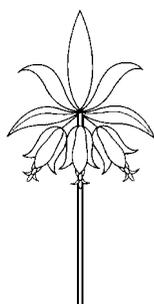


# HUNTIA

A Journal of Botanical History



VOLUME 16 NUMBER 2  
2018

Hunt Institute for Botanical Documentation  
Carnegie Mellon University

Pittsburgh

The Hunt Institute for Botanical Documentation, a research division of Carnegie Mellon University, specializes in the history of botany and all aspects of plant science and serves the international scientific community through research and documentation. To this end, the Institute acquires and maintains authoritative collections of books, plant images, manuscripts, portraits and data files, and provides publications and other modes of information service. The Institute meets the reference needs of botanists, biologists, historians, conservationists, librarians, bibliographers and the public at large, especially those concerned with any aspect of the North American flora.

*Huntia* publishes articles on all aspects of the history of botany, including exploration, art, literature, biography, iconography and bibliography. The journal is published irregularly in one or more numbers per volume of approximately 200 pages by the Hunt Institute for Botanical Documentation. External contributions to *Huntia* are welcomed. Page charges have been eliminated. All manuscripts are subject to external peer review. Before submitting manuscripts for consideration, please review the "Guidelines for Contributors" on our Web site. Direct editorial correspondence to the Editor. Send books for announcement or review to the Book Reviews and Announcements Editor. All issues are available as PDFs on our Web site. Hunt Institute Associates may elect to receive *Huntia* as a benefit of membership; contact the Institute for more information.

Hunt Institute for Botanical Documentation  
Carnegie Mellon University  
5th Floor, Hunt Library  
4909 Frew Street  
Pittsburgh, PA 15213-3890  
Telephone: 412-268-2434  
Email: [huntinst@andrew.cmu.edu](mailto:huntinst@andrew.cmu.edu)  
Web site: <http://www.huntbotanical.org>

Editor and layout	Scarlett T. Townsend
Editor, Emeritus	Robert W. Kiger
Book Reviews and Announcements Editor	Charlotte A. Tancin
Associate Editors	Donald W. Brown Lugene B. Bruno T. D. Jacobsen J. Dustin Williams
Photographer	Frank A. Reynolds

Printed and bound by R.R. Donnelley,  
Hoechstetter Plant, Pittsburgh, Pennsylvania

© 2018 Hunt Institute for Botanical Documentation  
All Rights Reserved

ISSN 0073-4071

## Contents

Early evidence of “Erica”: A linguistic and pictorial tracking from antiquity to the mid-16th century Holger Funk	79–94
Wild and cultivated plants in Cambridge, 1656–1657: A re-examination of Samuel Corbyn’s lists C. D. Preston	95–124
The deforestation of the French Alps Roger L. Williams	125–142
Some notes towards a reconstruction of Mark Catesby’s library E. Charles Nelson	143–156
Natural history, medical and economic properties of the <i>Solanum</i> and the genera merged with them: A dissertation by Michel-Félix Dunal Translated and abridged by Roger L. Williams	157–164
Idée fixe: A commentary on the opposition in France to the theory of lichen duality, 1870 to 1900 M. E. Mitchell	165–182
<i>Huntia</i> : History and reincarnation Scarlett T. Townsend, <i>Huntia</i> Editor	183–184
Book Reviews and Announcements	185–190



## The deforestation of the French Alps

Roger L. Williams

### Editor's note

Sadly, shortly after submitting this manuscript, Roger L. Williams passed away. Given Roger's long association with *Huntia* and the relevance of the subject matter, we decided to include the manuscript without the benefit of peer review and with only light editing. Roger's papers are located in the Hunt Institute Archives collection no. 373.

### Abstract

The article not only traces the gradual deforestation of the French Alps but also features the persistent denial of those responsible for it, namely the local inhabitants who cut over many centuries in violation of laws issued by the central government.

### The Old Regime confronts deforestation

Royal edicts issued for at least 300 years before the 17th century meant to preserve royal forests consistently had failed to halt their deforestation. In 1661 the Conseil du Roi complained that the large, fine forests in the Alps had become so deforested that timber for the repair of ships was difficult to find. Louis XIV resolved, consequently, to put an end to such abuses, empowering Jean-Baptist Colbert (1619–1693), the *contrôleur-général*, to design and enforce reforms.

His labor culminated in the *Ordonnance de Eaux et Forêts* of 1669, embodied in 500 articles meant to apply to all forested land in France. While it became the basic code for the next century and a half, its admirable detail and precision would fail to cope with the traditional practices of landed proprietors and peasants. The destructive abuses of forest

land were too widespread and customary for the authority of a distant Paris to reverse them (Bamford 1955, pp. 97–98).

A half century after Colbert's ordinance, the naturalist René-Antoine Ferchault de Réaumur (1683–1757) noted the continuing general anxiety over the decline of the woodlands. Complaints came from cities about the scarcity of wood, even from areas where wood was most common. He also described industrial locations where fears were being expressed of possible closure for lack of adequate fuel. As the national interest could be served only by an increasing number of such enterprises, the national interest also required that the quantity of wood not be allowed to diminish.

With the population increasing in the 18th century, additional lands likely would be cleared for cultivation, implying that care must be taken to assure that surviving woodlands produced wood to provide for the nation's requirements, and yet the surviving forests at that moment were not providing sufficient wood because they had been reduced in extent and because the forests producing full-grown timber had been substantially replaced by coppice: small trees and brush produced by frequent cuttings. Colbert's wise ordinance, designed to reverse that pattern, had proved to be insufficient to halt or curb the avidity of landowners or to force them to raise timber for their descendents (Réaumur 1721, pp. 284–288).

Georges-Louis Leclerc, comte de Buffon (1707–1788), appointed to be intendant of the Jardin du Roi in 1739, was aware that Colbert's

ordinance was not having its intended effects. He reported to the Académie des Sciences on experiments for reforestation he had begun about 1730 on his property in Burgundy. He had established nurseries for forest trees, seeding and planting extensive tracts to study reforestation. He meant to find how to conserve the remaining woodlands and how to renew those that had been destroyed.

The future of the oaks, the most useful of French trees, was of particular concern. Mature oaks, he explained, do not reproduce through underground rhizomes but are loaded with large quantities of acorns. One would suppose, Buffon asserted, that so profuse a fruiting would lead to a vigorous repopulation of the woodlands. In fact the several millions of seed that fell at the feet of such trees produced only a few hundred of shoots, only to be snuffed out soon by the constant shade and lack of air, by dripping from the tree, by frost or by competition from the established roots in the ground. A more successful seeding was accomplished in open areas by seeds carried by mules and birds, dropped accidentally. He argued that a fixed period for the cutting of mature woods should be set by law and depend upon the quality of the terrain, that is, by the depth of the soil (Buffon 1739, pp. 140–143).

Buffon cited the cases of Brittany, Poitou, Guyenne, Bourgogne and Champagne, where lands had become useless: sandy moors, heath-lands and commons, all quite sterile. Such terrains formerly had been natural woodlands, degraded little by little until totally stripped of forests. Buffon had begun restoration experiments with various methods simultaneously. Somewhat to his surprise, he found that acorns planted simply with a pick, and planted in the spring rather than before the onset of winter, gave superior results. Such experiments had all taken place on the good soils of his property.

Buffon's observations regarding reforestation permitted several conclusions. Even if oaks were the most useful of all trees, there were lands on which they could no longer be successfully introduced. Trees such as pines, firs and cypresses were suitable to poorer soils. Secondly, he recommended experiments in nurseries toward the goal of naturalizing useful exotic trees, such as Charles-François de Cisternay Dufay (1698–1739) had ordered after becoming intendant of the Jardin du Roi in 1732 (Buffon 1739, pp. 148–156).

In 1787 Tardy, an army captain, made observations of alpine Dauphiné, confirming the persistent lack of enforcement of Colbert's ordinance. He noted the lack of policing of rural properties and the establishment of too many factories requiring wood for fuel. He also believed that Dauphiné was no different from other provinces in never having established a formula for the suitable portion of the land devoted to cultivated food crops, forage crops and livestock raising. The result had been an insufficient portion given to forage crops relative to the needs of animal exploitation, driving peasants to illegal ways to supplement supplies of fodder for the animals. Landowners cannot protect woodlands and brush from the murderous teeth of animals, he added, surely referring to destructive goats in particular (Tardy 1787, pp. 133–134).

Captain Tardy's observations in 1787 that the timber crisis in Dauphiné was exceptional already had been recognized officially by Louis XV on 14 November 1724. He appointed a new commission for the general reformation of the waters and forests of Dauphiné. When the Ordinance of 1669 was framed, it had met lively opposition in Dauphiné. The ordinance was never registered by the Parlement of Grenoble and remained essentially a dead-letter in Dauphiné. Thus, the traditional bad habits had persisted.

When Boissier, the grand-maître des Eaux et Forêts, examined the forests in 1724, he reported the domain to be in a pitiful state from deforestation. He described the typical Dauphinois peasant who possessed nothing, got married, built a house from wood taken from the communal forest, made clearings to cultivate land and stole wood in order to sell it or to convert it into charcoal for the same purpose. He found grazing quite general in forests throughout Dauphiné, by sheep and goats in particular. He predicted that the future integrity of forests would be most threatened by the development of industries that required combustible wood.

In view of the official Dauphinois rejection of Colbert's forestry regulation, Boissier's description of peasant behavior was a factor accounting for official rejection. He depicted the peasants as *mauvais insolents* (exhibiting extreme effrontery) and dedicated to pillage. The local landowners, the seigneurs, found it difficult to hire anyone to guard their properties, given peasant threats to kill them or burn their houses. Without a reformed administration designed to curb illegal use of the forests, Boissier concluded that the last of the forests of Dauphiné would perish and that the province could become uninhabitable within ten years (Roy 1935, pp. 24–28).

The royal commission of 1724 had been invested with exceptional authority by Louis XV to cope with the grazing of goats and did put out an order on 10 January 1725 forbidding the pasturage of goats within forests. A second ordinance, 4 February 1726, forbade both clearing or burning of any copses or brushwood, or the cultivation of any earlier clearings, on sloping or mountainous places. Thereafter, the commission announced it would be visiting the various communities within the province, not only to assess the state of local woodland but also to question local officers about their observations. Their

goal was to bring forest management into adherence with the Ordinance of 1669. The commission employed an official land-surveyor to accompany those visits. In each commune he supervised the local land-surveyor to produce a map of each important local forest, in the presence of the communal officers and some inhabitants. The consequent ordinances drawn up for each commune were meant only to stimulate immediate reform. It remained for the commission to codify them into a general and definitive set of regulations to comply with the king's directive of 14 November 1724.

Named the *Règlement Général des Commissaires du Roy pour la Réformation Générale des Eaux et Forêts du Dauphiné*, it was not completed until 15 October 1731 and published in Grenoble in 1732 (Gevry 1906, pp. 246–249). Its terms, no doubt, contained imperfections from the standpoint of the 20th-century forester. The provision that copses should be cut only every ten years was inadequate. They required fully 25 years for regeneration. Such an error was excusable in an era when scientific forestry had hardly begun (Roy 1935, pp. 32–35). Moreover, as legalists, not foresters, the commissioners sought the enforcement of the laws for the first time in Dauphiné. To implement such reforms required firm hands and watchful eyes, and resistance to them was immediate in alpine country habituated from earliest times to all manner of licenses. Such resistance was voiced in the general assemblies of the provincial communes (Roy 1935, pp. 36–49).

One measure of the deepening crisis thereafter was the price of wood, which increased more rapidly than that for other staples, a situation approaching catastrophe by the eve of the Revolution. The notable improvement of French roads in the 18th century slowly had provided easier access to regions hitherto nearly inaccessible, accelerating the exploitation of forests in Dauphiné. The

increase in both the price and the consumption of wood after 1750 also was attributable to the rate of population growth. The population of France was about 19 million in 1700, reaching 25 million in 1789, the rapid growth beginning about 1740. The royal government was forced consequently to encourage forest clearings for the planting of grains.

As scientific forestry was hardly developed in the 18th century, the official foresters hired by the government were not technicians but men accustomed to a rural life. Most of them were routine-minded, knowing little more than the Ordinance of 1669; thus, foresters in name only (Devèze 1963, pp. 595–616). During the Old Regime conservational ideas and desires either curbed or gave some counterweight to the tendency to squander the public patrimony, but hardly had the Constituent Assembly decreed the sale of National Properties in 1790, and the freedom to clear them, than one began to see indiscriminate cutting of fully grown trees and their sale at very low prices. France was greatly impoverished by it (Carrière 1857, p. 110).

Any hope that the revolutionary regime would reverse the centuries of deforestation by the passage of the Law of 29 September 1791 was short-lived. The 18 maîtrises were eliminated and replaced by a centralized authority called the Administration des Eaux et Forêts. This implied a management of forests immune to traditional pressures for variances. Putting men in charge of forestry administration, chosen not for any knowledge of scientific forestry but for their *virtue*, meaning political correctness, guaranteed incompetence and failure (Badré 1987, p. 472).

The five years of the conservative republic known as the Directory (1795–1799) were troubled by conspiracies by republicans and monarchists. The consequent instability became the opportunity for a glamorous young general, Napoleon Bonaparte, to participate in a coup

d'état on 18th Brumaire (9 November 1799). The Directory was overthrown, the Consulate established, and Bonaparte declared that he was consolidating the Republic, not overthrowing it, and that the Revolution was over. Could that also mean an end to the uncontrolled woodcutting of the revolutionary years?

Bonaparte named the attorney Joseph-Alexandre Bergon head of the Administration Générale des Forêts on 22 December 1800 but did not communicate with him. Bonaparte dealt with Charles Gaudin (1756–1841), his minister of finances from 1799 to 1814, on issues concerning forests. Bonaparte to Gaudin, 9 August 1801: “The prosperity of commerce, the glory and political stability of the nation, require the greatest quantity of the forests be held in the government’s hands, as the conservation and good administration is so necessary to the reestablishment of the navy” (Badré 1987, p. 340). That goal of conservation and good administration was consistent with Bergon’s administrative plan as defined in the Corps Législatif. Namely, that it was urgent to give assurances that he would take measures “to halt the frightful disorder into which the forest administration had fallen, and to occupy himself with those plantations, always projected but never made” (Badré 1987, p. 337).

Bergon engaged an experienced agronome, Jacques-Joseph Baudrillart (1771–1832), to be his chief secretary and encouraged him to publish works on forestry technique and on needed related legislation. He translated from the Prussian, *Nouveau Manuel Forestier, à l’Usage des Agents Forestiers de Tous Grades*, published in 1805. A second title translated from the German, *l’Instruction sur la Culture de Bois, à l’Usage des Forestiers*, was also published in 1805. The first edition was sold out within two months, requiring a second edition in 1805, indicating an audience for regeneration among foresters.

In 1807 André van Recum, a deputy in the Corps Législatif, having read Duhamel du Monceau on his experiments to naturalize North American trees for use in reforestation, knew that France had long had sufficient scientific knowledge about trees and forests, but it had not been applied methodically through schools to train foresters. He published a book on the need to establish forestry schools in France (Badré 1987, pp. 348–361). Ernest Curten, an obscure landscape architect and nursery proprietor west of Grenoble, had published similar observations in 1804, citing the mindless encouragement of clearings under revolutionary governments. He argued that the way was open for a vigorous enforcement of an enlightened forestry code and that France needed a body of foresters trained in the science of forestry (Curten 1804, pp. 8–12, 43).

Félix Bonnaire (1767–1844), named prefect of Hautes-Alpes in 1800, was fortunate to have inherited Pierre-Antoine Farnaud as chief secretary of departmental administration. His assessment of the economy of Hautes-Alpes, published in 1799 when he was serving under François de Neufchâteau, argued that everything must be done to promote the culture of trees. All further clearing had to be stopped, and, above all else, get rid of the goats. He sought official encouragement to hire engineers to prepare plans and estimates and to seek the means to pay expenses (Farnaud 1799, pp. 1–8).

Having been born on the flatlands of Champagne, Bonnaire found the determination of the inhabitants of Hautes-Alpes to settle there inexplicable. Two-thirds of the terrain was occupied by mountains, the remaining one-third composed of shallow soils, continually threatened by precipitous water overflows from its rivers. The torrents, cutting ravines in the mountainsides, seemed to be increasing in frightening number. He estimated the population of Hautes-Alpes in

1899 to be 118,000. The loss of income from the damage to agricultural crops from annual flooding, along with the exceptional rigor of winters at that elevation, required an annual emigration of men south to work as laborers. They returned home in the spring with some savings, aiding in paying their taxes (Bonnaire 1801, pp. 1–27).

A peasant mentality that rejected the adoption of new methods of scientific culture was also recognized by Bonnaire to be another barrier to increasing agricultural productivity. Attempts by learned agronomes in the 18th century to provide useful examples had been lost on the multitude. The most obvious method of reclaiming soils, both for profit and enrichment, would have been the elimination of fallow by planting alternative crops. Bonnaire noted that once fields in Hautes-Alpes had produced wheat, rye or barley, they were never employed in other productions. Half the fields were in fallow. He advocated the establishment of experimental farms in every arrondissement of the department, headed by an honest, learned man, devoid of prejudices, to conduct experiments on the varying soils. Keeping records of results and building barns to store harvests could be used to instruct those peasants willing to learn the methods of the new agriculture.

The doubling of cultivated areas by abandoning fallow could eliminate, Bonnaire argued, the prevailing practice of selling harvested wheat to Provence, while nourishing themselves on the black bread made from oats and barley. As in some valleys they only ate bread baked every one, two or three years, it retained no flavor and had to be broken up with a hammer. Potatoes, which ought to have been cultivated for the poor in Hautes-Alpes, were little known (Bonnaire 1801, pp. 41–52). He rated the wines produced in the northern part of the department to be of poor quality. In the southern region, especially along the Durance,

a higher quality of wine was obtainable. The principal vineyard in Dauphiné was called l'Hermitage, which produced grapes in what is called Drôme today and is considered very fine (Bonnaire 1801, pp. 29–33, 168).

The rapacious cutting of the finest trees, Bonnaire asserted, taking no care to spare either young trees or the copse wood, had been the cause of the distressing nudity of the mountains. He found records of villages that had burned as many as six times during the 18th century, their houses built of resinous conifer wood with thatched roofs and inhabited by negligent owners. Each time they took axes into the forests to find rebuilding material, never meeting any authority to prohibit the damage they were doing (Bonnaire 1801, pp. 74–80, 84).

Bonnaire expressed to Chaptal the hopelessness of expecting any reform or reclamation to derive from local initiatives. If describing the general population as kindly and good-hearted, he cited its lack of education and energy to strive for improvement. Many of the communal mayors were unable even to sign their own names, a fair measure of local leadership. Verbal communication in the local *patois* was an additional impediment. Bonnaire consequently implored Chaptal to urge the national government to initiate those investments that could remake intransigent peasants into Frenchmen (Bonnaire 1801, pp. 97–113).

A second prefectural report to Chaptal in 1801, that of Jean-Pierre Colin from the neighboring department of Drôme, reinforced Bonnaire's main observations but was unique in its preliminary emphasis on the moral character of the local population. While Colin recognized that the removal of many men from their vocations for military service during the revolutionary years could have weakened the moral order, he suspected that the religious confusion during a decade of revolutionary turmoil had resulted in a decline in religious

authority and to the absence of religious principles for many. For them the promise of future happiness had now disappeared along with religious ideas. Such a situation engenders despair, and despair often gives birth to crime (Colin 1801, pp. 9–10). When turning to the condition of land and forest, Colin noted that Drôme was mainly mountainous and not naturally suitable for extensive cultivation. Imprudent clearings of forests in the mountains had led to landslides and swift runoffs of waters, further limiting agricultural production (Colin 1801, pp. 15–18).

As for the current state of the woodlands in Drôme, Colin claimed that all the forests had been devastated. Any economic recovery promoted by the state would require reforestation and its conservation to provide wood for local use and export. The arable lands, he added, were formerly bordered by oak trees, which the farmers, because of the customary stipulation in their leases, were expressly obligated to conserve for the benefit of the navy. Such properties were mostly sold during the Revolution through the auctions of the national lands. What was left in Drôme was either wasteland, brush or exposed rock (Colin 1801, pp. 33–37).

In 1801 the neighboring department of Var extended eastward to the Var River and included the arrondissement of Grasse. Joseph Fauchet, the prefect of Var, was concerned for alpine reclamation. He believed that the destruction of forests had made winters somewhat colder and the summers somewhat hotter in Var, based on records of temperature for the previous 30 years. There had been no measurable change in rainfall during that period, but the flow of water from springs had been diminishing since the clearings. Evidently, the trees had restrained rapid runoff of rainwater, so that it had soaked into the ground for storage in underground reservoirs (Fauchet 1801, pp. 12–18).

The roads in Var were not even bordered with trees. Fauchet explained that in the past one still regarded terrain used for roads as lost for public prosperity. Accordingly, the Estates of Provence would not recommend even a small portion of terrain for roadside planting. Given local prejudices, he claimed the powerful hand of government would be required to provide a reserve of trees through the establishment of nurseries, and any successful reforestation would require rigorous enforcement of forestry regulations. Fauchet believed that landowners would require encouragement to cooperate in planting mulberries along their roadways (Fauchet 1801, pp. 72–79).

Fauchet finally addressed the effect of the suppression of the tithe and feudal rights on the reclamation of land. Under the Old Regime, an acquirer of a feudal property became subject for 30 years to a law called *le Retrait Féodal*, the feudal redemption. Within that period, the former seigneur had the right to reclaim the property for only the original purchase price. Consequently, an acquirer usually had delayed planting and improving until his ownership was cleared.

By the decrees of 4–11 August 1789 the National Constituent Assembly abolished the feudal regime entirely and without indemnity. Several mitigating conditions were inserted in Decree #5: The abolition of tithes was subject to devising the means for providing the expenses of divine worship. Secondly, a distinction was made between servile and personal dues, the latter, if redeemable, to be collected until reimbursement had been made, a distinction based on respect for property rights. The complete suppression of the tithe and the right of feudal redemption only came with the fall of the monarchy in August 1792. Thereafter, the fields were better cultivated (Fauchet 1801, pp. 89–91). However welcome such extended production would have been, it had not been achieved by acceptance of

the new scientific agriculture advocated by the agronomes. Peasant intransigence and illiteracy still remained insurmountable.

François-Marie Perrin-Dulac (1766–1824), when prefect of Isère, examined old charters and titles in the departmental archives, finding proof that the old province of Dauphiné had been covered with superb forests that had almost disappeared entirely by the outset of the 19th century. While the failure of Colbert's ordinance to promote conservation was attributed in part by Perrin-Dulac to the *maîtrises* not effectively overseeing cutting, he described the refusal of local parlements to register that legislation as a defense of local authority against royal infringement. That conversion of self-interest into high principle would continue to obscure the prior merit of forest conservation well into the 20th century (Perrin-Dulac 1806, 1:223–225).

The alpine prefects all agreed that the suppression of the *maîtrises* during the Revolution had made matters worse. The purchasers of the national lands usually had no other means to pay for them except to cut trees for sale. Perrin-Dulac insisted that the only well-managed woodlands remaining in Isère were those in the hands of the Carthusians: the Grande-Chartreuse north of Grenoble, founded in 1084; and the Chartreuse de la Sylve-Bénite, near Virieu-sur-Bourbre, founded in 1166, reoccupied under the Consulate (Allard 1864, 1:255; Perrin-Dulac 1806, 1:230–236).

The reclamation efforts of the alpine prefects was reinforced in 1806 by the belated publication of agricultural recollections by Nicolas-Louis François de Neufchâteau, by then a senator from Dijon dating from the 18th Brumaire. The publication repeated recommendations for reform he had made in 1797 and was now dedicated to the emperor as a transparent request for imperial action. One of the primary concerns of the government,

he asserted, must be to restore the equilibrium between the consumption and reproduction of wood and to recruit effective foresters. The cooperation of the entire nation had to be secured in order to allocate funds to compensate the financial losses the restrictions on cutting would imply. Replanting the national forests and along roads, rivers in marshy places, dunes and mountains would have to be undertaken as ordered in the 17th century (François de Neufchâteau 1806, pp. 146–147). By 1806 he was president of the senate and could hope to inspire imperial policy.

All the good intentions given birth in the Napoleonic era became stillborn because of the priority of military expenditures for political ambitions. Those good intentions, if still inadequate, were officially recognized and rewarded. The prefects Colin and Fauchet were named chevaliers de l'Empire, and Bonnaire baron de l'Empire. Senator François de Neufchâteau became comte de l'Empire. Chaptal, a minister of the interior and councilor of state, also became comte de l'Empire.

### **Failed reforms between the Napoleons**

At the end of the first Napoleonic period, Jean-Henri Jaume Saint-Hilaire (1772–1845) of Grasse, a learned botanist, applied his technical knowledge to the continuing debacle of deforestation. If he welcomed the Bourbon Restoration in 1814, he saw it as the opportunity to replace both Napoleon and Jacobins whom he regarded as destroyers of natural and economic resources. If he never meant to abandon the meritocracy characteristic of their regimes, his Bourbon loyalty was fortified by his knowledge that the Old Regime had sought the advice of men like Buffon and Duhamel du Monceau out of concern to stop the deforestation (Williams 1988, pp. 233–262).

The end of the Napoleonic wars in 1814 was the appropriate moment for Jaume to present recommendations for the conservation of woodlands, and for competent public administration of them. Of primary importance, he asserted, was to recognize that forest management required professional training, a knowledge not casually acquired. No reforestation could proceed without specialists at the head of forestry administration. Secondly, he argued that the earlier recommendation by agronomists that trees be planted along all main roads should be implemented, estimated to require between eleven and twelve million useful trees. The cost of such plantings could be lessened immensely if the government established public nurseries in every department under the direction of a trained gardener.

The government must also take into account, Jaume continued, that the degradations of forest will continue as long as man has access to them. Only an enforced program of maintenance and improvement will prevent the vegetation from becoming permanently insufficient for the needs of the population. Sowing and planting must become proportionate to cutting. Otherwise, the agricultural soils will erode and lose fertility. The tax structure needed to be revised so as not to penalize the landowner who, in preserving his trees, becomes vulnerable to increased taxation because of the increasing value of his wooded property. He added a proposal for a royal ordinance to create a superintendent of forests and a corps of inspectors to be protected by armed guards to enforce conservation (Jaume Saint-Hilaire 1814, pp. 21–25).

The royal ordinance of 11 October 1820 established an Administration des Forêts separate from the royal domains, but both under the control of the minister of finances. At the time the system began functioning, 1 January 1821, roughly 7,410,000 acres were

claimed to be forested in France: 2,717,000 acres in royal forests, 4,693,000 acres in communal forests. Precise figures to measure the losses of forested land between 1789 and 1820 will probably always elude us, but a loss of about two-thirds remains a reasonable figure. The royal ordinance of 26 August 1824 provided for the creation of a forestry school but was actually organized by an ordinance of Charles X, 1 December 1824: the *Ecole Royale Forestière* at Nancy.

A new Code Forestier was adopted on 31 July 1827. If based on the Ordinance of 1669, the new code reflected changes in society after 1789. The judicial authority of the old *maîtrises* was not reestablished. Forest offenses had to be tried henceforth in regular courts. Penalties for forest offenses, corporal punishments under the Old Regime, were modified consistent with the newer concept of equality of everyone under the law. The revolutionary principle that all forests, regardless of ownership, should be subject to the forestry regime, was added to the Code of 1827.

The new forestry school, authorized in 1824, was not managed or performing well before 1838, and only 388 agents had been graduated by 1847. The difficulty the forestry administration experienced under the July Monarchy, in establishing its authority on the land, reflected undiminished rural hostility to the forest service. Perhaps the Code of 1827, by substituting an assortment of fines and imprisonments in place of the traditional corporal or arbitrary penalties, encouraged abuses unintentionally and accounted for the multiplication of crimes heard annually by the courts of first instance: about 100,000 by 1847. Landowners were often willing to run the risk of clearing their lands in view of the modesty of the penalties (Badré 1987, pp. 469–493).

Michel Chevalier traveled widely in the United States in 1834–1835. He found the economic development of the United States

advanced compared to that of France and an immense intellectual disparity between the American farmers and the French rural population. He wrote,

Study the population of the French country areas, plumb the brains of our peasants, and you will find that the motive behind their actions results from a mixture derived from Biblical parables with old tales of gross superstition. Perform the same operation on the American farmer, and you will find that the great traditions from the Bible are allied quite harmoniously in his head with the precepts of the new science posed by Bacon and Descartes; and with the moral and religious principles of independence promulgated by Luther and the most modern ideas of political independence.

In France, the important industrial and scientific appliances such as the steam engine, the balloon, the voltaic pile, the lightning rod, inspire religious terror in the greatest number. Among a hundred peasants in the depths of our provinces, you will not find one who, after having seen their uses, dared put a hand on them. They fear being struck dead, as in the sacrilege of touching the ark of the Lord. On the contrary, these are familiar things to the American. He knows them all, at least by name. He feels the right to possess them. For the farmer in the vastness of the West, as for the member of the Institut de France, these are tools, instruments for work and experiments, initiative (Chevalier 1837, 2:379–380).

Chevalier thought well of the improvements envisioned through the establishment of the forestry school in Nancy but believed the reform would remain token until funds adequate for forest reclamations were inserted into the budget. He proposed that the state must provide a million francs a year to seed or plant all barren land not susceptible to profitable cultivation in the Alps, the Pyrenees, the Vosges, as well as along the littoral of Les Landes, where the efforts to date had been *Lillipution* (Chevalier 1838, pp. 202–204).

Alexandre Surell, a young engineer in the Ponts et Chaussées (Roads and Bridges) stationed in Hautes-Alpes, published an account in 1841 of the recent disastrous flood

in the region, the first serious work on erosion (Surell 1841). He knew that the inhabitants had initially tried to control the flooding by erecting dikes along a ravine to a height of two meters, but debris carried by the water had soon filled the ravine to that level. The dikes were then raised successively to four meters, then eight meters and even higher. In July of 1838 the torrent brought down such immense rocks that the embankments were flattened, opening a breach 25 meters wide and forming walls of stone and lime, 2 meters thick and 5 meters high. The lava-like stream came straight for Chorges, covering it with rock and gravel. A similar terrible overflow of the torrent, Rif-Bel, had struck Guillestre in Hautes-Alpes in 1836.

Anticipating the claim that such torrents had always existed, Surell provided evidence they were of recent origin. He showed that affected towns such as Chorges had been inhabited before the Christian era, regarded as safe locations until recently. Such localities would never have been founded in the path of torrents. He recorded testimony of old men who had seen the torrents worsen in their lifetimes. The sustained, drizzling rains, characteristic of much of France, were unknown in Hautes-Alpes where the dryness of the air and the cloudless sky was only broken by occasional rain. If less frequent, they were tremendous when they occurred, often what we call cloudbursts (Brown 1879, pp. 26–36; Carrière 1857, p. 150).

The presence of occasional very old furrows in the mountains, dry and not carrying water, required an explanation. Surell described them as old flooding sites where the protective vegetation had been removed either by fire or deforestation. In time the vegetation had recovered naturally, and the furrows had become extinct. The great upsurge in deforestation by the 18th and 19th centuries had produced the same effect. Rivers and

streams, stabilized in the past, became subject to flooding, producing changes in river courses, such as was evident on the Durance in the 19th century.

A dramatic disaster occurred in the 19th century in Hautes-Alpes. A fragment of the Montagne d'Aurouse, deforested and covered with cultivated fields, broke loose in an immense block, tumbling into the gorge of the Abéou torrent above La Cluse. The torrent, Surell explained, had eroded the base of the deforested land causing a landslide. Surell explained how trees, with their root systems, branches and trunks, were not only soil-binding but also protecting the development of what we would call understory today, contributing to the absorption and distribution of moisture. He believed the rural population did not understand the rationale for reforestation (Brown 1879, pp. 40–48).

The alpine peasants had been learning to cope without wood during the long winters with what Fouché-Prunelle called *salons-écuries*, stables as living rooms, really sleeping space to benefit from animal heat. He described how cow droppings, the preferred dung for burning, was prepared for use and stored. As it could not be used for baking bread, communal ovens had to be used (Fouché-Prunelle 1846, pp. 378–388). Such conditions had begun to promote depopulation. Man at last is retiring from the fearful desert, J.-A. Blanqui (1798–1854) reported to the Institut; and a forest inspector predicted that all cultivators would soon be compelled to abandon the places inhabited by their forefathers as a consequent of the destruction of the soil, resulting from the destruction of the forests (Brown 1879, pp. 66–72).

The February Revolution of 1848, by overthrowing the July Monarchy, brought liberal republicans into office. Beset by socialist-radicals on the left and disgruntled monarchists on the right, the liberals sought to avoid any additional unrest by withdrawing

support for the forest legislation enacted by the monarchy. The foresters, unsupported by government, were suddenly powerless to protect the forests and became subject to increased popular attacks upon personnel. Authority was reestablished in the summer of 1848 thanks to the dictatorial powers granted to General Louis-Eugène Cavaignac (1802–1857) but only by making concessions to the public at the expense of the forests. Cavaignac's minister of finances reached an agreement with the governor of the Bank of France for a loan of 150 million francs to the state, giving 75 million francs worth of state forests as a partial repayment of the loan. Fortunately, the 210,000 acres of forest were not entirely sold and eventually reverted to the state.

Despite the setback in forest management in 1848, public opinion had been aroused by the disastrous floods in the 1840s, and the dangers of abusive deforestation and the evident need for reforestation were understood, if not in remote alpine villages. The election of Louis-Napoleon Bonaparte (1808–1873) as president of the Second Republic on 29 December 1848 was a massive public rejection of both the liberals of the February Revolution and General Cavaignac. The need to separate forest administration entirely from the ministry of finance and put it under a ministry of agriculture had been demonstrated (Badré 1987, pp. 500–509).

The electoral victory of Louis-Napoleon in 1848, when confirmed as emperor in 1852, justified the expectations of forestry administrators that the moment for enlightened administration of forests had dawned. P.-I. Delafont, a forester based in Hautes-Alpes and an advocate of Surell's proposals, was confident that Napoleon III would lead the population to see the urgency of reforestation and provide the funds for it (Delafont 1854, p. 12). Ernest Cézanne (1830–1876), an engineer in Ponts et Chaussées from Embrun, believed an era

of reparation was beginning and hoped to see the final decline of the modern Torrential Era (Brown 1879, pp. 110–111).

Elie-Abel Carrière (1818–1896), the authority on conifers, wondered how one could account for so much disastrous timbering over the centuries when the evidence of the results was so widespread. He found an answer in an article, *Egoïsme et Imprévoyance* (Egoism and improvidence) published by the botanist Charles-Victor Naudin. There is a certain class of man, he asserted, and unfortunately it is the largest class of all, which lives for the moment and without a care for the future, when the future does not interest them directly. *After us, the deluge*, they say. The world will become what it will. Provided that we do not have to suffer personally, what comes matters little (Carrière 1857, p. 110).

### Successful reforestation begins, 1851

Recommendation for forestry reform had traditionally only emphasized curbing abuses and promoting spontaneous regeneration. Suggestions for active reforestation only appeared in the 19th century, first advocated by several of the enlightened prefects appointed by Bonaparte at the outset of the Consulate. Jean-Baptiste Rougier de La Bergerie (1757–1836) served his native Yonne as prefect from 1800 to 1811. A wealthy landowner, he was a prolific writer on the history of agriculture and forests. In 1794, when the Convention voted to have all ponds drained to gain agricultural space, he wrote a report opposing such a ruinous proposal. He later referred to Georges-Jacques Danton's comment, that he preferred mutton to carp, as a measure of the revolutionaries' insight in rural fundamentals (Rougier de La Bergerie 1817, pp. 85–87). When out of office, La Bergerie began to collect the prefects' reports to the ministry of the interior as they provided evidence in support of his appeal for reseeding

and reforesting all water courses in France (Rougier de La Bergerie 1817, pp. 137, 173–175).

The revival of a vigorous forestry administration began immediately after the coup d'état of 2 December 1851. Having assured himself of a second term in office, Louis-Napoleon took steps to eliminate rural hostility to central government. His decree of 15 January 1852 declared a general amnesty for all forestry and fishing infractions. Auguste de Morny (1811–1865), his half-brother, appointed minister of the interior, articulated the new policy on 20 February 1852 in a message to all his subordinates: They must devote themselves with care for the interests of everyone, and the one they must give ear to with promptitude and good will is the most lowly and the weakest. The bureaucracy must not believe itself created to make objections, to obstruct or to delay when it is meant for putting things right and quickly.

A circular put out on 1 June 1852 by Blondel, the directeur-général des forêts, set down the principles that justified management of the forests by the state. While one could not ignore the revenue from forests, that factor was perhaps the least of the important reasons state leaders should attach to the development and conservation of forests:

Nearly all the most important interests of the country, its naval power, its agriculture, its industry, its commerce, the healthfulness of the climate, the temperatures, the conservation of soils and waters that provide fertility, and even the existence of a notable part of the population ... are more or less directly involved with the administration of the forests. Said administration participates in the solution of all the most important problems germane to government, the political economy, and industrial and commercial sciences (Badré 1987, pp. 510–511).

Napoleon III took a personal interest in developing new policies to promote a rational administrative structure for forest

management. The progress of what was then the Ecole Impériale Forestière de Nancy was advanced through augmented financial support. Legal investigations of the boundaries of local “rights of usage,” often untenable, led gradually to the elimination of such rights, opening properties for the reclamation of tall-tree forests. Management documents, defining the principles and the methods to govern management of a particular forest and defining proper exploitation, increased in number, especially after 1860.

Given the emperor's initiatives, the Second Empire made its most durable contribution to reclamation and reforestation in mountainous terrain although his first initiatives were limited to lowland wastes in Gascogne and Sologne. Les Landes of Gascogne, an insalubrious area, was transformed into pine forests, soon providing a substantial supply of wood. Such reforestation meant the introduction of the maritime pine, *Pinus pinaster* Aiton. If planted for its soil-binding character, it provided a resin for a turpentine industry. About 2,470,000 acres were reforested in Les Landes. Another 172,900 acres of wasteland were reclaimed for agriculture in Sologne by draining wetlands and introducing marls. A remarkable result of the emperor's initiatives was the commencement of private landowners' efforts to follow his example. Over the 18-year duration of the Second Empire, such private efforts reforested nearly 4,940,000 acres, without any subventions from the state (Badré 1987, pp. 514–520; Devèze 1979, pp. 151–152; Carrière and André 1887, pp. 506–507).

After a new flood in the Loire valley in 1856, the emperor, accompanied by Eugène Rouher (1814–1885), the minister of public works, made a trip to examine the ravages. Before seeking a remedy for a malady, the emperor remarked, it is well to seek its cause. From where come these sudden surges in our large rivers? They come from the water that has

fallen in the mountains, very little of it from water fallen on the plains. The phenomenon is easy to understand, the emperor continued. When rain falls on a plain, the ground is a sponge. The water, before reaching the river, must cross a vast extent of permeable terrains, their gentle slope retarding its flow. But when, quite apart from the melting snows, the same factor occurs in the mountains, where the terrain, most of the time composed of bare rocks or gravels, not retaining water, then the steepness of the slopes carries all the fallen waters into the streams.

More than 150 years ago, the emperor noted, a dam was constructed on the upper Loire at Pinay in 1711, about 12 kilometers upstream from Roanne. Monsieur Collignon, deputy from la Meurthe, reported to the Chamber in 1847 about the effectiveness of the dam during the surge of water in October 1846. The dam had held back water to its height of 21 meters above low-water mark, so that the full force of the Loire was deflected onto the Forez plain, greatly lessening the damage downstream. Collignon had recommended, therefore, the construction of two additional dams above Pinay, at La Roche and at Saint-Maurice. Only the dam at La Roche was in place before the great flood of 1856, but the two dams in place saved Roanne from a total disaster.

The system of flood control, Napoleon concluded, could only be effective if it was generalized, namely, applied to the smallest tributaries of the large rivers. He asked Rouher to have such a system studied by competent men in his ministry as soon as possible. After the flood of 1846 there was much talk in the Chambers, many enlightened reports were delivered, but no system was put in place, in effect rendering that last flood in 1856 more disastrous (Napoléon III 1869, 5:13–24). To provide that system in 1859, the Code Forestier of 1827 was amended to provide limitations on the clearing of private woodlands.

The Forest Administration was authorized to supervise such clearings if the conservation of said woodlands was regarded as necessary: first, to maintain the ground on mountains and slopes; second, to protect the soil against erosion and invasions by rivers, streams or torrents; third, to protect the vitality of springs and water courses; and fourth, to guard public health. The emperor's initiative implied that the traditional rural flouting of forestry legislation would no longer be tolerated (Devèze 1979, p. 252). That promise was verified by the passage of the law of 28 July 1860, the Restoration des Terrains en Montagne (the RTM), which embodied the above principles and became the most significant legacy of any French regime for reforestation and flood control.

Pierre Magne replied to the emperor on 2 February 1860, pleased to say that a draft for legislation providing for reforestation had been completed (Brown 1879, p. 147). Consequently, a new directeur-général de l'Administration des Forêts was appointed on 12 March 1860, Henri Vicaire (1802–1865). One of the first graduates of the forestry school in Nancy in 1827, Vicaire had served with such distinction as a career forestry officer that he had come to the emperor's attention by 1852 (Paule 1968, p. 79).

The RTM of 1860 provided for two types of state intervention to secure reforestation and had given the Forest Administration a credit of ten million francs to be spent within the next ten years. The first, called optional forestation, applied in cases where property owners voluntarily undertook the reforestation of their properties in exchange for subventions granted in seeds, plants or money. The second applied in cases where property owners had to be summoned to undertake reforestation. In the event of refusal, the state undertook it by expropriating the private landowner. The latter had the right subsequently to recover ownership, either by reimbursing the state

for its investment or by abandoning half of the reforested land to the state (Badré 1987, pp. 522–523).

Henri Vicaire, meanwhile, as soon as the law of 28 July 1860 had been voted, set himself to the task of enforcing it. He began by making his subordinates knowledgeable about the legislation and then embarking 17 August on a long trip to see forest conditions firsthand in Savoie, Hautes-Alpes, Ariège and the Hautes Pyrénées. He frequently encountered hostility from the local populations, something he had quite anticipated in the peasantry. His energetic leadership during his five remaining years proved to be the most productive years in the annals of French forestry (Paule 1968, pp. 79–80). The consequent prestige of French forest management would later induce Gifford Pinchot of Pennsylvania to begin his professional training in forestry at Nancy in 1889.

The persistence of vigorous rural opposition to reforestation was soon perceived to be a political issue too delicate to be ignored. One could have expected the mountain population, as the immediate beneficiaries of enlightened legislation, to have adhered to it without question, unless one knew something about the traditional mentality of mountain people. Mistrust was basic in the character of every mountain inhabitant and every peasant, even into the 20th century (Buffault 1913, p. 129). To save the principles of the law of 1860, therefore, the law of 1864 granted communes the right to substitute re-grassing for reforestation. Proving to be inadequate to stop flooding, it would be eliminated in the early Third Republic by returning to the program as of 1860 (Devèze 1979, pp. 253–254). The beneficial intent, and effects, of reforestation was only grudgingly conceded in the early 20th century, allowing the bad feeling between the rural people and the forest service to subside. The exodus of rural population contributed to that resolution

(Brosselin 1977, pp. 98–99). The opposition of mountain people to conservation measures required a change in mentality, a matter of public education (Buffault 1913, p. 185).

### **The lingering debates on deforestation**

Subsequent research, frequently based upon highly specialized knowledge and well meant, could be myopic in seeking only new factors in the history of deforestation. An article published by Mlle M. Gadoud in 1917 was one example. At the end of a lengthy analysis of what was at least superficially statistical evidence, Gadoud concluded that, dating from the 17th century, the wooded surfaces in humid Dauphiné remained about the same as they were in the early 19th century. In the drier regions of Dauphiné, the wooded surfaces had been significantly augmented by the early 19th century, nearly double. In other words, the more humid areas had been more vulnerable to human exploitation. The essential element in the life of the forest, she concluded, is humidity (Gadoud 1917, pp. 1–4, 108).

Gadoud apparently belonged to what has been called the meteorological school, emphasizing humidity and rainfall, thus diminishing, if not entirely ignoring, the human impact upon the forests. What is more, the forest sizes she cited contributed to the later argument that deforestation had been a myth, although that was not her intention. She had ignored, however, the testimony of agronomes and botanists beginning by mid-18th century, savants who were on the ground, whose measure was evidence, not theory.

The immense plantations of North American trees, established by Duhamel du Monceau and Lamoignon de Malesherbes, were the principal efforts to secure their naturalization. Such experiments were made not only in the awareness of vast deforestation but also in recognition that the

resulting depletion of soils would not again sustain native species. While those efforts at naturalizing foreign trees were infrequently successful, they were early attempts to secure reforestation (Williams 2007, pp. 265–283).

Consequently, one might omit any reference to a subsequent work published in 1923 had it not been cited favorably in a dissertation published in 1988 (Rosenberg 1988). Little is known about the motives of Félix Lenoble in his effort to discredit the work of Alexandre Surell. As an amateur botanist living in Drôme, engaged in field work in preparation of a catalog of the departmental flora, respect for scientific opinion would seem to have been essential. In the case of all such deniers, however, the evidence rarely confirms whether such denials suggest eccentricity or an aspect of ideology. Refusal to face the massive record of deforestation thus remains a mystery in his case.

Lenoble had argued on the basis of statistical evidence, but not revealing the source of the statistics, that the proportion of the mountainous terrain, supposedly reforested since 1860, had actually been exaggerated by the state: indication that the actual deforestation before 1860 had been substantially less severe than claimed. Thus, the exaggeration had provided the opportunity for central government to reduce rural liberties. As for the factors said to have contributed to deforestation, Lenoble acknowledged them only to trivialize their effects. Ravages by armies had been insignificant in his opinion. As for fires, Lenoble recognized only the relatively small fires, ignoring the truly devastating ones of record. He claimed that the mountain people had always had more wood available than they could use. He added an idyllic picture of sheep and goats on the landscape, ignoring the scientific evidence of the damage they did, notably the goats. It seems apparent that Lenoble wrote from the conviction that all traditional knowledge

about forests and forestry had to be suspect. He asserted that the Alps had been covered by more forest in the past centuries than in the immediate past (Mougin 1924, pp. 500–520).

The refutation of Lenoble from a professional forester was immediate, and in the same journal in which Lenoble had published. Paul Mougin had achieved the rank of inspecteur principal des Eaux et Forêts at the time he wrote his reply. He had been stationed in Savoie for 22 years and had learned much about mountains, a contrast with Lenoble, who had lived in Valence along the Rhône for the same period (Mougin 1924, pp. 497–498). Mougin exposed Lenoble's persistent attempts to discredit testimony about torrents by earlier authors such as Félix Bonnaire, seeming to have been a deliberate misconstruction of published evidence. Dr. Jules Offner, a professor of medicine in Grenoble and an amateur botanist, had been Lenoble's companion on botanical excursions. In noting Lenoble's polemic about the legend of the deforestation of the Alps, Offner confined himself to remarking that Lenoble had at least provoked useful discussion, adding that none of the parties gave any ground (Lenoble 1936, pp. 3, 112).

Twenty years later, P. Fourchy, an inspector for Eaux et Forêts, did not propose to add new arguments to the debate. He had come to believe that descriptions of deforestation over many centuries, inadvertently employing variations in terminology over the years, had inevitably led to misconceptions. He suspected that the imprecision applied to agricultural development as well. While historical records had been preserved in archives, they provided information only for limited sites and events, depending upon the dates of their establishment. There remained no reliable records of the phenomenon called deforestation for most of the past centuries.

Was there in fact, he asked, a golden age in which the Alps were entirely covered

by forests? If so, in what previous period did the disappearance of the mantle begin? What was its cause? Were the torrential phenomena that followed attributable to deforestation or to other natural conditions: geological and climatic? Have such phenomena undergone a renewed outbreak in the course of later centuries? Such uncertainties, Fourchy remarked, accounted for why some authorities, as of 1944, were inclined to regard deforestation as relatively recent in origin. Others, notably geographers, believed deforestation began before the medieval period, contemporary with Roman colonization.

Fourchy even cast doubt on the reliability of traditional records as it is difficult to define just what a forest is or where it begins or ends. Woodlands can mean different things to different observers: *bois* or *forêts*? How, he asked, do you classify a property that has been clear-cut in the past but has restored itself naturally, if not always with the same trees previously there? Even the explanation for a destroyed forest may not be clear as intensive pasturage can destroy a forest as effectively as an abusive cutting. Even an accurate distinction between clearing and grubbing was not always made, a great difference in the subsequent vitality of the soil.

The laborer had frequently abandoned grubbed terrain to begin again on new terrain. That left the ground relatively sterile compared to where a forest had simply been timbered, leaving small branches and leaves to be burned to fertilize the abandoned cutting. In other words, a forest could regenerate more easily if there had been no grubbing. In truth, Fourchy added, grubbing could lead to a more or less permanent alteration of the wooded terrain, as in the southern Alps. The original woody vegetation, once destroyed, could not be reconstituted as before. The more southern forests had survived only as long as they were untouched. The initial grubbing had been

fatal to that population. The vegetation in the northern Alps had always been more powerful, better able to stand repeated, rude shocks, but ultimately experienced the same fate as the vegetation in the south. He argued, in sum, that the forests, depending upon their locality, had been both depleted and revived over many centuries. Records, however, tended to reflect only immediate observations and interests to be served (Fourchy 1944, pp. 113–123).

Deforestation was not a myth, therefore, but was never a single or uniform process. Variation depended upon whether it was the result of timbering, pasturing or grubbing. If known before the medieval period, deforestation only became a serious threat to society after the medieval period. Successful reforestation undertaken by government only began with the law of 28 July 1860 and the appointment of Henri Vicaire as its administrator. Badré's judgment in 1987 still stands: The reign of Napoleon III was unquestionably the most brilliant and prestigious in the history of French forest administration (Badré 1987, p. 527).

## References

- Achard de Germane, A. 1787. *Mémoire sur les causes du dépérissement des bois en Dauphiné et les moyens d'y remédier*. *Mém. Soc. Litt. Grenoble* (Grenoble & Lyon) 1: 29–131.
- Allard, G. 1864. *Dictionnaire du Dauphiné*. 2 vols. Grenoble: E. Allier.
- Allen, E. A. 1984. Deforestation and fuel crisis in pre-revolutionary Languedoc, 1720–1789. *French Historical Studies* 13: 455–473.
- Badré, L. 1987. *Les Eaux et Forêts du 12<sup>e</sup> au 20<sup>e</sup> Siècles*. Paris: Editions du Centre National de la Recherche Scientifique.
- Bamford, P. W. 1955. French forest legislation and administration, 1660–1789. *Agric. Hist.* 29: 997–107.
- Baudrillart, J.-J. 1821–1829. *Traité Général des Eaux et Forêts, Chasse et Pêche*. 4 vols. Paris: Mme Huzard.
- Berthélemy. 1906. *Etude sur une ancienne réformation générale des forêts en Dauphiné (1725–1733)*. *Bulletin de l'Académie Delphinale* 20: 189–237.

- Blanchard, R. 1925. *Les Alpes françaises*. Paris: Armand Colin.
- Bonnaire, F. Year IX (1801). *Mémoire au Ministre de l'Intérieur sur la Situation du Département des Hautes-Alpes*. Paris: Imprimerie des Sourds-Muets.
- Brosselin, A. 1977. Pour une histoire de la forêt française au XIX<sup>e</sup> siècle. *Revue d'Histoire Économique et Social* 50: 92–111.
- Brown, J. C. 1879. *Réboisement in France*. London: C. Kegan Paul.
- Buffault, P. 1913. *Le Briançonnais Forestier et Pastoral: Essai de Monographie*. Nancy: Ecole Forestière Nationale.
- Buffon, G.-L. Leclerc, comte de. 1739. *Mémoire sur la conservation et le rétablissement des forests*. *Hist. Acad. Roy. Sci. Mém. Math. Phys. (Amsterdam) Année 1739*: 140–156.
- Carrière, E.-A. 1857. *Les Hommes et les Choses en 1857*. Paris: Chez l'auteur.
- Carrière, E.-A. and E. F. André. 1887. *Reboisement en Sologne*. *Rev. Hort. (Paris)* 59: 506–507.
- Charronnet, C. 1863. *Monastères de Durbon et de Berthaud (Diocèse de Gap)*. Documents Historiques. Grenoble: Alphonse Merle.
- Chevalier, M. 1837. *Lettres sur l'Amérique du Nord*, ed. 4. 2 vols. Paris: Charles Gosselin.
- Chevalier, M. 1838. *Des Intérêts Matériels en France*, Travaux Publics: Routes, Canaux, Chemins de Fer. Brussels: Société Belge de Librairie.
- Colin, J.-P. Year IX (1801). *Observations sur la Situation du Département de la Drôme*. Paris: Imprimerie des Sourds-Muets.
- Curten, E. 1804. *Coup d'Oeil Politique et Économique sur d'État Actuel des Bois et Forêts en France: Suivi d'un Projet d'Institutions Forestières*. Grenoble: Allier.
- Delafont, P. I. 1854. *Essai sur la Question du Reboisement des Montagnes*. Gap: Jouglard.
- Devèze, M. 1963. *La Crise forestière en France dans la première moitié du XVIII<sup>e</sup> siècle et les suggestions de Vauban, Réaumur, Buffon*. In: *Congrès National des Sociétés Savantes*. 1964. Actes du 88<sup>e</sup> Congrès National des Sociétés Savantes, Section Histoire. Clermont-Ferrand: Congrès National des Sociétés Savantes. Pp. 596–616.
- Devèze, M. 1979. *Le Reboisement des montagnes françaises dans la seconde moitié du XIX<sup>e</sup> siècle*. *Forêt Privée* 126: 251–256.
- Duhamel du Monceau, H.-L. 1755. *Traité des Arbres et Arbustes Qui se Cultivent en France en Plein Terre*. 2 vols. Paris: Guérin & Delatour.
- Farnaud, P.-A. Year VII (1799). *Description Abrégée du Département des Hautes-Alpes*. Paris: Imprimerie de la République.
- Fauchet, J.-J.-A. Year IX (1801). *Description Abrégée du Département du Var*. Paris: Imprimerie des Sourds-Muets.
- Fouché-Prunelle, A. 1846. *Rapport de M. Blanqui sur le reboisement et le regazonnement des Alpes*. *Bulletin de l'Académie Delphinale*, sér. 1. 1: 377–400.
- Fourchy, P. 1944. *Remarques sur la question du déboisement des Alpes*. *Rev. Géogr. Alpine* 33: 113–128.
- François de Neufchâteau, N. L. 1806. *Voyages Agronomiques dans la Sénatorie de Dijon*. Paris: Mme Huzard.
- Freeman, J. F. 1994. *Forest conservancy in the Alps of Dauphiné*. *Forest Conservation Hist.* 38: 171–180.
- Gadoud, Mlle M. 1917. *Les forêts du Haut-Dauphiné à la fin du XVII<sup>e</sup> Siècle et de nos jours*. *Rev. Géogr. Alpine* 5: 1–113.
- Gevrey, A. 1906. *Reponse au discours de M. Barthélemy*. *Bulletin de l'Académie Delphinale*, sér. 4. 20: 239–250.
- Guillaume, P. 1882. *Notice sur les Sources Historiques des Autes-Alpes*. Gap: Jouglard.
- Huffel, G. 1925. *Histoire des Forêts Françaises de l'Origine jusqu'à la Suppression des Maitrise des Eaux et Forêts*. Nancy: Ecole Nationale des Eaux et Forêts.
- Jaume Saint-Hilaire, J.-H. 1814. *Mémoire sur l'Administration et sur l'Aménagement des Forêts*. Paris: A. Egron.
- La Tourrette, M.-A.-L. C. de Fleurieu de. 1770. *Voyage au Mont-Pilat dans la Province du Lyonnais, Contenant des Observations sur l'Histoire Naturelle de Cette Montagne, & des Lieux Circonvoisins*. Lyon: Regnault.
- Lenoble, F. 1923. *La Légende du déboisement des Alpes*. *Rev. Géogr. Alpine* 11: 5–116.
- Lenoble, F. 1926. *Remarques complémentaires sur la question du déboisement des Alpes*. *Rev. Géogr. Alpine* 14: 186–213.
- Lenoble, F. 1936. *Catalogue Raisoné des Plantes Vasculaires du Département de la Drôme*. Grenoble: Imprimerie de Allier père et fils.
- Mathieu, A. 1864. *Le Reboisement et le Regazonnement des Alpes*. Paris: n.p.
- Mougin, P. 1924. *La Question du Déboisement des Alpes*. *Rev. Géogr. Alpine* 12(4): 497–545.
- Mougin, P. 1925. *Le Reboisement dans les Alpes méridionales*. *Rev. Géogr. Alpine* 13(2): 215–264.
- Napoléon III. 1869. *Oeuvres de Napoléon III*. 5 vols. Paris: Henri Plon.
- Paule, H. 1968. *Un grand forestier, Henri Vicaire (1802–1865)*. *Bull. Soc. Naturalistes Archéol. l'Ain* 82: 79–82.

- Perrin-Dulac, F.-M. 1806. Description Générale du Département de l'Isère. 2 vols. Grenoble: J. Allier.
- Réaumur, R.-A. F. de. 1721. Reflexions sur l'état des bois du royaume. Hist. Acad. Roy. Sci. Mém. Math. Phys. (Paris, 12 mo) Année 1721: 284–301.
- Recum, A. van. 1807. Observations sur la Nécessité d'Établir en France des Écoles Forestières. Paris: Cellot.
- Roman, J. H. 1887. Les Causes du Déboisement des Montagnes d'après les Documents Historiques du XIII<sup>e</sup> au XVIII<sup>e</sup> Siècles. Gap: Richaud.
- Rosenberg, H. G. 1988. A Negotiated World: Three Centuries of Change in a French Alpine Community. Toronto: University of Toronto Press.
- Rougier de La Bergerie, J.-B. 1817. Les Forêts de la France en 1817. Paris: A. Bartrand.
- Roy, A. 1935. Pour servir à l'histoire forestière du Dauphiné; la Réformation générale de 1724–1732. Rev. Eaux Forêts, sér. 9. 73(1): 24–49.
- Stewart, J. H. 1951. A Documentary Survey of the French Revolution. New York: Macmillan.
- Surell, A. 1841. Etude sur les Torrents des Hautes-Alpes. Paris: Carilian-Goeury et V. Dalmont.
- Tardy, Capitaine. 1787. Mémoire sur les causes du déperissement du bois en Dauphiné et les moyens d'y remédier. Mém. Soc. Litt. Grenoble (Grenoble & Lyon) 1: 132–152.
- Williams, R. L. 1988. Gérard and Jaume: Two neglected figures in the history of Jussiaean classification, parts 1–3. Taxon 37(1): 2–34; 37(2): 233–271.
- Williams, R. L. 2007. Malesherbes: Botanist, Arborist, Agronome. Journal of the Historical Society 7: 265–283.
- Young, A. 1890. Travels in France during the Years 1787, 1788, 1789, ed. 3. London: George Bell & Sons.