

Knowledge Production by the Spanish Royal Crown (1845-1868): From Making Maps to Policing Customary Rights

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The Spanish Royal Crown administration collaborated with international experts in the 19th century to produce a pioneering set of forestry maps. Forestry held a privileged place in cameralist thought and had material characteristics that were amenable to standardized classification. Analysis of this project revealed very clearly how national and international communities of experts generated knowledge about the Spanish territory. Producing credible environmental knowledge at that time required an international network of disciplined experts, and the Royal Corps of Forestry Engineers saw forestry maps as a way of producing a new community of experts. The map colors and legends corresponded to a new international classification system and constituted a groundbreaking accomplishment because of their potential to unify Spanish administration practices. The rigorously empirical descriptions of trees also revealed the interplay of the cosmopolitan values of scientific internationalism with the social tensions of that century.

Producción de conocimiento por parte de la Corona Real española (1845-1868): de la elaboración de mapas a la vigilancia de los derechos comunales

PALABRAS CLAVE: mapas forestales, corona real española, empirismo colectivo, internacionalismo.

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*L*a Administración de la corona real española trabajó en conjunto con expertos internacionales para producir un grupo pionero de mapas forestales. Debido a que la selvicultura ocupaba un lugar privilegiado en el pensamiento cameraalista del siglo XIX y a sus características materiales, que se pudieron someter a una clasificación estandarizada, el análisis de este proyecto revela con especial claridad cómo los expertos generaron conocimiento sobre el territorio desde comunidades internacionales y nacionales. La producción de un conocimiento ambiental que inspirase confianza requería una red internacional de expertos disciplinados y los ingenieros de Montes de la Casa Real entendieron los mapas forestales como un medio para producir una nueva comunidad de expertos. Los colores y las leyendas, que representaban un nuevo sistema de clasificación internacional, fueron un logro innovador porque prometieron unificar las diferentes prácticas de la Administración española. Las descripciones rigurosamente empíricas de los árboles revelan la interacción entre los valores cosmopolitas del internacionalismo científico y las tensiones sociales del siglo.

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1. INTRODUCTION

This paper addresses the issue of how public administrations develop territorial knowledge, one of the fundamental attributes of the modern state. In order to do that, the paper focuses on 19th-century Spain under the rule of Isabel II (1833-68). Territorial knowledge is defined here as the capacity to create a cartographic memory of royal forests, through high-resolution mappings of estates developed by the Royal Forests Bureau (Inspección de Bosques Reales, hereafter IBR). The paper will focus mainly on the strategies that a “weak” administration developed in order to overcome obstacles to the improvement of its capacity to know and control land tenure (Gautreau & Garavaglia, 2012). The IBR represents a critical yet neglected episode in the construction of Spanish territorial knowledge.

This paper analyses the first IBR maps, emphasizing their institutional and organizational aspects. The knowledge production that is specific to courts or bureaucracies is slowly gaining the attention of historians (Felten, 2018; Moran, 1991). By analyzing how experts confronted the challenges to produce standardized knowledge out of the boundless diversity of forests, this paper shows not only how internationally trained experts produced territorial knowledge, but how forestry management projects coproduced communities of experts (Jasanoff, 2004). The production of maps reveals the practices that produced a synoptic “view from above”.

Many studies on courts or bureaucracies rely on ideas of hybrid personae, shared spaces, interaction, and networks. Bureaucracies, with their emphasis on written proof, reasonable argument, and authority, will be a strangely familiar field to examine, and one in which the tested tools of the history of science will find a worthy object of analysis.

The making of the IBR maps between 1845 and 1868 illuminates the dynamics of the period in which extensive resource surveying built the knowledge infrastructure on which the development of the Spanish state depended. This experience contributed to the establishment of a new Spanish forest policies system. The IBR, with Agustín Pascual (1818-84) proudly touting German innovations in forestry, was the centrepiece of a pioneering position on national forest policies. Historians studying the early modern period have demonstrated the significance of Crown patronage in science and engineering projects (Labrador, 2019). The royal estates administrations provided an alternative set of institutions that also determined the structure, geographies, and norms of the 19th-century Spanish knowledge infrastructure.

This article considers the networks and geographies that shaped the actions and ideas of the first Spanish foresters. During those years (1845-68), the responsibility for royal forest map production and the control of the Crown rural police was allocated to a single Crown department, which helped lay the foundations for contemporary “scientific forestry” cartography in Spain. From 1845 onwards, the IBR was responsible for aiding local royal estates administrators to manage the forests¹. While almost all the cadastres of more developed European countries during the 19th century were systematic and planned mappings of the territory (Urteaga & Nadal, 2013), the precarious economic situation of the Spanish state prohibited similar ventures. Nonetheless, the Royal Patrimony provided financial support to undertake some of the earliest initiatives in the country, such as forest mapping projects. The IBR maps provide a clear link between statistics, cartography, management, and economy.

This map-construction process can be described as the strategy of a “young state” or “young administration” to maximize knowledge-building, with marginal investment (Gautreau & Garavaglia, 2012: 14). This was effected in two main ways: first, by financing missions of foresters for surveys and validating the maps *a posteriori*, and second, by archiving these maps to build a repository. This article will focus on the first strategy: since the administration was for the first time able to conduct the mapping of the forests by itself, it had to ensure the standardization of the techniques employed to make the maps comparable and compatible. This article will show that standardization was more complicated than the mere elaboration of technical rules for mapping. The problem was, above all, how to ensure the respect of these rules by foresters, forest managers, and local Crown administrators. During the period under study, the administration attempted to define the role of these agents by issuing regulations as well as through day-to-day administrative and technical practices.

Overcoming these difficulties required a capacity within the administration to articulate the different individual maps like the different parts of a puzzle, in order to build a complete panorama of the Spanish royal forests across space. The aim of this paper, then, is not to question the whole project of territorial mapping of the Spanish royal forests. This approach differs from –but does not contradict– analyses that focus on the building of state power by studying the tensions between local and “national” powers which the cadastral process involves (Touzerie, 2007; Scott, 1998).

1. The area of the Spanish royal forests was greater than 230.000 hectares. In the 1930s, only four Spanish landholders (all from aristocracy) had more than 30.000 hectares: duque de Medinaceli, duque de Peñaranda, duque de Villahermosa and duque de Alba. For more details see GARCÍA PEREDA (2019) and SÁNCHEZ MARROYO (1993).

My aim is twofold. I want to describe as plainly as possible how forestry knowledge “worked” in the particular bureaucracy under investigation, the IBR². More concretely, this article will follow the steps of two high-ranking officials (Pascual and Labiada) in the royal forests that led them to produce a modern forest map, that of Urbasa, which involved “linkage work” between practical/artisanal, theoretical/scientific, and administrative knowledge. In addition, the paper will show how actors in and around the forests sometimes engaged in “boundary work” (Gieryn, 1983, 781) by contributing consciously to different circuits of knowledge production.

The main sources for this investigation are the forestry files found at the historical archive of the Royal Palace in Madrid. In the Royal Palace papers, Pascual, the director of the IBR (1845-68), detailed the questions, themes, matters, actions, and debates within the small group of forest engineers. These documents offer rich and complex material to explore the daily building of an administration, and the tensions and relations between its members, local site administrators, and the outside actors of the Royal Patrimony. These data were supplemented by references to several other primary sources gathered in additional archives, such as the Navarra one (Archivo General de Navarra, hereinafter AGN), unhappily much less rich for the same years.

This article is divided into six parts, after the introduction. In the first section, it studies the most important economic and technical features of the IBR. In the second section, it presents the standardization of forest training as another strategy to improve the quality of the forest maps. In the third section, it presents the standardization of forest maps as one of the basic strategies to improve the quality of the forest cadastre. In the fourth section, it shows the relations between the agents of the Crown administration. In the fifth section it presents the mapmaking process of the Urbasa forest maps. The final section addresses an important point: how the changes proposed by the IBR provoked all kind of tensions and conflicts.

2. ADMINISTRATION GATHERING SPATIAL INFORMATION ON ROYAL FORESTS

In 1842, Martín de los Heros, *intendente* of the Royal Crown estates, sent two students, Agustín Pascual and Esteban Boutelou, to Saxony with the purpose of creating an IBR designed to improve the management of the Spanish royal forests (Pérez-Soba, 2016).

2. The making of the first *planos de ordenación* is one of the worst studied parts of Spanish forest history (JIMÉNEZ BLANCO, 2002: 158).

Heros appealed to catastrophic environmentalism to win the patronage of the other members of the board of the Crown (Heros, 1843). Heros was named administrator of the royal estates in 1840, and rapidly understood that within this structure he could achieve some of the political objectives he had pursued in the Ministry years before (Bauer, 1980; Gómez Mendoza, 1992; Casals, 1996). Heros wanted to revitalize a moribund Royal Patrimony organization. He sent both students to Germany with good reason: it was the place where the theoretical and practical foundations underlying the elaboration of forestry maps had emerged³.

Within a few years, forestry mapping followed the path geological mapping had taken some years before and became institutionalized. From the 1830s onward, special services devoted to forest mapmaking proliferated throughout Europe. The modern forestry working plans, taught in Saxony, made it necessary to establish a forest cadastre that could provide information about the state's forest resources and orchestrate sustainable management policies⁴. Saxon forestry professors such as Heinrich Cotta (1763-1844) pushed an internationalist agenda to create a community of experts that transcended political divisions⁵. German forestry ideas clearly expressed the values of a view from above. Maps were vital to the exploitation of forest resources. Maps based on standard systems of measurement would enable the rapid extrapolation of findings to new areas.

After the return of Pascual and Boutelou to Spain in 1845, the IBR was organized. For Cotta, the first step of forest management was the geometric survey, which would supply information about the extent of forests. The IBR was the first institution in Spain to get a forest mapping program off the ground, two years before the establishment of the Geological Map of Spain Commission and nine years before the General Statistics Commission, which had a division responsible for geological and forestry maps. This commission would publish the earliest-known Spanish map to show the extent of forest types (according to the age and species of tree) by area colours, engraved in 1863: the *Plano de Rodales del Monte de la Garganta de los propios del Espinar* (García López, 1995). But

3. The administrations of the smaller states of the Holy Roman Empire were “a hothouse for certain kinds of knowledge” such as scientific forestry, mining and the science of cameralism (WAKEFIELD, 2009, 24).

4. As an economic system, modern forestry originated in 18th-century Prussia, to establish a scientific resource use regime. The inclusion of forestry among the cameral sciences was a result of a perceived shortage of wood in Germany. By the 1750s, forestry schools had been established and journals devoted to forestry began to be published (RAJAN, 2006).

5. By the 1840s, German forestry was a systematic science of determining, predicting, and controlling wood mass. According to Pascual, it reached a climax in the works of Cotta, Georg Ludwig Hartig, and Johann Christian Hundeshagen, who wrote the first manuals (PASCUAL, 1870).

in the IBR, some years before, at least two maps were drawn showing the extent of forest types by area colours. The contour lines of the two maps presented an enormous amount of information in an orderly, bold, and scientifically accurate way. Until now, these two maps have never been the subject of an academic study.

Producing a forest map was in fact a slow business. To create these maps, experts had to negotiate bureaucratic and disciplinary politics. It is impossible to understand the practice of science and cartography in the IBR without analyzing interactions between the Crown central administration, local Crown administrators and other smaller actors. By the 1860s, the initial idealism of Pascual and Boutelou was tempered by the reality of the petty politics of the Royal Palace. But modern forest maps offered new opportunities for forging bureaucratic autonomy, as budgets ballooned and mandates expanded (Carpenter, 2011).

No concrete results of the IBR's efforts in this area were realized until the first sheet of the manuscript forest maps was finished in 1855. However, even in its early stages, this work was of great importance. The crucial decisions made by royal foresters involved – among other things– colours⁶, legends, and standardized scales, using the new metric system for scales and distances. Noteworthy is the *Plano de Rodales* of the Urbasa royal forest (1855), possibly the first Spanish forest map put together according to new “scientific forestry” criteria. Thirteen years elapsed between the Martín de los Heros decision to start the IBR and the drawing of the first modern forest map, which reflects the effort and difficulties encountered in the process: first, the coordination of information generated in the various royal estates had to be articulated and harmonized; second, the codes used in the representation of forestry information needed standardizing; and finally, the complex negotiations between participants, in both the political and scientific domains, had to be completed. During this period, forest maps were marked with multiple meanings (Catalá-Gorgues & Carneiro, 2013). In addition to being a sophisticated product of scientific knowledge, they gained a symbolic dimension as they became part of the paraphernalia of royal management. The reading of a forest map, in addition, had to be as universal as possible, helping to normalize the verbal and visual language of forestry.

The existence of the Tharandt Forestry School in Saxony and the Villaviciosa de Odón Forestry School in Spain from 1848 provided the IBR with well-trained experts, but map drawing proved to be a difficult task. The camaraderie forged during their years in forestry school and the practice of the field trips served to strengthen the contacts of the

6. Art. 35: “Se formará para cada monte su plano de cortas, en el cual se expresará por medio de la graduación de tintas el orden correlativo de aquellas” (REGLAMENTO, 1847).

forest experts (Araque, 2007). The forestry education system was starting to produce a new epistemic community. The emphasis on hiring only qualified men reflected Pascual's determination to keep forestry a profession, not "a political plum" (Lewis, 2005, 8). The young foresters prized the epistemic virtues of precision, detail, and quantification.

But the production of the maps was conditioned by other distinct interests; it required funds, logistics, equipment, and experts. IBR foresters used special techniques and instruments: a chain and a plane table, and in the later years a theodolite. To measure angles in the horizontal plane, surveyors of the 18th century (*agrimensores*) generally used a standard surveying compass with sighting vanes or perhaps a plane table (Ferreira & Bernardo, 1856). By the 19th century, the most important angle-measuring instrument was the theodolite. With this instrument, it was possible to make a "geometrically performed" map, based on triangulation, with associated field books and protraction sheets. Since they were designed to serve a single patron, the first royal forest maps were produced only as manuscripts; there was no need to disseminate them widely in printed form. Pascual's companions were capable not only of producing an accurate and functional map showing the estate in the detail needed to make decisions about its operation, but also of making it an elegant production, suitable for hanging in a conspicuous display. In a sense, the maps were fathered by Pascual, the commissioning manager, but birthed by map-making foresters.

The IBR produced a collection of maps, apparently all of them manuscripts. The publication of forest maps by the IBR was variable in conception and quality, although certain minimum standards were imposed. Pascual himself determined the scales used (1:20,000 and 1:5,000)⁷, and he selected the IBR personnel who complied and drew each map. The standards were hard to implement in practice, in part due to the high cost of mapmaking. The Urbasa map, for instance, cost 6,000 *reales* to create⁸. This was an amount equivalent to one-third of the annual salary of a senior forester at the IBR.

The IBR hierarchy evolved slightly during the period under study, showing slow progress towards specialization. At the top was the inspector, who was responsible for reporting to authorities and discussing the efforts to improve the general administration's work. Initially, only two foresters (*ingenieros de montes*) were assigned, though the num-

7. Archivo General de Palacio (AGP), Reglamento Orgánico, Pascual work record, Personal Division, box 793/42; AGP, Reglamento Orgánico, Gazeta, 10 March 1847.

8. AGP, Navarra, 10993, Presupuestos para el año de 1854, 18 December 1853; AGP, Planos, 415, Croquis Forestal de la Mesa Real de Urbasa, José Díaz Labiada, 10 February 1855, 1/25,000, 585-852 mm.

ber of trained employees expanded to reach six within fifteen years. The IBR received a part of the budget of the Royal Patrimony, a sum always inferior to that of the Architecture Department.

3. THE STANDARDIZATION STRATEGY: CONTROL AND TRAINING OF HYBRID FORESTERS

These new forestry bureaucrats married theory and practice, head and hand, theodolite and pen. Armed with German theory, experts like Pascual did not vacillate when they had to make difficult, technical decisions in soaking uniforms and muddy boots, with the company of a forest ranger and a horse. Pascual's education and outlook –his persona– were “hybrid”, in Ursula Klein's sense of the word. In choosing this word to characterize the technical experts who populated enterprises such as the IBR, she emphasized that they bridged various fields of knowledge. They were

neither mere savants, let alone natural philosophers, nor mere administrators and engineers. At meetings of academies and in their publications they reported what they had experienced at mundane sites, unfamiliar to most academicians. Inversely, they used their knowledge about plant species, materials, the chemical analysis, rock formations, mathematics and so on for the cultivation of exotic plants, chemical analysis of materials and various kinds of technical projects (Klein, 2012, 350).

In this section, I want to emphasize the second part of this quotation, which describes the flipside of Klein's concept: a crucial aspect of this hybrid expertise was to distinguish between the different “hats” these hybrid experts wore (Felten, 2018). Hybrid experts were able to inject their opinions into various networks of knowledge production. In a report on the 1856 Madrid agriculture exhibition, Pascual contributed to debates among contemporary experts on the role of rural education in shaping national policies. He offered his observations in a session of the Sociedad Económica Matritense de Amigos del País, of which he was president in the 1860s and 1870s. By 1878, Pascual was a member of the National Senate and the National Letters Academy (Real Academia de la Lengua). In particular, the latter may have encouraged him to employ the idiom of friendship when sharing his observations. The statutes of the latter organization envisaged a discourse among equals in the pursuit of knowledge.

Calling Pascual a hybrid persona highlights connectivity and demonstrates how varied fields of knowledge (practical, theoretical, administrative) could be combined in an

individual life story. Paying attention to Pascual's different roles as administrator and forester helps in understanding how the fields of knowledge and social action were kept apart. Pascual the professor (specifically one who had to devise curricula for the new Villaviciosa school) and Pascual the forestry official contributed to different conversations –continually to both, but not simultaneously in every action or utterance. A hybrid expert is, thus, a “bundle of different social roles who is able to fit into different contexts without losing a sense of self-identity” (Felten, 2018, 14).

The first consequence of the adoption of a map-based management –effected by foresters with comparable training– was that the administration could impose *a priori* the standardization of the maps. The observers in distant locations could make sense of the world through a standardized categorization, allowing a plausible semblance of collective empiricism (Daston & Galison, 2007).

The control operated *a priori* and *a posteriori* by administrative validation of the maps. In such a context, how did Pascual implement normalization and control over the IBR's outputs? That is, how did he produce criteria to distinguish between a good and a bad forest map? In a letter to the *intendente* dated August 20, 1861⁹, Pascual concisely expressed the essence of the administration's self-consciousness about its limited capacity to control the precision of forest surveys. For Pascual, although only the “utmost scientific determination” of the limits of properties could legitimize ownership, lack of funding prevented the administration from building a reference system which could ensure such accuracy –for example, by installing an official network of multi-annual forest management plans (*planes de ordenación*). In the absence of ideal conditions, Pascual instead laid down rules foresters had to follow on the ground, regarding how to map a forest and how to exchange information with the central office of the IBR¹⁰.

A first way to regulate forest surveying was to create a system of technical references. In 1845, after the Saxony study trip, Pascual received the technical instruments he had bought for the new IBR in Germany¹¹. Thanks to these tools, making maps could become more and more commonplace for the royal estates workers, which in turn increased their proficiency. This heightened competence manifested in various ways. One was a greater uniformity of style and units. The strict mandate to use the new area units (hectares) ex-

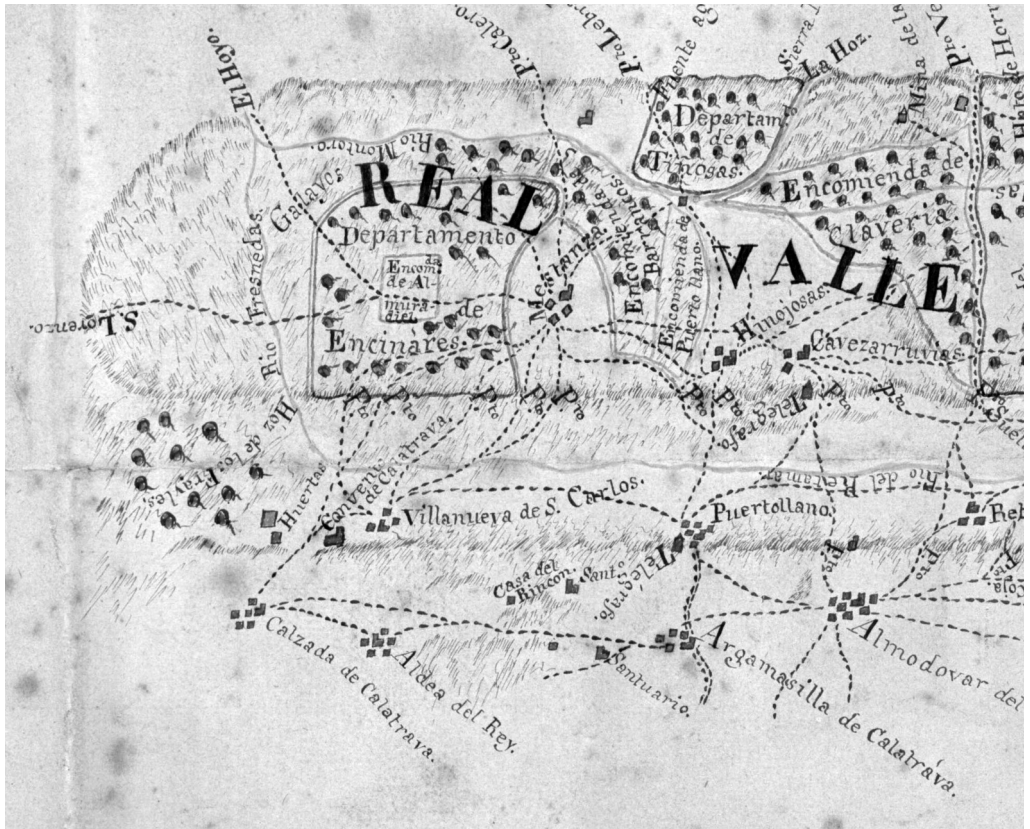
9. AGP, Navarra, 10994.

10. According to Jiménez Blanco, these plans should have “great monitoring and control capacity to be able to constantly contract the achievements with the objectives, taking the necessary measures to correct possible disruptions” (JIMÉNEZ, 2002: 156).

11. AGP, AG, 6/10.

emphified the standardizing logic of “centres of calculation”, which sought to eliminate all suspect, old, confusing, or local systems of measurement area units (Picado, Rico & Gómez, 2015, 191). It epitomized the epistemic virtues of the view from above. Another instance was the use of printing colour blocks for conventional signs and decorative features on the maps. Before 1845, and in some cases after (Fig. 1), vegetation was represented by tree pictographs and woodlands were distinguished by symbolic copses, isolated trees.

FIGURE 1
Alcudia forest map, 1854



Source: AGP, Maps Division, plano 3987, “Croquis del Real valle de la Alcudia, del valle del Retamar y el de Valdeazogues, con inclusión de navas y rincones, escala de leguas castellanas” (signed Gregorio Labrador, veedor), 1 december 1854.

Pascual’s first visits to the royal forests were pivotal in establishing the structure and purpose of forest policy in the royal estates. Pascual’s reports formed the basis of the draft legislation of the rules and regulations of the IBR that were put into practice as the

Reglamento Orgánico para el buen gobierno de los bosques reales, signed on 19 January 1847¹². Pascual was responsible for the implementation of the new rules. Forest management was not simply some applied biological blueprint from Germany unvaryingly extended to a Mediterranean setting, but was rather a network of hybrid practices. Through its provisions, Pascual believed he had achieved his aims of improving the position of the IBR, clarifying and facilitating forestry operations, and giving added impetus to forest conservation and management. The need to “homogenize” their working procedures was expressed by drafting a *reglamento*. The document served as a reference to evaluate the Crown foresters’ work in later years. No further adjustments would be made to the instructions until 1868, with the exception of the 1848 *Ordenanza de los bosques reales*¹³. The *Reglamento* stipulated that the measurement (*apeo*) of each forest should be formed by at least three kinds of maps: “un plano geométrico especial, un plano topográfico y un plano de los rodales”¹⁴. The *Reglamento* further instructed that timber to be sold should be marked, and should be cut under supervision.

A comparison of the royal instructions and the rules of the Ministry of Public Works provides essential insights into the evolving aims of Pascual’s standardization. A noticeable similarity in these technical articles was the frequency of articles standardizing the conduct of ground work and those standardizing the drafting of maps. There is a clear trend toward the formalization and institutionalization of forest surveying tasks. The first years seem to have been a “training” period as far as local site administrators’ obedience to rules was concerned. On some occasions, the reports sent by the local Crown administrators were refused after examination if Pascual noticed obvious noncompliance with the *Ordenanza*. For example, a working plan made by Labiada (the royal forester placed in Navarra) and not by the *veedor* was required in Urbasa in 1859¹⁵. Not all the administrators had accepted the working rules laid down by the Madrid central administration and the standards set for their activity.

This standardization was assured by the foresters’ training system in Tharandt and in Villaviciosa de Odón. The curriculum of both schools established a role for topography in the training of foresters. Cotta and Pascual wanted students to learn how to make the kind of maps they would have to produce in their professional work (Brown, 1886). Cartography was conceptually integral to the school design process; the ability to draw was

12. *Gaceta de Madrid*, 10 March 1847.

13. Real Biblioteca, caj.foll.fol.252, “Ordenanza de los bosques reales”, 1848.

14. “a special geometric plan, a topographic plan and a plan of the stands”. *Gaceta de Madrid*, 10 March 1847.

15. AGP, Navarra 12044/1, Pascual to the secretary of the quartermaster, 25 August 1859.

more than a means for expressing an idea: it could be critical to the very conceptualization of a planning project (Konvitz, 1987).

The forestry school in Spain, following guidelines from Pascual, was a tool for standardization (García Pereda, González Doncel & Gil Sánchez, 2014). The desire to compel employees to attend classes may be evidence of the first attempt to train public agents internally, and the school may rapidly have become a breeding ground for future civil servants. From the beginnings of the IBR, the title of forester (*ingeniero de montes*) was required for the forest manager positions. The title was granted after several years' attendance in a technical school, upon passing a final examination. There are some cases of royal foresters (with German diplomas) trying to enter the Corps of the Ministry of Public Works, and in some cases, the institution hesitated to give the candidate the license to practice without an examination, a proof that the evaluation system was not yet completely standardized¹⁶.

Striking differences between Spanish and Saxon training programmes included not only the Germans' systematization of the examination to become a forest engineer, but also their strong requirement of "practice"; it was common to ask men who wanted to pass a first theoretical exam to confirm their ability by practicing for a few months with an active German forester. Examination was always systematized (mainly to guarantee the practical training of inexperienced candidates). The requirement of practicing with former professionals –in Tharandt– guaranteed the homogenization of both methods and work culture: during the second half of the 19th century, foresters acquired their practical experience from the same teachers. This played a crucial role in the standardization of working practices as well.

4. FROM "CONSCIENCE" TO "SCIENCE": TECHNICAL NORMALIZATION FOR A GOOD FOREST MAP. THE EMANCIPATION STRATEGY

Did implementing this set of norms lead to a measurable improvement of forest surveys and maps? An initial way to measure this would be to analyze the number of forest maps that were rejected or reviewed by Pascual, which means analyzing the reports that point

16. This was the case with Antonio María Segovia between 1860 and 1862. Segovia, who wanted to enter the Ministry Corps, had to pass two examinations, the theoretical and the practical; in both, the topographical parts were very important and required the use of the *cadena* and *sextante*. AGA, Antonio María de Segovia, (11), 1.3, box 61/1637.

out technical errors or noncompliance with procedures during the forest surveying process. At first glance, one could conclude that foresters as a professional group easily accepted and incorporated the instructions and rules produced by Pascual. Three main types of criteria were used to evaluate a map: technical ones, related to the precision of measures; contextual ones, when the forester did not bring enough information to localize the map precisely within the larger territory; and procedural ones, when the forester failed to respect some being rejected during the period under study.

This section explores how relations between the Royal Palace in Madrid (Pascual's central office), its foresters, and the local Crown administrators came to be defined. The thesis is that the central administration tried to redefine this relationship in order to reduce its dependence on local site administrators. Relations between Pascual and the agents were more or less stable throughout the period, and their evolution shaped the global knowledge-building capacity of the administration. Foresters were considered to have special knowledge connected with measuring and describing lands. The products of their work were written surveys, formal descriptions of estates for managerial applications, defining the property and revealing its potential.

The process of defining and dividing tasks within the IBR was paradoxical, revealing a tension between tendencies toward differentiation and specialization, on the one hand, and recurrent factors that limited these tendencies, on the other. Among the limiting factors, the indeterminacy of tasks was problematic. The 1847 instructions are representative of this paradoxical situation. In a way, these documents tend to confirm a growing specialization of tasks inside the administration. The instructions successively describe the "obligations" of the inspector, engineers, officers, and forest rangers (*guardabosques*). The inspector was mainly in charge of distributing work between the engineers and the officers, which basically amounted to dividing the reporting tasks. Together with Pascual, engineers participated in overseeing the daily work of subordinates. The first engineer (*ingeniero primero*; Esteban Boutelou from 1847) was originally in charge of the Aranjuez forests, while the second engineer was responsible for some of the other forests. Instructional texts emphasized, however, that employees should accept and carry out tasks beyond their own roles, and help each other in their tasks, a counter-proof of specialization. This limited bureaucratization can be imputed to the reduced means of the IBR and its lack of staff, which required every employee to accept a wide variety of tasks.

Another important element in the bureaucratization process –and possibly an answer to the indeterminacy of functions– was the attempt to give employees a sense of responsibility for their outputs. Pascual's letters to the Royal Patrimony's central administrator

(*intendente*) more precisely describe how the reporting work was shared between engineers. Engineers were required to countersign every report they wrote or analyzed. Thus, engineers constantly had to take responsibility for the decisions they made. Even though this process offered obvious symbolic benefits to the engineers, who could now take public credit for quantifiable work, it also constituted a tool of control for the administration. At the same time, quantification made the engineers' negotiations to share tasks more straightforward.

Indeed, several documents bear witness to both a formal and an informal disciplinary process amongst IBR employees. Most of the norms were accepted and promoted early, starting in 1847, so as to ensure—at least in theory—administrative impartiality. From the beginning, the same problems affected the daily activities of the office: the slowness of the work (Esteban Boutelou needed a year for the first Aranjuez report)¹⁷, a lack of respect for the timetable, and behavioural issues such as absenteeism at work. Apparently undaunted by such issues, the Royal Patrimony attempted to control public employees' behaviour outside the office by compelling them to attend important religious or civic ceremonies, and even requiring permission to get married.

5. DEFINING RELATIONS WITH FORESTERS: HOW THE ADMINISTRATION “SHAPED” ITS AGENTS

It is important to focus our study on the status of the first foresters because it reveals some of the peculiarities of the administration-building process in Spain. Their status was implicitly defined when it was stated that these employees were forbidden to work for other administrations without obtaining special permission, even for those related to the state. Royal foresters were totally dependent on this administration and were strictly controlled by Pascual. The definition of the foresters' job by the administration even included their remuneration, which was meticulously calculated.

The complex relationships between royal foresters and foresters in the employ of the Ministry of Public Works underwent significant changes after 1860. Gradually, the profession in the Ministry became more clearly defined. The similar tasks and training of foresters at the Royal Patrimony and Ministry, and the fact that foresters might work for both organizations at some point in their careers, reinforced such indeterminacy. Exam-

17. AGP, Aranjuez, 14369; Memorandum about the current state of the forestry and horticulture branches in Aranjuez, and the improvements that are desirable. Esteban Boutelou to the *intendente*, Aranjuez, 19 September 1846.

ples of foresters who worked in both administrations can be found in other publications for instance, Boutelou, Labiada, Campuzano (García Pereda, 2021). The daily practices and exchanges may have created feelings of belonging to a single profession, close to the state's administration, and blurred the boundary between "public employees" and royal foresters.

In 1860, a controversy erupted within the Ministry when it was consulted by Antonio María Segovia, who wanted to know whether he could enter the Ministry Corps. Segovia was denied employment in the Ministry Corps on the basis of his lack of a diploma from Villaviciosa (a qualification that had been important for some time but was mandatory starting in March 1859). The government argued that public foresters had to follow these instructions strictly. An 1862 royal order confirmed the failure of Segovia's appeals.

In this tense dynamism, a kind of "autonomy" of the Ministry from the Royal Patrimony may have been an important factor. There was a clear political tendency to separate the ownership of the royal family from the state one. The strong claim of an emancipated administrative *ethos* probably induced the Ministry and the Villaviciosa school to emphasize the differences between Ministry employees and Royal Patrimony ones. The Ministry needed, for its own administrative and symbolic purposes, to distance itself from these formerly "semi-private" employees of the IBR. Nevertheless, this interpretation would be incomplete if it only took into account behavioural or political factors to explain the rising formalization and distinction of functions between the Royal Patrimony and Ministry foresters.

6. THE URBASA FOREST MAP

Now the paper will examine a specific example of the royal forest map: that of the Urbasa forests in Navarra. It was there that some modernization in the forestry sector was first realized in Spain. The IBR's policies and agents sought to promote the lumber industries in such a manner that yields might be sustainable and predictable even after long periods between harvests (Warde, 2011: 162). One of the methods they adopted to this end involved imposing limits on felling through the enforcement of a licensing system.

But why precisely did this project first take shape in the Urbasa area, more than 400 kilometres north of Madrid's Royal Palace? This decision may be understood in light of the fact that the area was close to new industrial centers. This furnished the forests with special potential to open up markets and contribute to commercial exchanges. Such potential could only be realized if forest exploitation was sustainable, and existing harvest

methods were inefficient, destructive, and uneconomical. Nonetheless, the rapid growth of harvesting activities, together with the radical changes that the area underwent due to the arrival of forestry works, led to inevitable conflicts with local administrators.

In reality, until the 1850s, Urbasa forest management was still tied to old technologies, which yielded a *Fagus* forest in clear “degradation”¹⁸. For Pascual, the French cutting method was of “impossible execution”¹⁹. The proximity of the San Pedro steel mill in Araya constituted a unique advantage for the Urbasa royal forest. These industries were the principal outlet for forest products, and a valuable one. Commodities such as wood and cork could have no future if they were relegated to sparsely urbanized regions without large centers of industrial consumption. The demand for wood and cork²⁰, which increased during the second half of the 19th century, came principally from factories.

Pascual chose Urbasa as his first target for a modern forest map because he had found fertile land for the wood business venture, above all thanks to the outlet for commerce offered by neighbouring industry²¹. Commerce, foresters, and the spread of technology are indispensable factors, in our opinion, for a correct reading of the events of Spanish forestry emergence in the 1850s. But intensive forest exploitation required a careful management plan²². As demand from local ironworks increased, so too did the relevance of the Urbasa forest’s resources. The area was transformed by the growth of production of iron and steel. Without Pascual’s management plan, it would have been impossible to calculate the allowable (annual) cut (*posibilidad*) and to know how much wood could be sold to the factory every year²³. Pascual directed that timber sales from Urbasa forests would be regulated to provide a steady supply of timber products²⁴.

18. It is very interesting to read Pascual’s articles about the *Abies* and *Fagus* trees, in which he applies concepts that would have been previously unknown to the general public such as *coeficiente mór-fico* and *tablas de productibilidad* (PASCUAL & BOSCH, 1855a, 1855b).

19. AGP, Navarra Division, box 10996/129, Pascual to the Palace intendent, April 1852. As Pascual observed in 1852, the method uses a seed-tree treatment (*resalvos*) every eight Castilian feet (*pies castellanos*, 0.2786 meters each).

20. The cork market was important in the southern royal estates, like in Sevilla province (Lomo del Grullo estate).

21. This siderurgic manufacture worked with charcoal (SÁEZ GARCÍA, 1999).

22. Pinchot’s definition and translation into English of the Working Plan: “to order the management of a forest in time and space as to fulfill to the utmost the objects of this management” (PINCHOT, 1891).

23. AGP, Navarra Division, box 10996/3, Pascual to the intendent, 28 September 1853.

24. AGP, Navarra Division, box 10995/8, Pascual to the Palace secretary intendent, 1 May 1854.

But Pascual would not be the first Spanish forester to draft a multi-annual working plan. In 1854, José Díaz Labiada, one of the first foresters trained in the Villaviciosa forestry school, was charged by Pascual with the management of the Navarra royal forests²⁵. Labiada was stationed on a semi-permanent basis in the Navarra district, where logging activities were already intensive. The location was far from cities, giving rise to feelings of loneliness and isolation. During his tenure, Labiada would have the right to travel from Madrid with some of the topography equipment Pascual had bought in Germany in 1845²⁶, such as a Breithaupt theodolite²⁷. Six thousand *reales* would be reserved in the Royal Patrimony in 1854 to pay for the forest inventory and fund the first mappings²⁸. After at least three years' work, Labiada's essential results of the preliminary work, including the determination of the yield and the regulation of the management, were compiled and delivered to the executive officer of the estate. From 1858 they could serve as a guide for any person in charge of administering the forest.²⁹ In Pascual words, "this would be the first scientific step in the way of the Spanish forestry Works"³⁰. The successful introduction of new forestry methods waited more than ten years for its first big step, after Pascual and Boutelou returned from Tharandt.

Industrial development was also important in the changing relations between the forests and the neighbouring rural communities. But the new working plan would not only alter commercial relations with the San Pedro mill. The new maps would define a forest division (as specified in the 1847 instructions), considering the formation of ranges (*tramos*). Each range was to be treated to a certain extent independently of the rest, and marked on the ground by open lanes and boundary stones³¹. The Open Lanes (*callejones-Schneissen*) would be very important for managing fires, so common in Spain³². As Pas-

25. AGP, Navarra Division, box 10997/41, Pascual to the *subdelegado*, 24 May 1854.

26. AGP, Navarra Division, box 10997/41, Pascual to the Navarra *subdelegado*, 21 September 1854.

27. F.W. Breithaupt & Sohn (Kassel) is a German company which delivered many compass types to the industry (mines) and the military. It was created in 1767 by Johann Christian Breithaupt (1736-1800); the Topography teacher in Villaviciosa forestry school had his "theodolito de Breithaupt y su plancheta de Lehmann" (PASCUAL, 1852, 3). In the 1880s, this theodolite was still part of the Spanish forestry school material (BROWN, 1886).

28. AGP, Budget, Navarra Division, box 10993, 1854.

29. AGP, Navarra Division, box 10994, Letter, September 1861. Pascual declared in some public revues that the Labiada Forest map was one of the first in Spain with the "Dehesa de castil-seras, cerca de Almadén, y de los montes, reservados a las mismas de Riotinto" (PASCUAL, 1857, 172).

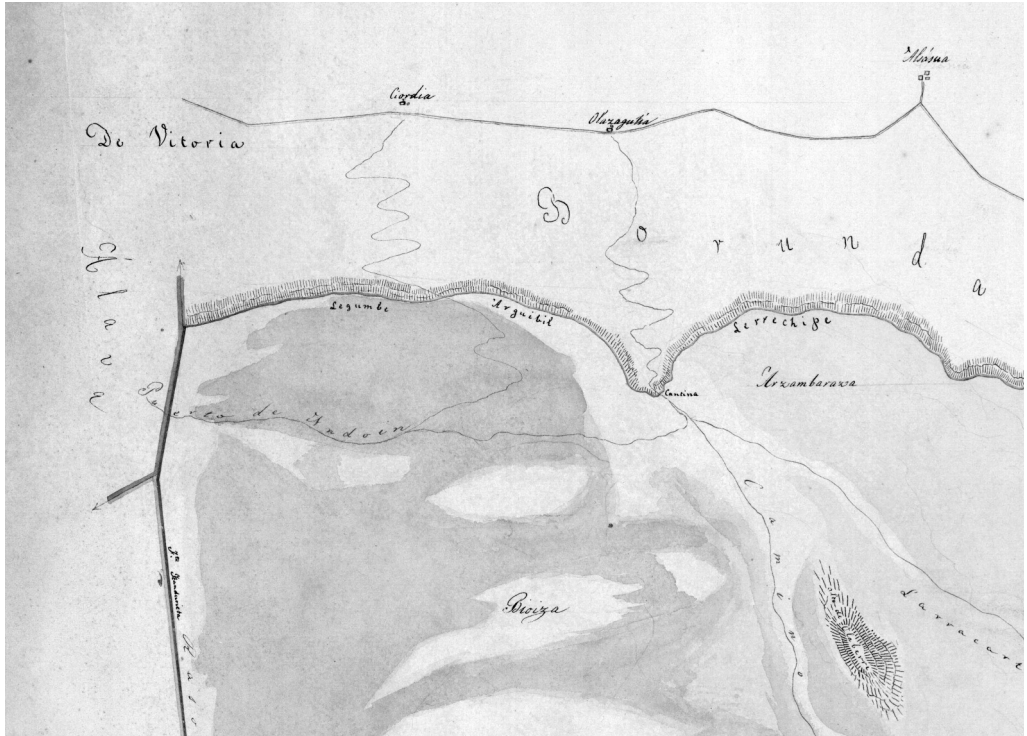
30. AGP, Navarra Division, box 10993, Pascual to the intendent, 25 September 1858.

31. AGP, Reglamento Orgánico, Personal Division, box 793/42, Pascual work record; AGP, Reglamento Orgánico, Gaceta de Madrid, 10 March 1847.

32. "The plan of stands of the Royal Table of Urbasa has been completed [...] The Forestry has made little progress so far [...] Among the causes of the abatement of the mountains are some meth-

cual remarked –and was later echoed by Pinchot–, “a series of safety-lanes could be cut through the mountains, separating the timber into comparatively small bodies, so that the fire in one body could not reach that in any adjacent one” (Pinchot, 1891).

FIGURE 2
Urbasa map, 1855



Source: AGP, Maps Division, plano 415, “Croquis Forestal de la Mesa Real de Urbasa, 1/25.000, 585-852mm” (signed José Díaz Labiada), 10 february 1855.

It seemed very possible that the forest maps ordered by Pascual in the royal estates would be finished earlier than the first ones of the Ministry of Public Works (Nadal, Urteaga & Muro, 1998). If Labiada started his Urbasa works in 1854, Esteban Boutelou had finished some other maps in April 1856, of the Lomo del Grullo royal forest, not far from Seville (Fig. 3). These forests maps predated *La Garganta del Espinar*, signed in 1863, up to now

ods of felling, whose fatal influence almost no one has noticed because antiquity gave a kind of sanction, and the habit surrounded them with a certain prestige. To this class belong the gallows and banner pruning, the overhang, the thinning and other discontinuous cuts that hinder the progress of the exploitation plan.” (PASCUAL, 1856).

considered by some scholars the first in Spain of its kind (Allué-Camacho & García López, 2007).

FIGURE 3
Lomo del Grullo map



Source: AGP, Maps Division, Archivo de los Reales Alcázares de Sevilla, Sevilla, plano 46, “Plano de los pinares de la Juncosilla en el Grullo” (signed Esteban Boutelou), 12 April 1856.

What conclusions can be drawn from this Urbasa exemple? From 1846, German forestry modernizations were increasingly implemented in Spain. They would bring new changes to methods of production, taking care of the particularities of the physical environment. Those changes, even if they were not always received with enthusiasm by the local Crown administrators or the factory managers, would strongly influence Spanish forestry, encouraging state civil servants to imitate the example of the Royal Patrimony. The Labiada map and forest working plan were very important moments for the process of modernization of Spanish forestry. It was a time of rupture with the past, in which the new German method finally superseded the old 17th-century system present in some royal forests. In fact, once adopted at the Urbasa forests –as a first trial–, the Saxon technique spread throughout the royal forests and some national forests within a few years³³.

33. Other figures to prove this argument, in GARCÍA LÓPEZ (1995).

7. THE ENEMIES OF THE FOREST AND THE TENSIONS WITH THE LOCAL ACTORS

The expanded policing and increased bureaucratic efficiency helped intensify the Crown's pursuit of brigands and beasts³⁴. Regarding the second group of "enemies", Crown foresters initiated broad extermination campaigns against detrimental and dangerous animals, from rabbits to wolves. Rabbits were considered the foremost menace among wild animals, for the harm they caused to young trees. In 1847 alone, nearly 18,000 rabbits were killed and presented for compensation in the Madrid royal forests³⁵. In 1867 3,000 rabbits were sold in the Acequia Crown administration³⁶. According to the 1848 *Ordenanza*, for the killing of wolves, the forest guards were paid between 44 and 55 *reales* a piece³⁷.

Rabbits declined in number, as did wolves. Forest crimes were better documented and customary rights were more closely inspected. In many ways, however, the arrival of a muscular manifestation of administration also served to provoke resistance among municipal administrators and rural populations. Armed with sabers and pistols³⁸, these recruits brought to the job a frontline approach that echoed the forest administrators' intolerance for delinquency and their belligerent attitude toward rural populations, whom they frequently viewed as enemies.

34. Kieko Matteson has studied the conflicts with such "predators" in the French context (MATTESON, 2015).

35. Monlau pointed out with regard to the Casa de Campo that in 1847 a thinning (*entresaca*) had resulted from the hunting of 18,127 rabbits (MONLAU, 1850: 391).

36. This proposal "is a very important progress, because there should not be one of those harmful rodents on that farm. There will be no pastures, there will be no mountains, and there will be no income, as long as in Aranjuez and Jarama the rabbit is not declared vermin [...] hunting made with ropes and nets, and in points where it cannot be carried out like this, the use of ferrets [...] The hunt will be directed by the overseer, who will take care not to dig their houses". AGP, 12038.17, Auction of 3,000 rabbits in the Dehesa Nueva del Rey, office of Pascual, 26 October 1866.

37. "For the death of wolves and other harmful animals, they were awarded: 44 *reales* (wolf), 55 (wolf), 8 (fox), 6 (wildcat), 12 (badger), 8 (marten), 8 (genet), 4 (eagle), 2 (birds of prey), 1 (snake), half *real* (lizard) [...] When they go to court armed, they did not enter it with loaded weapons" (*Reglamento Orgánico*, *Gazeta*, 10 March 1847).

38. AGP, Acequia, 12032/7, office of Guijarro, August 1850. He asks for weapons for the guards. He only has 11 heavy rifles in poor condition, 8 swords of extraordinary magnitude difficult to handle given in 1826, he asks for 20 useful carbines, 4 being for the custody of the flows, 13 sabers, and the same number of pistols for riders, all in accordance with article 497 of the ordinances.

Some of the most far-reaching limitations of the new rules conceived by Pascual were contained in article 222 of the 1848 *Ordenanza*, which warned that gathering mushrooms and other small plants of the forests fell under the jurisdiction of the Crown administration. Only when the proceeds from the products covered the expense of their extraction could the products be distributed to the poor, according to the conditions laid down by the administration. Silvopastoralism also topped the group of communal practices that the German-trained foresters wanted to contain. The practice had long been denounced by other European experts. “It is incontestable that nothing is more contrary to the growth of woods than bringing grazing animals into them”, Duhamel du Monceau had asserted in his 1760 treatise, *Des semis et plantations des Arbres*. Pascual described the entry of cattle in the forests in terms almost of violence³⁹.

Pascual installed a potent forest bureaucracy. Efforts, particularly the 1848 *Ordenanza*, were acceptable in the name of the public good. By introducing the forest administration at every level of woodland use, from cattle distribution to mushroom picking, the *Reglamento* and the *Ordenanza* rendered rural communities dependent on an growing bureaucracy. Forest users were also subject to amplified scrutiny by an ever more efficient ranger force. In this way, the *Reglamento* and *Ordenanza* engendered greater conflict between rural populations and the Crown. Rural populations fought almost every effort at external regulation of the resources they considered their own.

The forest’s communities had found themselves, in districts such as Navarra, competing with forge masters and other users for wood (Lana, 1992; Iriarte, 1998). The rural populations were less than satisfied with the new measures. In 1855 and 1867, members of the municipal governments of the Urbasa district complained that they had been deprived of their former grazing, gathering, water, and fuelwood rights, though the right had been confirmed in 1699 and 1855 and their villages were barely a stone’s throw from the Urbasa Royal Forest. The result, exclaimed the petitioners, was scarcity and even misery. The Araya iron factory and the Crown foresters gave rise to discord and alarm. Their contractors strong-armed wood from local communities, overrode customary rights, drove up values, degraded the ecology of the forest area, and provoked resentment and resistance among the rural population. By challenging rural inhabitants’ needs and practices, the Crown propagated antipathy where it hoped to attain reverence. Chafing against the

39. Another of the great evils that afflicted these forests was the abuse of pastures: “Si los ganados entran en los tallares jamás se tendrán rodales homogéneos y el bosque será un conjunto de brotes despuntados” (If the cattle entered the stands, there would never be homogeneous stands and the forest would be a set of blunt shoots). AGP, San Fernando, 10178, office of Pascual to the secretary of the *Intendencia*, 27 August 1859. Without this order, the celebrated Matas de Valsain and Riofrio would not have been achieved.

Ordenanza's dictates as well as against rangers and foresters' increased scrutiny, individuals and municipalities protested in a diversity of ways⁴⁰.

Navarran supporters of customary rights, who believed in allocating the fruits of the land rather than the ownership of the soil, would have to defend themselves against the statement that individuated ownership was not only more efficient, but essential to productivity. Limitations irritated the villages of the Urbasa valleys. To gain the Crown's approval to obtain timber from the closest woods, inhabitants and municipal authorities had to undertake a time-consuming rigmarole of correspondence and petitions. Villagers were frustrated at watching big trees decompose, unused, while their dwellings fell into poor condition for lack of lumber. Increasingly, the Crown's forests were being managed in an exclusionary fashion: focusing on a vision of the *bien público nacional* that did not take into account the connected interests of rural communities. Foresters regarded customary and collective practices as obstacles to the production and protection of timber and other forest products.

Villagers' violence took a diversity of forms. Fire remained a weapon of choice, though the damage it caused was to the forest itself. While most blazes were quickly controlled, they produced wider and more random injury. In the Pardo Royal Forest, close to Madrid, in the summer of 1846, a large fire could not be controlled for three days. The Crown authorities were unable to identify the perpetrators⁴¹.

The forest administration's lowest-ranking employees predictably bore the burden of the rural population's frustration. Many details of the 1848 *Ordenanza* and *Reglamento* aimed at regularizing the forest workforce. For example, forest personnel were required to wear matching green uniforms. The bulk of forest rangers hailed from a martial train-

40. AGN, 29600/6, Lacunza, 28 February 1867. Office of various members of the Unión de Aralar about their rights in the royal mountains, pleading with the provincial council that "a few years ago they had been the object of agreements with the subdelegate of the Royal Patrimony [...] and the attorneys of the towns of Echarri Aranaz and Lizarraga, where these villages were recognized the rights of pasture and water in Aralar, that of building huts and sheds for livestock cutting trees and necessary branches, that of making firewood and cutting wood for its uses, that of carbonating [...] Subsequently, the assignment by SM in favor of the State of all the goods has taken place roots belonging to the Royal Patrimony and for this reason these mountains have been established under the care of the Government forester and his dependents, inaugurating this new administration in measures that limit and hinder the old uses of neighbors [...] serve as an example, the February communication from the forester to show him the number of trees they need, a requirement contrary to those always observed [...] captivated the residents of Lacunza in the act of cutting wood to repair their houses, preventing them from extracting it [...] very serious damage to the inhabitants and the province".

41. *El Español*, 2 August 1846.

ing, which may have rendered them more willing to look upon rural people as challengers. When exposed, they used deadly force. In November 1855, three men tried to kill a forest ranger with axes; in his defense, the ranger shot and killed one of them. The judge sentenced him to a harsh monetary penalty and eight months of prison⁴².

Rangers' limited competence also posed problems. Until 1842, when Pascual and Esteban Boutelou travelled to Germany, forest staff received no formal training. The qualifications for forest rangers were minimal: one had to be at least twenty-five years old, male, and know how to read and write. Those with family in the Crown administration had preference. For higher-level officers, no special knowledge of forest management was required. Rangers arrived on the job unaware of planting, pruning, and logging methods. The majority learned their trade on the job, with no other guidelines to go on than the *Reglamento's* limited directives⁴³.

Reaction was especially hostile in the Real Acequia del Jarama administration, where a blend of extensive Crown open forests (like the Real Soto del Piul and the Dehesa Nueva del Rey) and lines of tree plantations (like the Alameda de la Cuesta de la Reina in the Aranjuez road), entrenched customary practice, and administrative intransigence generated bitterness on the part of local populations⁴⁴. Some angry denizens took a quarrelsome approach, seizing the occasion afforded by the political chaos of the 1854 revolution. The ferocity of the 1855 upheaval, in Ciempozuelos, was surprising. People acting alone and in groups unleashed decades of accumulated resentment against the royal guards and the Acequia administration. With Crown, state, and municipal administrations in disarray, and the sympathies of municipal guard forces divided, forest and water rangers had to retreat to another village. The bold defiance of Ciempozuelos's residents forced the Crown to recognize their anxieties and gained them concessions they might not have gotten otherwise (*e. g.*, the moving of the Acequia administration to Valdemoro). Another example happened in Navarra, where in December 1855 a new agreement was signed in Urbasa, between the villages and the Crown administration, for the access of the Urbasa forest products⁴⁵. The occurrence of revolutions in 1854 and 1868 catalyzed

42. AGP, 12033/54, October 1855. Attacked by three attackers with ax in hand to take his life, he fired his weapon, killing one, Pacheco was called by the Illescas judge and sentenced to a payment of 3,000 *reales* to the widow and eight months in correctional prison. It's commented that the queen used to pay these expenses.

43. *Ordenanza*, article 39, about age and rangers' conditions. A first version of the *Reglamento* and the *Ordenanza* was drafted in large part by Agustín Pascual and backed by the Crown administrators, Egaña and Miraflores. This effort included technical principles and clauses on fishing and hunting mingled with sections on administration, policing, and punishment.

44. AGP, Acequia, 12032/32, Martín de los Heros correspondence, 1855.

and capacitated resistance by giving rural citizens new opportunities and political and rhetorical tools to press their case.

A landmark of modern environmental legislation, the 1848 *Reglamento* and *Ordenanza* combined the rationalizing vehemence of statistics and the emerging science of forestry with the administrative consolidation and contempt for the poor and the villages characteristic of Spanish governance in much of the 19th century. Though it brought much-needed precision to forest supervision, it also augured a fight for poor rural populations. Ostensibly focused on the national *bien público*, the *Reglamento* and *Ordenanza* tried to crush customary systems of forest resource use while making some concessions to private and commercial interests that could increase forest degradation. In privileging private initiative over common rights, the *Ordenanza* epitomized the weaknesses and contradictions of modern conservationism.

8. CONCLUDING REMARKS

In education and outlook, the bureaucrats/foresters Pascual and Labiada were hybrid experts. This enabled them to wear different “hats” and to direct their observations and conclusions into both scientific and bureaucratic paths of communication. These paths were kept apart by their respective specialties. When Pascual put forward one or the other aspect, he strengthened the boundaries that his hybrid persona bridged.

The colours, numbers, units, symbols, and scale of the first Spanish forest maps depict those bureaucratic and disciplinary borders, as well as intellectual traditions and internationalist convictions. Convincing Crown administrators to invest scarce resources into what turned out to be a twenty-year project to produce forest maps was an accomplishment in its own right. For the layman, for the *intendente*, and for the local Crown administrator, a first encounter with the forestry maps must have been overwhelming: a meaningless disorder of colours, rather than a standard simplification of the display of the royal forests. Together, the maps displayed a first appraisal of the queen’s forest resources. They showed the distribution of the trees and their age, each group represented by a colour. The maps presented a patrimony with ownership borders. The message was clear: the queen’s patrimony was dependent on the forest resources, and therefore on the scientific elite who could decipher the maps.

45. AGN, 29600/7.

A close analysis of the Spanish Royal Crown files reveals some interesting facts. The maps enhanced foresters' reputation for competence and thus bolstered their bureaucratic autonomy. The standardized system Pascual produced disciplined experts in the field in order to produce a view from above. This was, by design, an elitist endeavour. These maps embodied the modernist values of universal knowledge, legible only to an elite group of cosmopolitan experts.

The Royal Crown in the 19th century was a wealthy landlord, contributing to the modernization of national forest politics. As royal appointees, and not permanent lords, the local Crown administrators had little or no incentive to plan long-term managerial strategies aimed at ensuring sustainability and improvement. Instead, it appears that foresters did their best to reap profits and conserve existing woodlands. Scientific forestry took the form of utilitarian conservation, ensuring perpetual harvesting (later called sustained yield).

The IBR marked the beginning of Pascual's forty years as a crucial presence in Spanish forestry. He succeeded in generating interest in the viability of forestry while making a name for himself. Pascual believed in the ability of science both to protect the well-informed man and to manage resources wisely in the public interest. Pascual's ideology could not answer all questions regarding forest management, but it offered an alternative to the destructive policies of the past. The 1847 instructions predated the major reforms that occurred in Spain with the establishment of a nationwide professional forestry service. The Urbasa and Lomo del Grullo manuscript maps, two of the achievements of the bureau, marked an important shift in the forest history of 19th-century Spain.

From 1845 to 1868, the IBR carried out an ambitious task in forest cartography in order to fulfil the requirements of the Royal Patrimony. Supervision was not possible without accurate maps. Describing and mapping the various forest types became an important feature of Pascual's general strategy. The IBR conducted experiments in forest cartography that have remained mostly unpublished. In spite of this, the forestry mapping made by the IBR laid the groundwork for the Ministry of Public Works' forest maps and trained the staff who would serve in it. The IBR helped to create a national policy for forest conservation and management. In this sense, the Forestry Corps (Cuerpo de Ingenieros de Montes) was a legacy of the IBR, it also bore Pascual's imprint.

In spite of the many obstacles to the expansion of the IBR over the royal estates, it is impressive to observe how a handful of men were able to gather and organize information about such a large territory. It is likewise remarkable that the strategies developed to face these challenges were successful. The IBR's experience, from the 1840s to the

1860s, shows the power of a simple but efficient strategy to collect and interpret spatial information. The work of the IBR proves that internal norms of organization and working practices ensured the continuity of the bureau and made it able to respond to the needs of forest management. Finally, the capacity to assert its independence and to differentiate itself from local Crown administrators may be another fundamental sign of the building of a modern administration.

Two important remarks from Jeremy Black about the relations between mapping and state building in modern Europe allow us to underline some key points related to the IBR works (Black, 2008). First, Black warns against the risks of making overly strong parallels between state-construction and the progress of mapping. The case described here certainly shows strong parallelism with other contexts where surveys “made landscape understandable to a central bureaucracy” (Gautreau & Garavaglia, 2012, 29), or where “the creation of geographical knowledge has been closely bound up with the emergence of the modern state” (Dodds, 1993, 314). This article nonetheless has pointed out several pre-modern dimensions of the forestry administration which took decades to disappear. The fragmentation of territorial knowledge, the dependence on local Crown administrators’ decisions, are but a few examples. Administration and state-building were not parallel and continuous processes. Another premodern dimension can be seen in the fact that the Royal Patrimony was easily able to sell some of its better forests in the 1860s: the state has many ways to know the territory in addition to mapping.

What was it in the activities of the IBR from 1845 to 1868 that provided the Royal Patrimony with the decisive tools for the consolidation of its power? In fact, the spatial progression of forest mapping was accompanied by drastic change in forest management methods. Also, a central strength was the archiving capacity: Pascual did not participate personally in mapping but in large part gathered the maps and working plans drafted by foresters and local administrators, determined their “annual possibility” within the territory, and analyzed the profitability of the sales of forest products. This building of an administrative memory of territorial knowledge was far more innovative and decisive for the Royal Patrimony than the mere fact of increasing the precision of mapping, which for the period under study should not be stressed as a key objective. Archiving and mapping were the invention of a weak and young form of modern state. Through personal vision and his connections, Pascual, as other international forest engineers such as Pinchot would do in the USA fifty years later (Pinchot, 1947; Gardner, 2009), crafted a government program for the scientific management of forest resources⁴⁶. Pascual believed that expert

46. Between 1898 and 1900 Pinchot controlled more than 60 million hectares of forest property, thanks to the creation of the National Forest Service (RAMOS, 2004). If we try to compare Pascual

training and government management would result in scientific forestry that produced a profitable, sustainable business and improved the environment (González Pellejero, 1992). The IBR first, and the National Forest Service later, adopted this belief as an institutional ideology.

Future research should involve more comparative work between forestry bureaucracies. Portugal started building hierarchical structures, just like those of the Spanish state, in the 1870s (Joanaz de Melo, 2017). Only cautious comparison with other bureaucracies will indicate whether or not some form of advice and obedience is a general feature of bureaucratic knowledge production and, if so, how this manifested itself in particular cases (Felten, 2018).

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