “montes de propios”. In other words, they became assets of free disposition intended to contribute to financing the corporation. This granting was formally confirmed by the Castilian Crown in 1520. The awarding made in 1512 allowed the corporation to sell timber and firewood to export it, as well as allowed the inhabitants to get their own supply of wood and combustible from the “montes de propios”.

Figure 1. Public forests of Tenerife awarded in 1512.



The ordinances approved by the Council during the successive years gave definite form to the rights of use of the “montes de propios” for the inhabitants. After many regulations and corrections, the ordinances approved in 1542 established that the inhabitants were allowed to chop wood free of charge for building edifications and boats, as long as they requested permission to the Council. Besides, other activities such as chopping wood for fuel and collecting sticks to build fences and huts were allowed without requesting permission.

The Council of Tenerife and the forests management.

Since the beginning of the colonization, the Council was the institution responsible for forests management, authority they had until 1824, when the “Comandancia de Marina” (Naval Command) took over. The Council of Tenerife was composed of a governor appointed by the Crown presiding the sessions, several aldermen and a representative elected by the inhabitants, known as “síndico personero” (syndic of neighbors). In the second half of the 16th Century the aldermen started to control the election of the “síndico personero”, undermining his authority as a consequence. Given the fact that the governors were step officials appointed by the Crown from time to time and whose management was under severe scrutiny, they needed the support of the aldermen to come out well. For this reason, the aldermen were the true core of power forming a veritable oligarchy that represented the interests of the big landowners of Tenerife. Taking advantage of the purchase of councilman trades was sold the crown from the mid-sixteenth century, the rich and powerful families (landowners and rich traders), who formed a group in the midst of the process of being part of the aristocracy, joined the municipal oligarchy. Besides, they did not only get this post in a life-long system, but they bought the privilege of making the charge hereditary from the Castilian Crown (FERNÁNDEZ, 2014). During the period between 16th and 18th centuries, the aldermen were the power core of the Council, although the reforms made by the Bourbon Monarchy since 1770 tended to erode their autonomy. For this reason, at the end of the 18th century the council went through an institutional crisis, which turned it into an inoperative institution. This situation was prolonged until the Independence War (ARBELO, 1996; NÚÑEZ, 2001). Despite the fact that the island was divided into 31 independent councils in 1812, the council held control of forest management throughout the island over than a decade. It was only from 1824 on that the forest management was placed under the control of the Naval Command, situation that was prolonged until 1834. This period happened to be one of the most destructive and corrupt in the forest history of the Canary Islands.

Surveillance of public forests of Tenerife.

The council had two surveillance systems to control the forest exploitation in the early 16th Century. First, appointing a bailiff responsible for controlling logging in the forests surrounding the capital, and second making guards in the major ports (Santa Cruz, La Orotava, Garachico) in order to prevent the exports of wood and tar without

paying the appropriate tax to the Council. The governors were responsible for monitoring damages in the rest of the forests of the island. They had to make regular inspections of forests, pastures and other common goods every three years accompanied by a delegation of Council members. These inspections, when carried out, were really inefficient, as the few complaints processed about damages and public lands seizure show. Meanwhile, there was a dispute between the royal governors (appointed by the Crown) and the aldermen over who would be responsible for judging the forests damages. Between 1521 and 1565 there were several disputes regarding this issue in the Appeal Court of the Canary Islands and the Royal Chancellery of Granada, until the crown confirmed the aldermen right to resolve complaints regarding damage to forest. Therefore they would impose punishment and charge penalties. The council deputies sentenced these trials, taking monthly turns to exercise the council jurisdictional functions on markets, forests, pastures and other matters regulated in the ordinances. These proceedings were oral trials. Hence the sentences, penalties and its amount were neither registered nor recorded in any official document. Therefore, the way the Council imposed justice was absolutely opaque, so we cannot know who was sentenced, the reason, nor the imposed punishment. One thing seems clear looking at the high number of complaints: the exercise of jurisdiction made by the council deputies was highly influenced by the *esprit de corps* of the aldermen, who avoided bothering other corporation members, their relatives and servants.

By the mid of the 17th Century, the situation of the forest reserve was already a matter of concern in some areas of Tenerife. For this reason, the Council agreed to confer a Special Commission to one of their aldermen in order to supervise exclusively the compliance of the forest ordinances. The first mountain marshal was appointed in 1642, and he would serve as alderman for one year. Besides, mountain marshals used to appoint trusted bailiffs to act as mountain bailiffs, who conducted inspections and reported complaints. The attractiveness of this this post, which provided significant revenue in bribes and fines, resulted in several conflicts in the 18th century between those aldermen who wanted to remain in power. For this reason, the Appeal Court of the Canary Islands forbade the reelection of the same alderman for more than two consecutive years.

The mountain marshal post became a corrupt position, whose holders were exclusively interested in obtaining the maximum profit during their term of office. As the "sindico personero" indicated in 1761, loggers and coalmen were raided by the mountain marshals in order to take bribes. Some disputes from the 18th century show that the forests of Anaga were the area where the mountain marshals used to take more action. The population of these scattered hamlets lived off the forests, clearing forest areas in order to practice agriculture in the high areas of these mountains, producing charcoal and selling sticks and forks to the vineyards. This area of Anaga was quite accessible for the mountain marshals, who were a one day trip away from collecting a handful of complaints and therefore start arresting the accused. The accused did not offer much resistance because they knew that it was all a matter of money: as long as they paid the bribe they would be able to resume their activities.

The incomes the mountain marshals earned reignited the long time conflict between the ordinary judges and the aldermen over who was to judge the forest infringements.

From 1765 on, a heated judicial confrontation started, for which the Crown tried to solve creating a new mountain marshal post, who would be appointed by the Council from the inhabitants that were not members of the corporation. This new post included a salary and was exempted of the jurisdiction. His task was to investigate damages and take the complaints to the ordinary judge, who would be responsible of judging the cases afterwards. Although the mountain marshals were exempted of judicial functions since then, this post was still really attractive for the council oligarchy, because its salary enabled them to accommodate those relatives who needed a comfortable income.

Beginning in the 1770s, and due to the critic situation of the forests of Tenerife, controlling the forest resources became the main focus of conflict on several fronts, where the “mayors of small villages, military authorities and the Royal Navy were trying to gain control over the forests. During the period of 1814 to 1820, the Appeal Court of the Canary Islands tried to put an end to these conflicts establishing a Board of Forestry, which was a special committee of the council presided by the governor appointed by the King, and with several aldermen among its members. The Board of Forestry was responsible for authorizing the logging licenses and for appointing the guards, seeking to root out the corruption. However, the Board of Forestry was not able to put an end to the corruption, which was a deep-seated problem in the Canary Islands. Finally, the council of Tenerife lost the control over the forests of Tenerife in favor of the Naval Command in 1824.

The priorities set by the council on the “montes de propios” management indicate that, although many of their regulations tried to contain those destructives forms of exploitation, the main goal of the aldermen was to ensure the availability of raw materials for export agriculture, represented by the sugar mills in the first half of the 16th century and by the vineyards afterwards. As a result, the oligarchy group composed mainly of major landowners who controlled the Council defined the forest-great property relation as a “natural” and unquestionable economic law with an essential economic function, on which the prosperity of the whole island depended.

Results: historical process and documentary evidences

The historical processes can't be directly observed by the historian. Historical research can only base their explanations on the documentary evidence. The historical explanation is a methodological process where documents are subject to review to deduce the facts, and such facts are interpreted by the historian to deduce the processes (the cause-effect relationship between facts and others). This process is too long and complex, so that the historiographical narrative tends to be limited, in most cases, to the simple enunciation of the process, as if these explanations were already present in the original documents. The interested reader can find much of this information in the *Historia de los montes de Tenerife* a book which published some years ago with several colleagues from the University of La Laguna (QUIRANTES et al, 2011), although the theoretical formulation of this article is the result of a recent meditation.

The time of inexhaustible forests.

The European loggers had started the exploitation of the forests of Tenerife prior to the conquest, thanks to some pacts made with some indigenous communities, who allowed them to exploit the wood and tar of the pine forests in their territories. After the conquest, the exploitation of wood for exportation and the production of tar spread through the whole island. We know that this extractive industry, which was carried out without control, was of a great importance during the first years of the colonization. Between 1497 and 1505, the council tried to use the abundance of natural resources to attract settlers, allowing them the free exploitation of forests in return of settling themselves with their families in the island, although the tar manufacturers were required to pay a minor tax. Once the colonization strengthened and new settlers would start streaming (between 1507 and 1512) the council restricted the policies on forest harvesting, imposing tariffs on timber exports and forcing tar manufacturers to request operating licenses and to move their wood stoves into more remote pine forests, in order to save the supply of construction materials and wood for the new settlers.

From 1512 onwards, the council started to commercially exploit the “montes de propios”, controlling the production of tar and the exports of timber and firewood. The tar was produced burning pine logs in furnaces excavated into the ground. Using this technique, tar manufacturers were able to distil the resin, which was melt in blocks for its subsequent commercialization. Despite the ordinances from 1542 put a ban on pine logging for tar production, forcing tar producers to use only rest of logging and wood from fallen trees, it was widely understood that it was impossible to produce tar this way, so they kept logging a huge amount of pines and moving from one location to another after ravaging the nearest pine forests. The first measure adopted by the Council in order to make the export of tar more profitable was to double the existing tariff for every 100lbs of tar exported. Nevertheless, this system of tariffs, which were collected in main ports, was really inefficient due to the illegal exportation made in the numerous beaches and small coves of the island, places where the Council had not control on the exports (VIÑA, 2001). The exploitation of tar was regulated by the Council more accurately in the 1540s, aiming to relocate tar furnaces in those forests where this activity was less damaging to the population while at the same time making profits. A tar exploitation system that lasted more than 150 years therefore began, which was based on concentrating the tar furnaces in the largest pine forests of the island (pine forests of Icode, Agache and Abona), auctioning the exploitation of these pine forests separately and leaving the monitoring of illegal production to the lessor, who besides had the monopoly on sales of tar in the island. In theory, the purpose of this leasing system was to limit damages to the pine forests, since it only allowed using one tar furnace at the time. However, an inspection made in 1574 revealed that the lessors used 4 and 6 furnaces simultaneously in different locations, reason why the destruction of these natural resources was progressing rapidly. The estimate we made using isolated data from the 1533-1593 period calculates an average annual pine wood consumption in tar production of 32.000m³. Tar exploitation continued throughout the 17th century until it was abolished by the Council in 1699 when the earned income through fees was too low.

In respect of timber exports, in the early times the council collected in ports a tax depending on the type and unit of the product. But it soon became apparent that the illegal exportation was uncontrollable, reason why the Council tried to implement a lease on the exploitation rights. This system was used between 1522 and 1559, when several exportation permits over firewood were auctioned. This product was needed in a large scale by the sugar mills from Gran Canaria. It was cheaper for the sugar mills to import the firewood by sea rather than obtaining it from their own forests. The total volume of firewood sold by the Council during this period stood at 122.000m³. However, the real amount exported by the lessors was probably much higher than it was recorded in their contracts. Meanwhile, the sale of sawn timber continued through the granting of logging permits at the request of wood traders. It is impossible to quantify the total sales volume of sawn timber, but it seems clear that it caused a significant impact on the “montes de propios”, because the Council agreed on putting a ban on the exportation of wood due to the harm that this activity was causing to the forests.

Analyzing the agreements taken by the Council during the early years of the colonization, we note that the forest reserves in the surroundings of the sugar mills were a high priority. The sugar mills required a high volume of sawn timber to build its facilities and the water irrigation channels. But, above all, they required an annual supply of timber for boiling the sugarcane juice. The ordinances from 1542 guaranteed to the sugar mill owners the right to a free supply of timber and firewood from the “montes de propios”. In theory, the firewood should be obtained from waste mounts without logging, but the sugar mills required a high volume of heavy logs, as the sugar boiling process required a combustible with a high energy potential. For this reason, the firewood supply was collected from logging at a large scale and then stored during a year for drying purposes, in order to obtain the maximum performance during the boiling process. Despite the fact that there were not production series of sugar in Tenerife during the 16th Century, we estimate that the annual consumption of firewood in the sugar mills was 44,000m³, between 1507 and 1520. The flourishing of the sugar industry lasted until 1560. This activity fell into decline since then, in as much as the sugar industry of the Canary Islands was displaced out the markets by the antillean and brasilian production (VIÑA & RONQUILLO, 2009)

There was a significant decrease of public forest, in particular considerable since the 1570s. This was the result of the mercantilist economic management of public forest carried out by the Council during the 16th century, in conjunction with the unstoppable forest land usurpation process to expand the farmland. In 1561 the Council facilitated the procedures to occupy wildland, resulting in an increase of the occupation of reclaimed land from the mountain through fraudulent licenses. At the same time, the population of the island grew dramatically as a consequence of the mass arrival of settlers. According to the most reliable data, Tenerife saw annual population growth of 2.6 % between 1531 and 1585. In this period of time, the island population rose from 5.766 to 23.471 inhabitants. The reigning oligarchy at that time started to worry about a number of factors in the last third of the 16th century, such as the rising demand for building materials and domestic fuel or the occupation of forest land. Indications of concern about forest reserves were found written in the Minute Book of the Council. Firewood and timber

export was prohibited in 1564. In 1574 there was a debate regarding the banning of tar fabrication in the mountain. The harvesting of the laurel fruit was prohibited too in 1582, as it was deteriorating the woodland. Claims against massive timber felling in the mountains of Icode and in the vicinity of the capital prompted the Governor to suggest the Council the launch of a demarcation plan of the “montes de propios” in 1585. This plan was aimed at ploughing up new land and prosecuting infringements committed in forest areas. According to governor Juan Núñez de la Fuente estimates, a third of the mountains granted to the Council in 1512 were already lost by 1585. Timber export and land usurpation were stated as the underlying causes. The aldermen, the main involved in Council territories usurpation, rejected out of hand the demarcation plan of the “montes de propios.” They only requested the royal ratification of the new ordinance prohibiting timber export, which was subsequently confirmed by the Crown in 1586.

Community rights and use of the “montes de propios”.

The “montes de propios” was subject to free communal rights by residents of the island. Although there are no significant data on timber for building, the local consumption must have been rather high because of the building model of Tenerife. The wood from *pinus canariensis* forests was frequently used since it was cheap and long-lasting. Ordinances prohibited the logging of less than 40cm in diameter pine specimens and obligated beneficiaries of logging licenses to plant 10 saplings for each logged pine. Timber was used for a number of activities, ranging from water conduction to winepresses fabrication. This involved a massive wood exploitation of the “montes de propios”. Urban growth during the 18th century intensified even more this process.

Boat building constituted an important activity during the 16th and 17th centuries. Since the beginning of colonization, wood from Tenerife forests was used for the construction of small and medium-sized vessels. In some occasions, vessels reached 400 gross tonnage. A total of 92 licenses for cutting wood for boat building were found in a registration of licenses which covers from 1618 to 1652. The cutting of wood for wooden boatbuilding usually took place in the neighboring forest areas of ports. Therefore, forest exploitation was more noticeable in the largest and most densely populated cities of the island. It was the case of the valley of La Orotava at the end of the 17th century. Boat building continued during the 18th century. However, in 1764, the Council decided not to issue new licenses, except for coasters and small fishing boats. Mountains were already too overexploited.

There is little information about harvested timber as a source of supply to private household. As stipulated in the ordinances from 1542, inhabitants were allowed to cut down certain plants in the laurel forest (such as heather or *myrica faya*) to fabricate farming tools or as a source of supply to private household. A license to fabricate carbon was required instead. The depletion of these sources became evident since the late 17th century. Accordingly, inhabitants had to move to forests farther away to meet household needs.

Cattle grazing was also subject to community easement use. Since the beginning of colonization, herds pastured freely across the “montes de propios.” An ordinance of the

Council imposed in 1500 seasonal migration of herds between the coast and the mountain in the areas of Anaga, Tegeste and Tacoronte. In 1503 the mountains of Anaga were declared as pastureland for small livestock. Mountains became the major grazing area of communal use of the island. Chronicler Juan Núñez de la Peña highlighted in 1676 the fact that the exploitation right of the “montes de propios” granted by the Crown in 1520 did not include “pasture, grass and watering holes in the mountains... they are for cattle from neighboring” (NÚÑEZ DE LA PEÑA, 1994).

In the mid-16th century, the system of seasonal migration of herds across uncultivated coastal lands, mountains and high summit consolidated. This need arose as a result of the increasingly limited free grazing areas because of land clearing. The grazing of goats and sheep took place exclusively in the mountain in those regions where vine crops occupied the large majority of coastal lands and midlands, as was the case in the region of Daute.

The use of the “montes de propios” as grazing area of communal use became an immemorial right for the local shepherds of the island which survived unquestioned until the late 18th century, when mount herding was prohibited to favor forest regeneration. Goats and sheep shepherds were considered enemies of the woodland since the early 19th century, and subsequently marginalized and stigmatized. In the second half of the 20th century they were expelled from forest areas and high summits.

The cycle of vineyard and the changes in the forest - agriculture relationship

Vine growing started in Tenerife since the beginning of colonization. However, export restrictions slowed down its expansion during the first half of the 16th century. In 1549 the Crown eliminated all legal barriers to export Canary Islands wines. This enabled penetration in the wine international market and resulted in a major expansion cycle. Canary Islands wines had already captured important market shares in northwestern Europe by the early 17th century. Sugar cane and cereal cultivation was replaced by vine growing, which developed considerably. Pasturelands disappeared. The reduction of cereal fields and the risk of shortage for the local population led the Crown to order the eradication of the latest vineyards in 1640.

Different social groups took part in the vine growing expansion cycle, but the landowning elites benefited particularly. They had the best soil and irrigation water and could therefore produce the most demanded and high-quality vine: the famous “malvasía” wine. This cycle had an impact on the population of the island as well, as abundant seasonal workforce was demanded. Tenerife saw annual population growth of 0.77 % between 1585 and 1688. This rate was very high in comparison with the rest of Europe in the 17th century. From the social point of view, a very large group of landless labourers emerged. They only lived on seasonal work in winegrowing farms and had to find other sources of income to make a living during unemployment periods.

The vine growing expansion cycle between 1550 and 1640 implied a significant shift in the relationship forestry exploitation-big property. The vineyard culture systems used in the big property were based on high trellises. These trellises required numerous wooden posts and sticks to hold the branches. As for dry wines (cheaper and lower

quality), smaller forks in a large amount were used. The need for forest resources had a direct impact on the economy of the island, as for what forest type is concerned. During colonization, the most valuable wood was that from thick pine logs and some other tree species from the laurel forest suitable for building, such as “barbuzano”, “palo blanco” and “viñático” (characteristic trees of the canary wet forest). However, the wooden holders for vineyards were now constructed with wood from less valuable species such as heather and *myrica faya*. Not surprisingly, ordinances allowed unrestricted exploitation of these species. Agricultural laborers of the island had thus an additional work opportunity during seasonal unemployment periods. The work consisted in cutting sticks and forks for subsequent sale to landowners.

Figure 2. Malvasía vineyards on high trellises (recorded by J. J. Williams, 1836).



The importance of communal easement use of public forest for the poorest population ended affirming the popular belief that public forest was “the heritage of the poor”. Thus the difference in terminology: council officers referred to the “montes de propios” as *mountains of council*, whereas peasants considered it *royal mountains* as a gesture of royal magnanimity with the poorest.

Usurpation, overexploitation and devastation of the public forests.

Since the 1670s authorities were concerned about the depletion of forest resources in Tenerife, particularly in the nearby mountains of the main wine regions, such as Taco-

ronte, Acentejo y La Orotava. The following had already been stated during those years in the proceedings against illegal logging and forest land usurpation: “we have already reached the limit of missing wood for *malvasia* forks, whose preservation is essential for the foreign trade of this island” (QUIRANTES et al, 2011).

Forest land usurpation is acknowledged as the main deforestation factor of the 18th century. Some claims against illegal land occupation by landowning elites were already lodged during colonization. However, the cultivated land expansion process at the expense of mountains intensified during the 18th century. Given the implication of numerous landowning elites in usurpation land, the Appeal Court of the Canary Islands imposed in 1716 the general demarcation of the mountains of the island to establish fixed boundaries for the forest land. The demarcation plans carried out between 1717 and 1718 in certain villages were paralyzed as a consequence of the large number of appeals lodged by landlords or even some bailiffs. Land clearing affected all the mountains of the island, from the laurel forest of the northern slope to the highlands in the south (where only pine forest exist). A well-documented example can give us an idea of the magnitude reached by the clearing of lands during that century. The mountains of the valley of La Orotava, had been demarcated since the 17th century. Therefore, at the beginning of the 18th century there was a point of reference to measure the usurped land. According to an in-depth investigation carried out in 1734, the extension of occupied mountain lands was equivalent to 482 hectares. In 1772 it was at least of between 1.300 to 1.600 hectares.

Maps and records elaborated in the decade of 1780 to legalize land usurpation were lost. Consequently, an overall estimate of the usurped land extension is not possible. In any case, there is clear indication of the strong impact on the forest cover.

Together with forest land usurpation, forest clearing and trafficking in forest products constituted major deforestation factors during the 18th century. A wide range of products were traded, such as sawn wood, coal, tar or resinous splinters of pine wood.

A group of aldermen prosecuted determinedly damage to the “montes de propios” between 1720 and 1740. Reports indicate that the main destination point of this trafficking were the main villages and especially the Port of Santa Cruz. This city saw considerable population growth and urban development in the 18th century. Trafficking in forest products intensified in the decade of 1770. The economic expansion of Lanzarote and Fuerteventura, thanks to the cycle of prosperity that generated the export of barilla, caused a strong demand for firewood, building materials and coal. This led to an active clandestine trade in the late 18th and the early 19th century.

The Council was concerned about the deforestation of certain areas since the early 18th century. In 1707 the Audience banned for 15 years the exploitation of the mountains which supplied with water La Laguna and La Orotava. A large number of claims against forest clearing and wood trafficking were lodged between 1720 and 1740. The situation became particularly worrying from 1770 on. Severe droughts occurred between 1768 and 1772. The remaining laurel forest protected the mineral springs which supplied villages with public water and water for irrigation. Accordingly, clandestine coal makers and loggers concentrated their activity in this area. From 1770 on, the action of mountain marshals and the “Fiscal Sustituto” (a new special prosecutor to promote the writs for

damages in the mountains) increased the persecution of exploitation and trafficking in forest products. In 1772, 1778, 1779 and 1790 mountain marshals carried out exhaustive inspections around the entire forest land of Tenerife. Reports were shocking. The forest product clandestine extraction was widespread. Local authorities took part in it too. Timber trading large operations (without license) took place. Large pine logs were transported from Arico to La Orotava, across the island from side to side, along rough roads using several pairs of oxen. The Council had now detailed information about the situation of the “montes de propios” of Tenerife. However, policies did not change because the Council was facing other issues (NÚÑEZ, 2001). Reports warning the Council about the situation of the public forest were sent by mountain marshals. In a report (1772) by the mountain marshal Antonio José Eduardo, he claimed: “finally, the island moves toward desolation; in less than a decade there will be no firewood for cooking” (QUIRANTES et al, 2011).

The aldermen Lope de la Guerra noted in 1785 that land owners had to use little forks because of wood shortage with a resulting loss in wine quality. Ten million forks were needed for the vineyards of Tenerife. However wood shortage resulted in a doubling in prices in a decade. Wine production costs increased too, precisely when a new export expansion cycle started as a consequence of revolutionary wars.

According to a report entitled *Reflexiones económicas sobre los montes (1797)* by the mountain marshal Antonio de Monteverde y Molina, the forest mass of Tenerife represented at that moment, only a sixteenth part of the total forest mass of the island at the beginning of the century. Data showed the following progression: out of 16 existing trees in the early years of the 18th century, only 8 remained in 1738 and 4 in 1776. Timber prices had doubled in the last ten years, whereas consumption remained steady. Therefore, timber supply must have reduced proportionally (15 of each 16 timber tree was destroyed through the century). Once again, it came to the same conclusion. The subsistence of wine-agriculture, depended on adequate forest-agriculture relationship. Without forests that provided the sticks for the vines there would be no vineyards and wines for export.

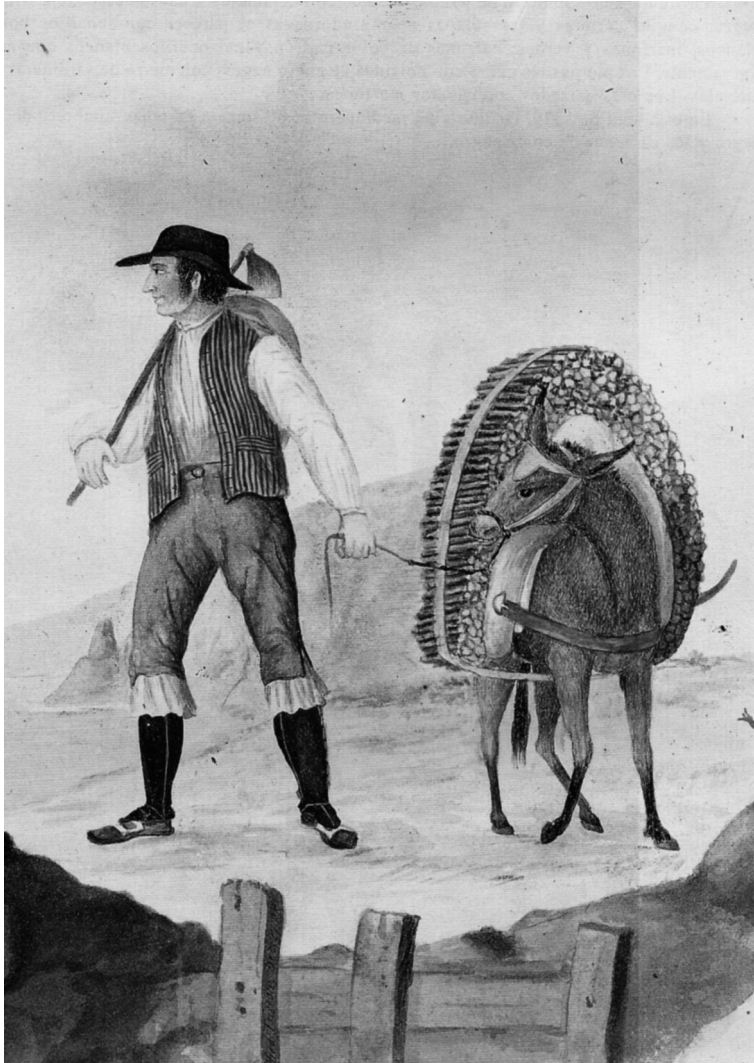
Discussion: rural poverty and environmental harm.

The massive exploitation of forest land during the 18th century is not directly attributable to population growth. According to census data, more accurate than in the past, Tenerife saw only 0.25 % annual growth population in the period 1688-1802. Social factors may be identified as the reason for this massive exploitation. Peasantry depended on forest land for their subsistence (they cut down timber and then sell it illegally). From 1770 on, when the repression of illegal logging intensified, we have plenty of documentation to analyze to the protagonists in the forest damages.

The bailiffs mountains arrested many poor farmers whose only property (at best) was a donkey. These poor farmers confessed before the court the name of the land owners for whom they worked or the traffickers they dealt with. However, mayors, rich landowners or members of the Council were never called to testify. Not surprisingly in a society of privileges, action would only be taken against the direct actors, and not against their promoters. This privileged system of justice and the popular consideration of mountains as

“the heritage of the poor” resulted in an increasingly destructive action by loggers, shepherds and coalmen. As an example, a large number of forest fires between 1775 and 1784.

Figure 3. Logger from La Orotava (drawing by Alfred Diston, 1824).



The social profile of the direct actors of the mountain degradation during the 18th century (poor peasantry) confirms recent theories about the relationship between, poverty, social inequality and environmental harm. As mentioned above, “the total magnitude of environmental harm depends of the extent inequality” (BOYCE, 2008). The relationship between poverty and environmental harm has led to following affirmation: “the poor do

not initially or indirectly degrade the environment. The response is qualified, because it is contingent upon the activities of the other groups” (DURAIAPPAH, 1998).

In this regard, the available studies on wine economy of Tenerife in the 18th century show that poverty among peasantry in wine-growing areas exacerbated during that century. The fall in prices of the Canary Islands wines on foreign markets led to land owners to save heavily in operating costs. This saving had as a consequence a drop in production and chronic unemployment for a large number of day laborers (MACÍAS, 1988). As food prices started to rise quickly in the late 18th century, poverty deepened in winegrowing areas. Poverty among day laborers became an endemic problem for thousands of poor farmers whose only means of subsistence was the mountain. S. Berthelot, a french naturalist, affirmed in 1868: ““en Canarias, más que en otra parte, los montañeses viven del monte, han vindicado el monopolio de la leña para quemar y del carbón vegetal como un derecho de necesidad” (BERTHELOT, 1868). The emphasis on this idea in traveler books during the 19th century show that the relationship between peasantry misery and environmental disaster was unquestionably.

References.

- ARBELO GARCÍA, A. Elite social y poder político en Tenerife a fines del Antiguo Régimen. Los regidores del concejo de La Laguna. *XI Coloquio de Historia Canario-Americana (1994)*. Las Palmas de Gran Canaria. concejo de Gran Canaria, vol. I, p. 427-488, 1996.
- BERTHELOT, S. Árboles y bosques. Páginas de un libro inédito. *Revista de Canarias*, 19, 1868.
- BOYCE, J. K. Is inequality bad for the environment. *Research in Social Problems and Public Policy*, 15, p. 267-288, 2008.
- CIRACY-WANTRUP, S. V. & BISHOP, R. C. Common property as a concept in natural resource policy. *Natural Resource Journal*, 15, p. 713-727, 1975.
- COLE, D. H., & OSTROM, E. The variety of property systems and rights in natural resources. In Cole, D. H., & Ostrom, E. (Eds.). *Property in land and other resources*. Cambridge, MA: Lincoln Institute of Land Policy, 2012.
- DURAIAPPAH, A. K. Poverty and environmental degradation: a review and analysis of the nexus. *World development*, 26(12), p. 2169-2179, 1998.
- FERNÁNDEZ-PALACIOS, J. M; LEA DE NASCIMENTO, K; WILLIS, R. J. W. “El impacto de los aborígenes sobre la naturaleza canaria. *Makronesia: Boletín de la Asociación de Amigos del Museo de Ciencias Naturales de Tenerife*, 10, p. 66-79, 2008.
- FERNÁNDEZ RODRÍGUEZ, L. *La formación de la oligarquía concejil en Tenerife 1497-1629*. La Laguna. Instituto de Estudios Canarios, 2014.
- FORD RUNGE, C. F. Common property and collective action in economic development. In Bromley, D. W. (Ed.) *Making the commons work. Theory, practice and policy*. San Francisco. Institute for Contemporary Studies, p. 17-39, 1992.

- GIBSON, C. C, MCKEAN, M. A. & OSTROM, E. eds. *People and forests: Communities, institutions, and governance*. MIT Press, 2000.
- HARDIN, G. The tragedy of the commons. *Science*, 162 (3859), p. 1243-1248, 1968.
- KLINK, F. A. ¿La tragedia de la propiedad común o la tragedia de la malinterpretación en economía? *Agricultura y sociedad*, (61), p. 157-183, 1991.
- MACÍAS HERNÁNDEZ, A. Explotación directa o medianería en el viñedo canario durante el siglo XVIII: estrategias para una crisis. *Revista de Historia Económica*, 6, p. 43-71, 1988.
- MOOR, M. D., SHAW-TAYLOR, L. & WARDE, P. The management of common land in north west Europe, c. 1500–1850. *Turnhout, Belgium, Brepols*, 2002.
- NÚÑEZ DE LA PEÑA, J. *Conquista y antigüedades de las islas de la Gran Canaria y su descripción [1676]*. Las Palmas de Gran Canaria. Universidad de Las Palmas de Gran Canaria, 1994.
- NÚÑEZ PESTANO, J. R. *La Nivaria triunfante y su capital gloriosa o los orígenes del pleito insular*. La Laguna. Servicio de Publicaciones de la Universidad de La Laguna, 2001.
- OSTROM, E. *Governing the commons: The evolution of institutions for collective action*. Cambridge University Press, 1990.
- QUIRANTES GONZÁLEZ, F. NÚÑEZ PESTANO, J. R. & GARCÍA MESA, D. A. *Historia de los montes de Tenerife*. La Laguna. Servicio de Publicaciones de la Universidad de La Laguna. 2 vols. 2011.
- RAMOS GOROSTIZA, J. L. La escuela de los derechos de propiedad: análisis crítico de la teoría naïve de los derechos de propiedad. *Información Comercial Española, ICE: Revista de economía*, (865), p. 91-106, 2012.
- VIÑA BRITO, A. & RONQUILLO RUBIO, M. Canarias en el primer ciclo del azúcar. En Luxán Meléndez, S. & Viña Brito, A (dir). *La empresa azucarera en Canarias. Siglos XV-XIX*. Destilerías Arucas – Ayuntamiento de Los Llanos de Aridane, 2009.
- VIÑA BRITO, A. La pez. Su contribución a la economía de Tenerife (Primera mitad del siglo XVI). *Anuario de Estudios Atlánticos*, 1 (47), p. 313-331, 2001.
- VIVIER, N. Los intereses en torno a la propiedad colectiva en Francia. Siglos XVIII-XIX. *Investigaciones sociales*, 18, p. 565-583, 2007.
- YANES, M. D. DEL ARCO AGUILAR, M. C., VERNET, J. L., & OURCIVAL, J. M. Man and vegetation in northern Tenerife (Canary islands, Spain), during the prehispanic period based on charcoal analyses. *Vegetation History and Archaeobotany*, 6(3), p. 187-195, 1997.

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FOREST AND POVERTY: A HISTORICAL EVIDENCE OF THE RELATIONSHIP BETWEEN SOCIAL INEQUALITY AND ENVIRONMENTAL HARM

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Abstract: This is a case study that analyzes the relationship between forest management and sustainability of forests in the long term. Our research is based on analysis of the of management decisions adopted by the Council of Tenerife in the administration of the public mountains of the island between the sixteenth and eighteenth centuries, and describes the impoverishment of rural communities in the eighteenth century as a result of the crisis in the wine exports, and the severe deforestation caused by forest overexploitation. This study confirms the need to investigate the relationship between natural resource management and sustainability from a “micro” approach to specify how the interests of the institutions that manage public resources affect their evolution. Attributing the deforestation of the mountains of Tenerife to the rural poor, as it has been doing, is not only unfair, it is also wrong.

Key words: public forest, forest management, environmental harm.

Resumen: Este estudio de caso analiza la relación entre las políticas de gestión forestal y la sostenibilidad de los bosques a largo plazo. Nuestra investigación se basa en el análisis de las decisiones adoptadas por el Concejo de Tenerife para la administración de los montes públicos de la isla entre los siglos XVI y XVIII, y describe el empobrecimiento de las comunidades rurales en el siglo XVIII, como resultado de la crisis de las exportaciones vitícolas y la grave deforestación causada por la sobreexplotación forestal. El trabajo confirma la necesidad de investigar la relación entre la gestión de los recursos naturales y la sostenibilidad, desde un enfoque “micro” para especificar cómo los intereses de las instituciones que gestionan los recursos públicos afectan decisivamente a su evolución. Atribuir la deforestación de las montañas de Tenerife a la población rural pobre, como se ha venido haciendo, no sólo es injusto, también es erróneo.

Palabras clave: Monte público, administración forestal, deterioro medioambiental.

Resumo: Este estudo de caso analisa a relação entre as políticas de gestão florestal e sustentabilidade das florestas a longo prazo. A nossa pesquisa é baseada na análise das

decisões tomadas pela Câmara Municipal de Tenerife para a administração das florestas públicas da ilha entre os séculos XVI e XVIII. Também descreve o empobrecimento das comunidades rurais no século XVIII, como resultado da crise nas exportações de vinho e deflorestação grave causada pela sobre-exploração florestal. O estudo confirma a necessidade de investigar a relação entre a gestão dos recursos naturais e a sustentabilidade, a partir de uma abordagem “micro” para especificar a forma como os interesses das instituições que gerem recursos públicos afetam decisivamente a sua evolução. Atribuir a deflorestação das montanhas de Tenerife às atividades da população rural pobre, como se tem feito até agora, não é só injusto, é também errado.

Palavras-chave: floresta pública, gestão de florestas, a degradação ambiental.
