Henry Hardtner, Pioneer In Southern Forestry: An Analysis Of The Economic Bases Of His Reforestation Program

Stanley Todd Lowry

Louisiana State University and Agricultural and Mechanical College

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HENRY HARDTNER, PIONEER IN SOUTHERN FORESTRY:
AN ANALYSIS OF THE ECONOMIC BASES OF HIS
REFORESTATION PROGRAM

A Thesis

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Master of Arts

in

The Department of Economics

by

Stanley Todd Lowry
B.A., The University of Texas, 1945
LL.B., The University of Texas, 1950
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MANUSCRIPT THESES

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ABSTRACT

The study, Henry Hardtner, Pioneer in Southern Forestry: An Analysis of the Economic Bases of His Reforestation Program, was undertaken to analyze the economic and institutional bases of an early decision to reforest cutover land as a private business venture. The case chosen is that of Henry E. Hardtner of Urania Lumber Company, who in 1913 secured the first reforestation contract with the State of Louisiana.

Chapter I portrays the streams of cultural influence which blended to form Louisiana's forest land use heritage. The land-use traditions of the southeastern states, the naval-stores industry, the development of industrial logging in the South at the time of its migration from the Lake States, and the influences of German forestry ideas on the thought of the day, are considered.

Chapter II traces the beginnings of the Hardtner timber investments and the early growth of the Urania Lumber Company, followed by a biographical sketch of Henry Hardtner in Chapter III.

The silvicultural measures taken to implement the Urania reforestation program are considered in Chapter IV.

The economic aspects of the Urania reforestation program are dealt with in Chapter V. In a discussion of the cutover land problem in the South, Hardtner's views are contrasted with those of his contemporaries. Hardtner's analysis of compound interest in relation to forestry investments is developed.

Chapter VI deals with the economic aspects of the relationships involved in the transition of the lumber industry from a mining to a reproducing or regenerative one. The failure of Hardtner's contemporaries to
accept his thesis of the profitability of reforestation is attributed to the time span in timber production which was beyond the grasp of current economic expectations.

The acceptance upon the reforestation area was seen in 1915, as payment for which.- The area under reforestation contract with the State of Wisconsin. The contract provided that it would be a perpetual and unreserved interest in certain forest land as a long-term commitment for its timber use with punctual dedication in planting practices and reforestation activities on the same.

The contract between the State of Wisconsin and the Leased Forest Company, and the Conservation Commission of the State of Wisconsin under the legal sanction of the State Forest and Water Board laws of 1915. The pertinent provisions of the act as applied to the reforestation contract were as follows:

1. Any person at least 16 years of age trained in tree or other land management or the owner of such land less than 25 acres per year would enter into a reforestation contract with the State of Wisconsin.

2. The owner of the land must comply with the reforestation contract to the satisfactory satisfaction of the Department of the land.

3. The owner is required to maintain an adequate fire-protection system.

4. The owner of the contracted lands could not cut or remove any trees except as permitted in the contract.

The contract ran from reforestation to January 1, 1922.
CHAPTER I
INTRODUCTION

Henry Hardtner made a unique economic decision when in 1913, as President of Urania Lumber Company of Urania, Louisiana, he placed 25,719 acres of his cutover forest lands under reforestation contract with the State of Louisiana. His earlier decision that it would be a profitable business venture to invest in cutover forest land as a long-term investment was the crucial one which prompted his action in placing his lands under contract with the state.

Reforestation Contract No. 1 was entered into on June 11, 1913, between Henry E. Hardtner, President of Urania Lumber Company, and the Conservation Commission of the State of Louisiana, under the legal sanction of Act No. 261, Louisiana Laws of 1910. The pertinent provisions of the act as applied to this reforestation contract were as follows:

1. Any owner of land which had been denuded of trees or other lands assessed at the value of not more than $5,000 per acre could enter into a reforestation contract with the State of Louisiana.

2. The owner of the land under contract was required to use accepted forestry practices in the management of the land.

3. The landowner was required to maintain an adequate fire-protection system.

4. The owner of the contract lands could not cut or remove any trees except as permitted in the contract.

The contract was made retroactive to January 1, 1913.
The lands covered by such contract would be assessed at a valuation of $1.00 per acre for the life of the contract. At the expiration of the contract, the lands would be assessed as any other lands of like value and condition in the same locality.

The uniqueness of Hardtner's decision can be seen clearly only in its historical context. Cutover lands at the time were thought to be valueless to most lumbermen. Once the trees had been cut from the land, the cutover land was disposed of in any expedient way: sold as "agricultural land," reverted to the state for non-payment of taxes, or if it was kept, generally neglected with frequent fires preventing what reproduction of trees might have occurred. These lands were known as "stump wastes" and wastes they were - both to the landowner holding them and to the state since the tax revenues collected on them were negligible.

Among the lumbermen in Louisiana, Hardtner was alone in his attitude toward the cutover lands. No other forest landowners in the state took advantage of the reforestation contract provisions of Act No. 261 until nine years after Hardtner entered into his contract. In 1922 the Great Southern Lumber Company (now Gaylord Container Corporation) of Bogalusa entered into a similar contract. At a time when other lumbermen were disposing of their cutover lands, Hardtner was buying such lands and offering to show anyone interested how he calculated that they would be a safe business investment. He set up plots on his lands to show the ef-

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2 In 1913 Reforestation Contract No. 2 was signed by Quinton T. Hardtner and Milton Tannehill of Urania, Louisiana, covering 2,000 acres of cutover lands. Both, however, were connected with the Urania Lumber Company. The contract of the Great Southern Lumber Company was under the sanction of Act No. 90 of 1922 which superceded Act No. 261 of 1910.
fects of fire and hogs on the reproduction of pines. His speeches and writings reveal a deep and sensitive understanding of the problems of the lumber industry and of the effect of the "cut-out and get-out" policy of the day on the communities which were left in the wake of the great lumber nomad.

In his day Hardtner was regarded by many lumberman as an eccentric and even an outright fraud for claiming that he was successful in growing a second generation of pine trees on his land. Although a thorough study has not been published dealing with Hardtner's contributions to the lumber industry, recent writers in brief references have belatedly accorded to Hardtner a part of the recognition he deserves. William B. Greeley, formerly Chief Forester of the U. S. Forest Service, wrote in 1951 of Hardtner:

"Many lumbermen and foresters made pilgrimages to Urania, Louisiana. It was the mecca of piney woods forestry . . . . Roaming over his 'longleaf pastures' with 'Marse Henry,' I learned more dirt forestry of the South than I had ever gleaned from textbooks or lectures. He had an indefatigable zest for finding things out himself. He had learned when the longleaf seedlings should be lightly burned to free their needles of the brown-spot fungus. He had areas of saplings, side by side, one regularly burned, the other kept meticulously free of fire, to show the actual effect of the prevalent woods burning upon the mortality and growth rate in young pine forests. He had seeding plots and thinning plots, running the whole gamut of southern pine silviculture. And he told his wealth of experience, the things he had learned by trial and error, in a homey, down-to-earth way that took hold. My days with Henry Hardtner were inspiring. He had the unconscious power of a man whose taproots grip Mother Earth. He was a great leader of southern lumbermen toward a new order of land use . . . ."

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Stanley F. Horn characterized Hardtner as "forestry's Moses in the South" and "the first practical lumberman to practice tree-growing on a commercial basis."  

Aside from silvicultural studies published on plots established at Urania and such brief references as those above, Hardtner's contribution to southern forestry has been largely neglected. Nothing has been published on the economic aspects of his reforestation program and the economic theory which he developed applicable to the lumber industry.

Thus, in choosing this subject for the present study, the writer believes that the presentation and analysis of Hardtner's economic calculations in their historical context may contribute to an understanding of forest valuation judgments. In an era when contingencies for gain or loss ten years in the future were hardly considered economic realities and barely conceivable, a program of forest investment such as that of the Urania Lumber Company, based on a forty-year span of time, exhibits such a measure of assurance and confidence in the basis of judgment that it deserves study, particularly since the judgments involved were vindicated.

The historical approach used in this study has not been widely recognized as a productive approach by forest economists. Until recently, forest economics has been considered almost the exclusive domain of foresters. However, in a recent study sponsored by the Society of American Foresters, the authors stated:

"Although foresters with advanced training in economics have dominated forest economics research and probably will continue to do so, it would be desirable to attract to this

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research field more economists with training and research experience in other branches of economics."

It is believed that the historical approach will prove to be a useful one in forest economics, particularly in view of the critical nature of the time element involved in supply adjustments.

Lumber production in Louisiana did not develop to any extent until the 1880's. Prior to this time, only small inroads had been made into the pine forests near the major waterways and railroads. Cypress had previously been the main source of timber in the state. By 1800, twenty small sawmills were operating in Louisiana, producing lumber for sugar boxes.\(^1\) An early steam-powered sawmill was built in New Orleans in 1811,\(^2\) but as late as 1883 New Orleans found it cheaper to import pine lumber by water from the Gulf Coast states than to utilize small-scale local operations in the state.\(^3\)

Louisiana's forest-use traditions are chiefly derived from three sources: the high-grade logging and naval-stores traditions and customs in the Atlantic Seaboard states, the traditions and customs of industrial lumbering in the Lake States, and the economic theories and practices of German forestry.

In states along the Atlantic Seaboard, the forest resource had been exploited in one way or another almost from the landing of the first colonists. High-grade logging, the naval-stores industry, and livestock

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\(^2\) Glover, John George and William Bouck Cornell (Eds.), *The Development of American Industries*, Rev. Ed. (New York: Prentice-Hall, Inc., 1945), p. 108. According to these writers, the steam sawmill erected at New Orleans was immediately destroyed by workmen.

Figure 1. Forest Regions of Louisiana in 1912. J. H. Foster, Assistant Chief, State Cooperation, made an extensive study of Louisiana forests and forest industries in February and March of 1910 with the aid of the State Land Office, the Registrar granting him $250 in the capacity of State Forester under Act 113 of 1904. The 120-page report filed with the State Land Office as a result of this investigation was the basis of much of the 1910 conservation legislation. Source: J. H. Foster, Forest Conditions in Louisiana (U.S. Department of Agriculture Forest Service Bulletin 114, 1912).
grazing in the forest had developed over a period of 200 years in these states as a relatively stable land-use form. As it worked out in Louisiana, however, industrial logging moving in from the Lake States arrived in the state before the joint forest-use system developed in the southeastern states had extended into Louisiana and therefore had the greatest influence on the state's lumber development.

German forestry theories permeated the practice of forestry in the United States during the early part of the 1900's. All of the early foresters in the United States were deeply influenced by French and German forestry traditions, since no forest science as such existed in the United States at the time. While none of the lumbermen in the early days practiced forestry on their timberlands, the influence of German theories on state forestry reinforced the common belief that \textit{laissez-faire} lumbering and forestry were incompatible. Thus, most of the early forestry literature in the United States dealt with state plans and policies based on intangible values such as flood and erosion control to the exclusion of the forest economics of private enterprise.

In order to get a picture of the development of Louisiana's lumber industry during the early 1900's when Reforestation Contract No. 1 was entered into, it will be necessary to examine these three streams of cultural tradition.

\textbf{The Southern Land Use Tradition}

When the first settlers landed at Jamestown they were faced with an entirely new set of natural factors. The unending forest was both the symbol of virgin fertility and the major obstacle to their agricultural pursuits. The colonists had to adopt an entirely new approach to agriculture involving the application of relatively scarce and expensive labor
to the extensive use of rich land which could be had virtually for its clearing. They learned from the Indians the essential technique of extensive agriculture as described by John Smith in 1612:

"The greatest labor they take is in planting their corne, for the country naturally is overgrowne with wood. To prepare the ground they bruise the barkes of the trees neare the roots, then do they scorch the roots with fire until they grow no more. The next year . . . corne is planted."  

The result of the early adjustment of the European settlers to the new surroundings in America was the development of two basic southern customs. The first of these was the use of fire as a basic tool for extensive clearing of the woods for agriculture. Fire could clear fields, clear brush from the woods and leave the ground free from litter, exposing acorns and grasses for hogs and cattle. Hartman says of the southern custom of woods burning:

"For three centuries people in the South have practiced woods burning. The custom began in the Coastal Plain flatwoods, where groups of settlers had to clear ground for farming and then for livestock. They soon learned that late winter was a critical period for their stock—the ground had a cover of dead grass, needles, and litter, and the animals fared badly. But on a fresh winter burn new and succulent grass would spring up and tide their stock over until spring. They set fires also to clear the woods of varmints."  

Potash and its refined form, pearl ash, were by-products of the early woods burning practice in the South, particularly from the leachings of oak and hickory ashes. Potash was exported to England for use in bleach-

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3 Hawk, op. cit., pp. 113-114.
Figure 2. Typical Stand of Virgin Longleaf Pine. The forest floors in this forest type were kept free of shade-tolerant hardwoods by frequent burning. There is little doubt that groundfires are part of the "natural" environment of longleaf pine.

Source: Louisiana Department of Conservation, Seventh Biennial Report, 1924 - 1926.
Typical stand of virgin longleaf pine.
ing and soap making.

The sale of select timber and light transportable products such as potash helped defray the cost of clearing land, but it did not keep the endless expanse of sturdy trees from being the major obstacle to settlement. Marsh points out that even the primitive Indians found the forests sterile, contrary to popular belief:

"... the history of savage life, as far as it is known to us, presents man in that condition as inhabiting only the borders of the forest and the open grounds that skirt the waters and the woods, and as finding only there the aliments which make up his daily bread. The villages of the North American Indians were upon the shores of rivers and lakes, and their weapons and other relics are found only in the narrow open ground which they had burned over and cultivated, or in the margin of the woods around their hamlets. Except upon the banks of rivers or of lakes, the woods of the interior of North America, far from the habitations of man, are almost destitute of animal life."7

The adjustment of the European settlers to the vast wealth of resources which were at first almost worthless because of the distance and cost of transportation to the European markets, led to a steady development of extensive use of their productive potential, with the emphasis on lighter, more valuable and transportable products.

Although the European settlers had brought with them different attitudes toward the use of forest lands, the conditions which existed at the time of settlement of the United States were to mold an entirely different set of values in America which would later affect tremendously the ways our forest land was utilized. Marsh comments:

"According to the maxims of English jurisprudence, the common law consists of general customs so long established that

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'the memory of man runneth not to the contrary.' In other words, long custom makes law. In new countries, the change of circumstances creates new customs, and, in time, new law, without the aid of legislation. Had the American colonists observed a more sparing economy in the treatment of their woods, a new code of customary forest-law would have sprung up and acquired the force of a statute."\(^8\)

Though the early destruction of our forests by the torch of the settler may be lamented, it was the only approach feasible at the time. What affected the utilization of our forest resources far more than the early depredations of the woods by the settlers is that the traditions and customs which developed from this period were to influence forestry practices long after the conditions which created them existed.

Four industries were carried on along with the woods-clearing activities of the settlers in the South. The first of these, the raising of tobacco, depended on the constant clearing of rich virgin lands, their use for a decade or so, and a gradual abandonment, first to corn and legumes and weeds, and then to "old field" pine, loblolly pine (*Pinus taeda*). This practice spread across Virginia into northern North Carolina and characterized southern agriculture for the two succeeding centuries.

The second of these industries was made possible by the relatively mild winter climate in the South which enabled livestock to survive without supplementary winter feeding. In the Carolinas, hogs, sheep and cattle were raised in the same extensive way that farming was carried out. These animals were allowed to run free in the woods, being brought in at night in some areas. Pickled beef and salt pork were exported in quantity to the West Indies, particularly the British colonies of Jamaica and Barbados. An English observer in 1731 was shocked at the complete lack of

shelter and winter feed given livestock in the South, and was unable to grasp an economy which was built on exploiting the productive potential of the country, spreading human effort as extensively as possible.

The running of stock in the woods and the customary late winter grazing-improvement fire became a fixed part of the southern environment, and may be characterized as part of the environment wherever settlement spread across the South. The effect of ground fire on a pine forest is an involved question, but of major significance are the facts that healthy trees of sapling size are sufficiently well insulated by thick bark to be protected against serious injury from ordinary winter ground fires. However, small seedlings are killed and reproduction is thereby prevented. The exception to these generalizations is longleaf pine (Pinus palustris) which is immune from light fires as early as the second year because of a heavy taproot which gives it great recuperative powers after defoliation and a heavy protective bark and mat of needles which protect the bud. However, unlike loblolly and shortleaf (Pinus echinata) pines, the taproot of the longleaf is eaten by hogs. As a result, pine stands which are subject to winter-grazing improvement fires and hogs will have only scattered reproduction over long periods of time.

The third forest industry of the Atlantic Seaboard which influenced the southern attitude toward the forest was the high-grade lumber business. The presence of magnificent specimens of white oak and longleaf pine close to cheap water transportation combined with the expansion of British shipping during the seventeenth century and the near exhaustion of British domestic supplies of large oaks for basic heavy ship timbers to create an.

Bogart and Thompson, op. cit., pp. 100-11.
export market for ship-building products from the southern colonies.
Early colonial exports to England included masts, shingles, spars, timbers, clapboards, staves, headings, and hoops.10

The strength, rot resistance and availability in long, clean timbers of southern longleaf pine along the coasts of the Carolinas and Georgia brought logging in connection with ship-building exports, but on a limited and highly selective basis, with only the very best and largest trees, or small, clean mast material being taken. With the development of an American ship-building industry in New England, the utilization of southern trees became more extensive, but apparently no less specialized.

During the first half of the nineteenth century, logging in the South began expanding, as evidenced by the increase in the number of sawmills in Virginia from 112 to 779 between 1810 and 1860.11 A Maine organization in 1834 bought up 700,000 acres of timber land in Georgia and in that year began operating four sawmills and eighteen saws in the neighborhood of Savannah.12

In 1828 reservations of timber for use by the United States Navy were established on Commissioners, Cypress, and Six Islands, Louisiana.13 These reservations reflect the earliest national concern for the exhaustibility of timber resources within the economic reach of the ship-building

10 Hawk, op. cit., p. 112.
11 Ibid., p. 279.
12 Ibid.
Figure 3. Virgin Longleaf Pine Scorched By Fire. The severe scorching illustrated here raises the question as to the adequacy of light, prescribed burning to achieve the level of hardwood control found in virgin stands.

Figure 4. Longleaf Pine Forest After Removal of Merchantable Timber. This picture illustrates the effect of pre-industrial logging. Only those trees were cut which could provide dimension material. The broad axe and the ox team were the only essential capital goods for this type of logging.
Fig. 1.—Longleaf Pine Forest in Louisiana Flats, Virgin, Scorched by Fire as Usual.

Fig. 2.—Longleaf Pine Forest after Removal of Merchable Timber.
industry. However, the character of this exhaustion was of selective species and prime trees.

The change from high-grade logging to industrial logging in the South did not occur until the 1880's. The significance of the high-grade logging was that it did not destroy the forest as an active growing unit even after this type of logging had been carried on for as long as two centuries. Although the running of cattle and hogs in the woods and the custom of winter burning hempered reproduction, the seed supply was such that reproduction did occur, though with certain changes in species composition such as the replacement of longleaf by loblolly pine over a period of years. The result was that there was no problem or custom developed in the economy of the South for the use of cutover lands since the problem had not existed until industrial logging came south from the Lake States.

The Naval-Stores Industry

This industry received its name and initial importance as the development of commerce in wooden ships became a key factor in national power relations in Europe, both economically and as a reserve of naval power. From the earliest American settlements, naval stores were recognized as a vital resource as a preservative for timber and cordage and as waterproofing material.

Tar burning was the first practice to spread through the colonies. This involved the burning of the naturally fallen trees in the pine forests in improvised charcoal pits, or merely retarding their burning, and making provision to catch the pitch that oozed from the slowly burning logs or that accumulated in the bottom of the charcoal pit. 11 This was an exten-

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Figure 5. Turpentine Orcharding in Louisiana. The box, or cavity cut into the tree trunk to catch the ooze from the wounded tree would extend 7 inches into the heart of the tree, 4 inches wide, and hold from 3 cups to a quart. Smaller trees were weakened by such treatment and fell in windstorms. The turpentine face also invited fire damage and insect attacks after the orchard was abandoned.

sive woods use and parallels the present wood naval-stores industry which relies on mill residues and old stumps left after logging. When the pitch and turpentine content of the longleaf was recognized, the practice of bleeding or tapping living trees for turpentine and tar developed. As early as 1700 naval stores was the second most valuable industry in Virginia, and in Maryland was second only to tobacco. The industry spread rapidly through the longleaf flatwoods of North Carolina and developed along with stock raising and selective logging. North Carolina was the nation's leading producer of naval-stores products until 1850.

This early combination of stock raising, turpentining, and high-grade logging suggests a relatively stable pattern of land use applied to the longleaf pine stands. Selective logging opened up the stands and incidentally stimulated growth, and the turpentiner and stock man made joint use of the woods.

The gradual increase in the value of timber close to the coast, the high mortality rate among young trees resulting from the crude "boxing" method of tapping, and the replacement of longleaf by loblolly pine as a result of the running of hogs, combined to gradually limit the naval-stores production in its original areas of the South. This, combined with the advance in American ship-building and the demand for turpentine oil, led the turpentiners to move through Georgia, Alabama and Florida, bleeding the virgin trees relentlessly as they moved ahead of the expanding logging business.

15 Hawk, op. cit., p. 113.
16 Ward, op. cit., p. 287.
In 1834 the development of better distilling techniques and the subsequent use of turpentine oil as an illuminant (camphene)\textsuperscript{17} led to a pell-mell expansion of the industry and the abandonment of any stable long-term use of the pine forests as the "chippers" moved out from Mobile Bay and into western Mississippi deep into virgin stands inaccessible to lumbermen where the cost of transportation forced them to leave the rosin in the woods.\textsuperscript{18}

The heavy, high-quality yield of "virgin dip" during the first three years of tapping led to an overproduction and a price break in 1841. The substitution of kerosene for turpentine oil and the disruption of the Civil War almost finished the industry until a new crop of industrial uses grew up with the introduction of iron ships and the development of the chemical industry.

The point of real importance is that the turpentine industry as a stable land form never reached Louisiana, and even in its industrial expansion got little beyond Alabama. The speed with which the virgin stands of longleaf were cut in Louisiana under industrial logging methods was chiefly responsible for the failure of a naval-stores industry to develop in the state. Also, the industry had not recovered sufficiently from the fall in the market before the Civil War to permit its expansion outside of the areas where it was established, except for sporadic tapping just before logging.

The naval-stores industry, therefore, did not exercise a significant influence in Louisiana toward using methods of logging which would have

\textsuperscript{17} Hawk, op. cit., p. 280.

made possible a sustained use of forest land.

This, then, was the pattern of forest resource use in the southeastern states before the arrival of industrial logging: a joint use of the forests by the turpentiner, the stockman, and the high-grade logger. These industries had developed before the mechanization of logging equipment, and even after industrial logging became established in these states the joint forest industries must have influenced the utilization of the forest resource. It will be seen that the speed with which industrial logging moved through the virgin forests of Louisiana prevented the joint land-use system of the southeastern states from getting a foothold in the state.

The Southern Development of Industrial Logging

"First Maine, then New York, and then Pennsylvania led the states in lumber production. In the vast pineries surrounding the Great Lakes, following the War between the States, lumber manufacture took the form which molded its destinies. It became the great nomad among American industries, driving from one virgin forest to another like a threshing machine from one ripe wheat field to the next."

"...Early in the eighties, lumber capital from Michigan and Wisconsin began to flow into the nearest virgin fields—the southern pineries. The South entered its period of active timber buying, speculation, and the blocking up of large holdings. Many tracts of state timber, public lands, and private patents were brought (sic) up, much of it at $1.25 per acre. In the following twenty years, company after company cut out in the North, junked the old plant, and trekked with its group of skilled hands to a new location in Mississippi or Louisiana.  

The Lake States story was largely repeated in Louisiana where the pine forests had scarcely been touched when industrial logging arrived.

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Valuable timber land as late as 1891 was being sold at $1.25 per acre. Some of the speculators accumulated land in blocks of hundreds of thousands of acres. Although much of the valuable land had been sold by 1908, even at that time forested public lands in Louisiana were being sold to the highest bidder at the following rates per acre:

<table>
<thead>
<tr>
<th>Type</th>
<th>Rate per Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untimbered</td>
<td>$2.50</td>
</tr>
<tr>
<td>Cypress</td>
<td>10.00</td>
</tr>
<tr>
<td>Pine</td>
<td>8.00</td>
</tr>
<tr>
<td>Hardwoods</td>
<td>8.00</td>
</tr>
<tr>
<td>Dry Lake</td>
<td>3.00</td>
</tr>
<tr>
<td>Prairie</td>
<td>10.00</td>
</tr>
<tr>
<td>Sea marsh</td>
<td>.25</td>
</tr>
</tbody>
</table>

The lumber industry in its migration from the Lake States to the South in the 1880's brought with it, along with physical equipment and capital, value judgments which had become institutionalized in the Lake States.

Since the destruction of the timber had always been the necessary prerequisite to agricultural development, the lumber industry had not yet adjusted to the problem of non-agricultural timber land.

The credit structure of the industry at the time of its arrival in the South was itself predicated on the availability of another virgin stand to which to move when the stand then being cut was finished. With the vast expansion on credit and the heavy obligations to be met annually carrying six to eight per cent interest, it was cheaper to operate at a profit level which at least covered part of the overhead than to close down completely and let the overhead eat up the value of

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21 Ibid., p. 7.
the mill. Foster reported that as much as $2 had to go to meet bonded debt out of every thousand feet of lumber sawed by many of the operators in Louisiana in 1908-1910, with lumber selling at $12.05 per thousand board feet on a market which had broken in 1907. Some of the mills in Louisiana, according to Foster, were even running day and night to meet credit obligations. The slogan of the industry and the requirement for survival of the over-expanded companies as expressed by a Minnesota lumberman was: "Keep your saw in a log and sell at the market." The Copeland Report in 1933 summarized the past financial difficulties of the lumber industry as follows:

"Overproduction . . . grows in part out of an overhead of stumpage and forest land, the consequent financial pressure to liquidate, the development of excessive plant capacity, and the burden of high and largely fixed and inescapable capital costs. Manufacturers have accordingly believed that they would lose less money by running than by shutting down. Un-economic manufacture, overproduction, and demoralized prices have been the inevitable outcome."24

Hardtner, as chairman of the Louisiana Conservation Commission, put it flatly to the Yellow Pine Manufacturers Association in a speech in 1911 that if the loggers didn't stop leaving 2,000 board feet per acre of second-grade logs lying on the ground in the woods after logging, the state would have to take measures similar to those already taken to pre-

22 Foster, op. cit., p. 24.
23 Greeley, op. cit., p. 42.
vent waste of natural gas. 25

Getting the timber cut, sawed and sold was as far as the majority of the lumbermen were willing or able to go. The possible shortage of the timber supply (not only for the nation, but for their own operations) was of little moment.

The possibility of growing timber for a second cut after the first siege on the virgin forests was not envisioned by the industry generally at this time. As a member of Gifford Pinchot's Forest Service staff, William B. Greeley and others undertook a survey by questionnaire in about 1911 to determine the status of current timber cutting practices. The final question read: "What provision do you make for reproduction?" Greeley reported that most of the lumbermen left this question blank, but one wrote in: "Nothing of the kind allowed in my camps," and this reply fairly summarized the situation. 26

In the wake of industrial logging in Louisiana were left the cutover lands, a burden on the lumber industry and the state alike. By 1918 it was estimated that there were over 12,260,000 acres of cutover land in the state, and that it was increasing at the rate of 250,000 to 300,000 acres yearly. 27


26 Greeley, op. cit., pp. 116-117.

The credit structure of the industry and the cutover-land problem will be discussed in more detail in a later part of this study. The point here is that since Louisiana's pine forests had hardly been touched prior to the coming of industrial logging to the state, the arrival of the industry at this point in the development of the state's economy led to its growing in an entirely different tradition than that developed in the Atlantic Seaboard states with the practices of joint land use by the cattleman, the turpentiner, and the selective logger. It was full-blown industrial logging unrelated to the land-use traditions of the Carolinas, Georgia, Florida, and parts of Alabama and Mississippi. While cotton cropping and field abandonment, and wild hogs and fire in the woods were customs carried to Louisiana by settlers as part of a land-use form tied to climate and social traditions, these practices did not develop as a part of the logging tradition in the state and their application to industrially logged lands had a different significance. The traditions were the same, but the environment to which they were applied was entirely different.

It was in this setting that Louisiana was being logged in the 1890's and early 1900's and it was in this period that Henry Hardtner developed his views and made his economic decisions.

The Influence of German Forestry

The contribution made by examples and individuals from Europe in the latter nineteenth century founded the science of forestry in the United States. The situation can best be indicated by the long divergence between forestry, or the science and arts of production, as opposed to lumbering, the business of cutting and selling.

While England had developed an import trade before her economy was
brought around to widespread forestry measures as important aspects of
the nation's development, Germany and France had distinct experiences
which give us a clearer understanding of the forestry issue in the
United States at the turn of the century.

Germany began extensive formal emphasis on forestry as an abstract
study in the eighteenth century. The Kameralist tradition among the
German states and the nationalist trends which emphasized resource de-
velopment, making it the concern of the nation to foster both industrial
and agricultural progress, inevitably had their effects on forestry.
Through the nineteenth century the customary management of forests be-
came the object of formal study on the university level by men trained
and educated in the von Humboldt tradition with an orientation in the
German version of political economy or statesmanship.

By 1800 extensive planting was being developed, mainly with forest-
grown seedlings, and by 1840 the basic techniques of today, using nursery
stock, thinning, and cutting practices, were well established. 28 The ad-
vanced state of all the life sciences in Germany through this period
culminated in applied fields yielding well-orientated scientific devel-
opment. This early development had two important influences. First,
the large numbers of German immigrants arriving in the United States
brought a consciousness of the exhaustibility of forests and the poten-
tiality of the economic validity of frugal use as well as some considera-
tion of reforestation. Since Germany had just finished two centuries
of development toward the recognition of forests as a valuable and de-
structable resource, one can expect that German immigrants must have had

28 Fernow, op. cit., pp. 59-68.
a fairly uniform reaction to American forest practices of the time. Their impact on the American scene seems to have been small, however.

Secondly, German-trained scientists in the field of forestry found their way into positions of influence in the United States as the government began to concern itself with an understanding of the forest industries. B. E. Fernow, Carl Schenck, and the botanist, Charles Mohr, among others, represented German forestry in the founding of the study of American forest problems. Although Gifford Pinchot was trained in France, German science dominated the continent. Charles Mohr's work in the South on the southern pines, with his base at Alexandria, Louisiana, between 1880 and 1883, tempts one to speculate upon the role of personal contacts in that area on both the Hardtner family and the tendency for conservation legislation in Louisiana to spring from that area.

The French development represents a different type of forestry background much more meaningful to a virgin country like the United States, convinced by custom as well as price relations that scientific tree production was an old-world fallacy.

After 1789, vast areas of forested mountains in France were released from the protection of the languishing French feudal system and the surging industrial development, stimulated by the Napoleonic Wars, led to a serious erosion and flood problem following so immediately upon the heels of denudation that government attention was mandatory and clear-cut recognition of the cause was unavoidable. The devastation caused by only ten to twenty years of irresponsible logging took almost a century to arrest. With mountain watershed-control projects and later the Landes Dune-Control Project started under Louis Napoleon, German science was applied in a way which emphasized national values and protection against
great loss rather than profit.

The concern in the early conservation literature in the United States for flood control, watershed protection, and climatic influences of forests was responsible for the New York Adirondack forest-reserve program of the 1880's.

By 1890 the Landes dune reclamation program in France was showing signs of being economically profitable from the point of view of private investment. The role of this vast reforestation program in the popular imagination leads one to expect that it would have received attention at the Paris Exposition of 1900, which was attended by Henry Hardtner's father.

Hardtner served as a member of the board of directors, manager of commissary and secretary and treasurer of Vagot Hardtner & Co., Ltd.

In 1896, having gained the basic experience and capital, Hardtner
CHAPTER III
THE DEVELOPMENT OF THE HARDTNER TIMBER INVESTMENTS

Henry Ernest Hardtner was born in Pineville, Louisiana, in 1871. His father, E. J. Hardtner, had come from Germany in 1865. He first visited the Pineville area in 1867 and settled there permanently in 1869.¹

Henry Hardtner's career began in 1892 when at 21 years of age he invested $1,000 his father had given him in a local sawmill venture, with his father and J. M. Nugent holding the remainder of the $6,000 capital. Hardtner served as a member of the board of directors, manager of commissary and secretary and treasurer of Nugent, Hardtner & Co., Ltd.

In 1896, having gained the basic experience and capital, Hardtner entered a partnership with Charles W. Lacroix. A sawmill with a small amount of timber was purchased from John Q. Prestridge at Maxwell Spur, Louisiana, on the Iron Mountain Railroad. The business was operated under the name of Hardtner and Lacroix with a cash capital of about $3,000.

¹ Biographical information on E. J. Hardtner and the early beginnings of the Hardtner investments are taken largely from the following documents: "Biography of E. J. Hardtner," (an autobiography), undated mimeographed pamphlet in the writer's possession. Copies of this document are also on file in the office of the Urania Lumber Company. Another source of information is an application by the Urania Lumber Company to the Whitney-Central Trust & Savings Bank, New Orleans, 1910, for a loan of $700,000, which outlines the early history of the company. This document is on file in the office of the Urania Lumber Company also.
"I was born in the forests and have had close association with them since childhood. What I know of them cannot be learned in schools or colleges. To me they are as humans and I know the trees as I try to know men."

- Henry E. Hardtner
Hardtner renamed the town site Urania after the Greek muse of astronomy, saying "it was like moving from hell to heaven." The naming of the town Urania seems to indicate more than the fancy of a young man with a literary bent. It suggests that even then Hardtner had the feeling that a stable community could be organized around the timberlands which were then being cut over, burned over, and left to the hogs and the tax assessors. The "hell" Hardtner referred to was the usual raw, brawling, lumber boom towns.

After two years, in 1898, the small tract of virgin timber which had been purchased with the mill had been cut over. A tract of 3,158 acres of virgin timber was purchased from Atwood Violet of New York, situated eight miles north of Urania in Caldwell Parish, for $13,500 cash. The sawmill which Hardtner and Lacroix then owned was valued at $5,000 and the partnership had $5,000 in cash. Hardtner's father and William Edenborn invested an additional $5,000 each in the new venture. The first operation of Urania Lumber Company, Ltd., with Henry Hardtner as its president, was to build a railroad to the new tract of timber, logging small stands and "picking up stumpage at 50¢ per M feet to keep the mill running." After three years, the main body of timber was reached and a new sawmill was erected at Urania with a capacity of 60,000 feet per day.


3William E. Greeley in Forests and Men (Garden City, N.Y.: Doubleday & Co., Inc., 1951, p. 11) gives this description of the early lumber towns: "Twenty years, and even less, became the common lifetime of a sawmill. Then—dismantle, junk and move on. Not only did lumbering become a nomadic industry; it became an industry with no permanent interest in the land. A logged-off section was in the same category as a junked mill—to be sold for what it might bring, or abandoned and forgotten. Hence forest fires were of small moment until they threatened merchantable timber or a logging camp."
Hardtner's father stated that before 1906 his investments in Urania Lumber Company had yielded 85% of his investment in cash dividends and 100% in stock dividends. In 1906 he sold 90 of his 100 shares in the company to his son for $35,000. Henry Hardtner also bought 20 shares from Walter Tisdale for $3,000 and the company bought out Lacroix's interest for $35,000. Q. T. Hardtner, Henry Hardtner's younger brother, also held a minor interest in the company at this time. During the same year the stock of Urania Lumber Company was increased to $200,000 and paid as stock dividends. Aside from cash dividends paid between 1898 and 1906, this increase in value of the company's assets represents roughly a 30% compounded rate of reinvestment out of profits.

It is impossible to be sure to what degree these moves represented a difference of agreement among the investors, but as early as 1904 and 1905 Hardtner had begun buying cutover tracts at $1.00 per acre with a definite opinion of their reforestation potential, and at a time when fifteen years separated him from the pioneers of southern reforestation and twenty-five from its general respectability.

During this period of rising prices before 1907, Hardtner took an active part in local affairs in the community, working for the division of Catahoula Parish which later resulted in the creation of LaSalle Parish.

4Greeley (op. cit., p. 69) stated: "None of us, foresters or lumbermen, had as yet (in 1902) any conception of the reproductive power of the logged-over forests, especially in the South, or how the growth rate was increasing as young trees replaced old timber."

5John S. Kyser ("The Evolution of Louisiana Parishes in Relation to Population Growth and Movement," unpublished dissertation, Louisiana State University, 1938, p. 193) said of the division of Catahoula Parish: "The hill area of LaSalle was feeling the full swing of the pine lumber industry, and this had little in common with the major portion of what is now Catahoula."
in which Urania is now situated.

In 1908 President Theodore Roosevelt called his Governors' Conference to discuss conservation problems. The meeting was held May 13-15 at Washington, D. C., and Hardtner attended as a representative of Louisiana.

Hardtner was elected to the Louisiana Legislature and served in the session of 1910 where he was appointed Chairman of the House Committee on Conservation set up by House Resolution No. 1 which he had introduced on May 12, 1910. During this session of the legislature Hardtner succeeded in obtaining the passage of Act 172. This act established a Louisiana Commission of Conservation, giving life to Act 113 of 1908 which had established a Commission on Natural Resources with a two-year assignment of reporting on conditions throughout the state. Act 113 had been inspired by Roosevelt's Governors' Conference and had been introduced by Representative Thornton of Alexandria, possibly under Hardtner's guidance.

In addition to basic wildlife conservation legislation, Hardtner also introduced Act 261 which set up the Division of Forestry in the Conservation Commission and contained the provisions for the reforestation contracts. Act 261 supplanted Act 113 of 1904, which had dealt only generally with fire prevention and reforestation and had lain idle on the statute books.

Important aspects of Hardtner's plans are documented for the years 1909 and 1914. Reports to the U. S. Forest Service on Urania lands were made in these years, the first in 1909 by W. W. Ashe and the second in

Ashe was sent to Urania by Chief Forester Gifford Pinchot of the U. S. Forest Service in response to Hardtner's request for advice from the Forest Service in 1909. Ashe set forth the information Hardtner wanted from the Forest Service as follows:

"The owners desire to ascertain (1) the rate of growth of the small trees left on the cut over lands; (2) whether it will be profitable to replant portions of this land where there is now no small timber and the natural restocking is imperfect; (3) whether it will be profitable in future lumbering to set a diameter limit for cutting trees or to continue to cut clean."\(^9\)

At the conclusion of his report Ashe commented:

"Fires must be stopped before reproduction can be secured. It is useless to either plant cut over lands or to leave seed trees in order to obtain natural reproduction unless the young growth is protected from fires."

According to Ashe's report, Hardtner at this time had accumulated a total of about 20,000 acres, about 12,000 of which had been cut over. Ashe estimated that 80 per cent of the land was longleaf pine, 15 per cent shortleaf pine, and 5 per cent or less loblolly pine. The lands were located in Caldwell, Catahoula, and Winn parishes and lay to the north and northwest of Urania on both sides of the Iron Mountain Rail-

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\(^8\) Brief History of Conservation in Louisiana, undated pamphlet on file in the office of the Louisiana Forestry Commission, Baton Rouge, Louisiana. It is believed to have been published privately by the Urania Lumber Company.

road, and were part of the tract which was later included in Reforestation Contract No. 1.

Ashe was skeptical of the possibilities of natural regeneration on most of the land and emphasized the necessity of planting for reforestation,

"The conditions which determine a permanent forest investment on the land of Urania Lumber Co. are most favorable on the loblolly pine land and least favorable on the longleaf pine lands. The loblolly pine land, including the lands which are suitable for planting with this species, offer a 5 per cent investment at the present prices of stumpage. The longleaf pine lands which must be artificially restocked, offer a 5 per cent investment only in the event of stumpage attaining a value of $8.50 per M feet by 1970."

Mattoon was more optimistic concerning the possibilities of natural regeneration in his report in 1914:

"A very heavy crop of Long Leaf Pine in 1913, which, accompanied by warm weather in November, resulted in splendid seed germination. By early December Long Leaf Seedlings were present in great abundance near practically all Long Leaf trees of seed bearing age. This means that large areas for which artificial reforestation had been considered necessary are now well restocked."

Even though Mattoon reported longleaf regeneration on difficult areas, he outlined Hardtner's program as follows:

"He is working toward developing a normal forest representing all ages in a cutting rotation of 40 to 60 years for shortleaf and loblolly pines. The aim is to have a continuous yield (of possibly about 15 million board feet annually) from the tract. The company has for some time been purchasing wornout homestead lands and cut-over tracts of young pine lying within or near their main body of land."

Hardtner's land had been under reforestation contract for nearly a year when Mattoon saw it and Hardtner apparently felt that planting for reforestation was not necessary in order to comply with the terms of the

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10 Ibid., pp. 5-6. Italics mine in excerpts from the Ashe and Mattoon reports.
contract. He was convinced that fire prevention would allow an adequate stand of seedling shortleaf and loblolly pines to reach a size where they would not be completely wiped out by occasional fires. Also, he was on some lands, following the principle of careful logging, leaving enough small and growing timber undamaged and free from burning over so as to provide a second commercial saw-timber cut in a few years.

Of most significance in Mattoon's report is his statement that Hardtner was planning for a 40 to 60 year cutting rotation on his lands. A review of the current literature of the time shows Hardtner's understanding of the growth potential of pines and the practicality of planning for a crop of timber far in advance of many of the outstanding foresters of his day.

H. H. Chapman of the Yale School of Forestry was recommending management for a 20-year second cut for virgin stands of longleaf pine in Texas in 1909. While he pointed out in a study on shortleaf and loblolly pines in Arkansas in 1912 that a second cut program could result in a by-product stand of five-inch saplings at final cutting, he questioned the economic feasibility of management for sustained yield of second growth timber. Carl Schenck, founder of the first forestry school in the United States, had the same opinion after studying in Alabama in the late 1890's. Ashe also did not view second-growth timber


12 Chapman, H. H. and Ralph C. Bryant, Prolonging the Cut of Southern Pine, Yale Forest School Bulletin 2, April, 1913, pp. 21-22.

as productive enough to make a good investment, although he was aware that the North Carolina lumbering during the first decade of the twentieth century was about halfway through a second-growth fire and old-field sub-climax of loblolly pine ranging from 100 to 150 years of age.

Glenn Tannehill, forester for the Urania Lumber Company since 1942, stated that the notations which Hardtner made on the company records of small plots of cutover land purchased in 1904 and 1905 give remarkably accurate anticipation of the stands in forty years.  

Ashe in his 1909 report to the Forest Service on Urania lands included growth rate charts on individual trees before and after logging of the area. While his figures indicate that the growth rate during the ten years after logging tended to be double that during the ten years previous to logging on loblolly pine, he was apparently dealing with released trees and his three-inch increment in ten years was not applied in terms of a stand or yield per acre. His North Carolina study indicated that he found second-growth stands crowded and slow growing. Ashe’s estimate that the growth rate on loblolly pine in bottomlands on Urania lands would yield a 5 per cent return and that longleaf would yield an equal return if stumpage prices should rise to $8.50 by 1970 would not have encouraged Hardtner when credit in the form of timber bonds would cost him at least 6 per cent interest.

Hardtner had built in 1901 a mill designed to handle 60,000 board feet of lumber per day, or 15 million board feet a year, and he was sys-

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15 Interview with the writer.
tematically accumulating cutover land designed to provide an annual yield equal to the mill's capacity.

When he attempted to obtain $700,000 credit in 1910, he contemplated acquiring a vast tract of virgin timber and building a second mill in Winn Parish north of Urania. This lends credence to the idea that he still considered the object of his enterprise to be the maintenance of a stable mill based on enough land within easy reach to fill its annual timber requirements. The second mill was never built at Winnfield, but he did acquire additional stretches of timber. Our assumption must be that when Hardtner gave up his plans of a second mill at Winnfield and the acquisition of new tracts of virgin timber, he followed his father's example and retrenched in what he considered a sound investment; that is, a mill at Urania running at 15 million board feet per year capacity with an assured supply of timber from second-growth forest lands.

According to Q. T. Hardtner, Jr., present president of the company, the Urania mill was operating on the basis of sustained yield on company lands by 1917.  

Having laid the groundwork for a stable mill at Urania, Hardtner's energy and understanding of problems of lumbering led him to intensify his conservation activities. As Chairman of the Commission on Natural Resources (1906-1910) and Chairman of the Conservation Commission (1910-1912), he travelled extensively over the state familiarizing himself with forest conditions. Both in his capacity as a state official and as a private citizen, he missed no opportunity to make speeches explaining

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16 Interview with the writer.
his ideas on conservation and forestry.\textsuperscript{17}

The \textit{Daily Picayune} for May 13, 1913,\textsuperscript{18} reported a rumor that Hardtner represented interests that would shortly put 200,000 to 300,000 acres of cutover land under reforestation contract. The \textit{Picayune} stated that the owners of these lands were waiting "to see whether the state's proposition was agreeable or too binding."

The reason such large-scale contracts did not follow was because no one except Hardtner really believed that reforesting cutover lands was a profitable private business venture. The contract made with Urania Lumber Company shows clearly that the state was primarily concerned with the popular issues of reforestation as a means of flood control and the climatic influence of denudation, and while the contract alluded to possible financial aid being forthcoming on this basis, the only real concession was the long-term freezing of the tax evaluation on contract lands. Since the market value of these lands was no higher than the contract's valuation of 1.00 per acre and was not expected to rise much above that sum, the only reason for a landowner to bind himself to maintain fire protection and fire wardens, and to follow the Conservation Commission's reforestation ideas, was the positive belief that within a short time a stand of second-growth timber on the lands would raise its value to such a point that the low tax evaluation would

\textsuperscript{17}Though most of his speeches contained stern warnings to his fellow lumbermen of the wastefulness of the industry, Hardtner's sense of humor was well known. One of his speeches was entitled, "The Tale of a Root and the Root of a Tail, Or Root Hog or Die."

\textsuperscript{18}Reforestation Contract No. 1 was signed on July 14, 1913 but was made retroactive to January 1, 1913. Hardtner had applied for a contract on September 23, 1912.
become an economic boon. This was an assumption that most of the foresters of the day and the owners of Louisiana's cutover lands were obviously unwilling to make on a private economic basis, and without a cost-covering stipend, they were uninterested.

As early as 1907 the Southern Lumber Operators' Association was formed, but this apparently was not in response to President Roosevelt's conservation ideas but a product of the growing size of the southern lumber industry and its common industrial problems, not the least of which was the widespread labor unrest in Louisiana and Texas among sawmill and woods workers during that year.¹⁹

Most conservation work and forestry of the day were tied to problems and plans for state forestry, or efficiency in utilization of virgin stands. Carl Schenck felt that his attempts at bringing forestry to private industry were a failure as a general rule.²⁰ Fernow as early as 1892 had brought the benefit of his broad German education to bear on the problem, and applied classical economic concepts of the market. He took the consistent position that the individual could not participate in the timber industry in the South at a level of forest policy designed for sustained yield when the market was set by those mining the virgin timber and not contributing preparation for the future as a cost of production.²¹

¹⁹ McWhiney, H. Grady, "The Socialist Vote in Louisiana, 1912: An Historical Interpretation of Radical Sources," unpublished thesis, Louisiana State University, 1952. Although McWhiney's study is mainly devoted to labor unrest in Louisiana sawmill towns, he does not mention Urania Lumber Company.


As late as 1917, Fernow still felt that until the lumber industry as a whole accepted forest regeneration as a cost of production below which it could not do business, the only hope of scientific forestry was through government acquisition for joint purposes of watershed protection and recreation combined with reforestation for future timber production.  

This was the basis upon which Greeley felt that the lumber industry in 1917 was a sick, unhealthy one, forced by its credit structure and competition and overhead to mine the forests as long as virgin timber was present, while Gifford Pinchot blamed the industry as a willful one.

In the light of these views, it is not surprising that in the absence of extra financial inducements, cutover land holders in Louisiana were not willing to attempt fire protection and reforestation, however inexpensive these measures might be. Nor is it surprising that as late as 1917, according to Heyward, "...Hardtner was generally conceded to be a visionary and an eccentric because of his claim that his efforts to grow a second generation of pine trees was succeeding."  

Four years after Hardtner had staked the future of his cutover lands on reforestation, representatives of the southern lumber industry met in New Orleans at the Cutover Land Conference of the South to face the critical economic problem of what could be done with cutover lands. This con-
ference will be dealt with in more detail at a later point in this study, but suffice it to say here that reforestation of the cutover lands was not seriously considered by the lumbermen as a solution to their problem.

The blossoming of industrial logging with mass techniques and decreasing costs as far as tree selection was concerned led to the de-nuding of forest land in Louisiana. With almost no trees left for seed and masses of undisposed slash concentrated, the aftermath of industrial logging was the traditional southern grazing-improvement fire which killed even large saplings accidentally left after destructive logging, and hogs and the annual range fires kept reproduction from re-establishing at all in many places. Hogs destroyed fire-resistant longleaf seedlings and fire killed hog-immune shortleaf and loblolly seedlings. East of the Mississippi River, slash pine suffered from both scourges.

There was no room left for the auxiliary land use systems of the South Atlantic states which had been built up over the years around turpentining and grazing of high-graded longleaf stands on lands cut under a different system than that of industrial logging with its power skidders and unskilled gang labor. Turpentining was never developed in Louisiana to any extent as an auxiliary forest land use, although it had been a pre-logging industry for a short time.

In 1917, Austin Cary, an ardent defender of \textit{laissez faire} and advocate of southern forestry said,

"I have advocated opportunistic, catch-as-catch-can forestry in the main as that which seems to fit our circumstances and people, and the kind that, frankly pursued, will yield most in the long run."\[25\]

But Henry Hardtner at Urania, Louisiana, had been doing the uneconomical, the silviculturally unfeasible for almost ten years and he did not rely on a long-range view, but on the present.

Hardtner said in 1913 in explanation of why he was putting his cut-over lands under reforestation contract:

"That I or anyone else will be permitted to destroy our forests and leave the lands bare and valueless for years will not be tolerated much longer in any state. We must either develop them properly or allow the state to do so - and when the state takes hold of them, they will fix the values... I am not quite in the millionaire class that I could afford to be so reckless or generous, nor am I yet a true philanthropist. I consider it a good business investment."26

26 "Reports and Correspondence of Urania State Forest, 1913," bound volume of unpublished documents and correspondence on file at Urania Lumber Company, Urania, Louisiana.
CHAPTER IV

SILVICULTURAL ASPECTS OF THE URANIA REFORESTATION PROGRAM

It is not the purpose of this study to examine in detail the silvicultural implications of the forestry program at Urania. However, since silvicultural practices naturally influence the economic aspects of any forestry investment, those of major economic importance will be discussed briefly as they affected the economic evaluations of Henry Hardtner.

Fire Protection

Ashe's report in 1909 on Urania lands clearly pointed out that unless fires were stopped in the woods, it would be impossible for the pines to restock the cutover lands. One of the first steps taken by the Urania Lumber Company in complying with its reforestation agreement with the state, therefore, was to set up a system of fire protection on the company's lands. In his report to the Louisiana Conservation Commission in April, 1911, Hardtner reported that the company had fifteen to twenty fire wardens in the field during the year and had been successful in preventing serious fires, with not over 700 acres having been burned over.

Chapman in about 1922 described the changes which the fire protection measures started by Hardtner had made on Urania lands:

"For about twelve years after logging, fires burned

annually over this area, destroying all reproduction of loblolly pine and probably the greater proportion of long-leaf seedlings. The tract remained a typical stump waste similar to the conditions on millions of acres in the longleaf cutover lands of Louisiana. But, by the spring of 1921, after nine years of fire protection, the entire appearance of this tract had been transformed. The loblolly pines now reached a height of from 8 to 20 feet, and all the gaps had been filled in with more recent seedlings so that the formerly barren stretches had been converted into a thrifty, fully stocked stand of pine saplings, which in another 5 years will be so large and well protected by thick bark that they will be practically immune to ordinary surface or grass fires burning in the winter or early spring. The great service to forestry in Louisiana which the demonstration on the Hardtner tract has rendered is to show the comparative simplicity of the methods necessary to secure reproduction of pine timber on cut over lands, the remarkable abundance and certainty of the resulting reproduction and the difference in value of the land, brought about in just a few years by the practice of these conservation measures.

Hardtner understood the possibility of using a controlled burn as a protection against wild fire, although he did not recommend its use as a silvicultural tool as evidenced by his comments in this report to the Conservation Commission in April, 1916:

"From our experience we do not recommend the burning over of forest lands at any time but, if it must be done for protective purposes and in self-defense, the best time is in January and February during the wet spell when the sap is down."

**Hog Protection**

Along with the protection of the lands from fire, hog damage to young longleaf seedlings was reduced on Urania lands by fencing off

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After twelve years of burning, what had begun as a demonstration of the damaging effects of hogs and fire on longleaf pine seedlings emerged as an example of the dependence of longleaf pine on fire to form pure stands, notwithstanding a stunting effect equal to several years' of growth.

Southern Forest Experiment Station)

PROTECTED FROM FIRE
Longleaf Pine Seedlings—14 Years Old—1927
Roberts Plot, Urania.

(Courtesy Southern Forest Experiment Station)

BURNED ANNUALLY DURING THE WINTER
Longleaf Pine Seedlings—14 Years Old—1927
Roberts Plot, Urania.
approximately six or seven per cent of the contract lands. Although
hogs are extremely destructive to longleaf seedlings, they do not
generally eat the roots of loblolly or shortleaf pine. Thus, protection
from hogs was not a critical factor since Hardtner as early as 1913 had
decided to manage his land for loblolly-shortleaf pine. The story is
told that Hardtner first became aware of hog damage to longleaf repro-
duction by noticing the regeneration in the fenced-off railroad right-
of-ways as early as 1904 or 1905. Charles Mohr, who made one of the
earliest studies of forest conditions in the South, had pointed out the
damaging effects of hogs on longleaf reproduction in 1897.5

Principally because of the expense involved in protecting longleaf
lands from hogs and because longleaf is an indifferent seed producer,
Hardtner had decided to manage his lands for loblolly-shortleaf pines
rather than longleaf. He had probably noticed that loblolly was reseed-
ing the open areas much faster than longleaf anyway. While longleaf
pine has always held the popular imagination and is superior to loblolly
and shortleaf in strength, hardness, and rot resistance, Hardtner relied
on fire protection and loblolly-shortleaf regeneration to cover most of
his lands.

The Daily Picayune for May 13, 1913 reported Hardtner as predicting

4 One observer has reported watching hogs root up and chew longleaf
pine seedlings at the rate of six seedlings per minute, or an acre of
plantation in a couple of days. (Walt Hopkins, "Forest Research in the
Longleaf-Slash Pine Belt," speech delivered at the annual meeting of the
Southern Pine Association, April 5-7, 1951).

5 Mohr, Charles, The Timber Pines of the Southern United States,
(U.S. Department of Agriculture Division of Forestry Bulletin No. 13,
a heavy longleaf seed crop for the fall of that year, but the small area subsequently fenced suggests that he relied less on his heavy longleaf seed crop than is generally assumed, except insofar as he was ready to adjust his plans to take advantage of longleaf seeding a particularly barren tract rather resistant to loblolly and shortleaf because of its drier nature and distance from seed sources.

**Growth Rate**

The Conservation Commission of Louisiana reported in 1923 that Henry Hardtner had realized six per cent compound interest on his reforestation program for the thirteen previous years.\(^6\) This return represents an increment which included silvicultural gains plus such factors as an increased scarcity of wood because of decreased supply or increased demand, or changes in the economic measure, inflation, all of which determine the economic return from dollars invested.

It was generally believed in the early 1900's that the maximum growth rate based on ring measurements of virgin trees was about eight rings to the inch, or about one inch in tree increment per four-year interval. The tendency seems to have been to think in terms of saw-timber maturity as a natural absolute, twenty inches or more, rather than financial maturity of timber subject to the sawyer's uses. The point is that the thought ran in terms of second growth timber competing with virgin stands at virgin stand prices, prices including no cost of production.

Tree diameter increment has no absolute measurement for the land

Figure 8. Loblolly Pine Stand, 28 Years Old.
LOBLOLLY PINE, 28 YEARS OLD
user unless it is defined in terms of number of trees per acre. Diameter growth is reduced by crowding and increased by wide spacing, and the concern of the silviculturist is to bring a maximum number of trees to economic maturity, which is a function of time required for the trees to reach merchantable size in relation to the compounded interest rate.

The virgin forest was generally understood to have been made up of a patchwork of even-aged plots dominated by the long-persisting mature and decadent trees, and the possible regeneration of cutover lands was generally expected to be similar in growth rate and characteristics. The differences between restocking by a limited number of seed trees over wide areas as opposed to virgin forest conditions where partially released trees around windfall or fire openings would probably seed heavily the first or second year were not generally considered. However, gradual stocking over a period of five to ten years tended to give a faster growth rate to the young seedlings, and prevented any tendency of "locking in" or mutual crowding except in very heavily seeded areas.

By virtue of his personal observations in this region, Hardtner must have seen enough cutover land which had restocked to have an independent judgment of the growth rate of second-growth timber. At any rate, his estimate of the growth potential of his lands in 1911 was somewhat higher than most estimates as evidenced by his prediction of 5,000 board feet per acre in 35 years, and 10,000 in 50 years. The latter yield would average about 200 board feet per acre per year increment.

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Most experts of the day generally anticipated 100 to 150 board feet per acre growth rate on extensively managed land. The company presently assumes over 300 feet per acre on extensive management methods, but over 500 feet could be obtained at a more intensive level involving a higher labor input.

Silvicultural Costs

It has been pointed out that as early as 1913 Hardtner was generally committed to loblolly-shortleaf management in spite of the fact that 80 per cent of his land at that time was in longleaf pine. Management for longleaf pine would have involved the expense of woven wire fencing and hog roundups, while the cost of loblolly-shortleaf regeneration was principally the expense of fire protection.

In a letter to the Conservation Commission in 1922, Forest Inspector Thomas described lands cut by the Urania Lumber Company since 1913 and reported that many fewer longleaf seed trees were left than loblolly. The area described by Thomas was adjacent to Contract No. 1 lands and was "hilly to rolling sandy loam frequently cut by hardwood-loblolly stands in creek bottoms." Thomas in this letter gave an interesting description of the land logged by Urania Lumber Company:

"The merchantable timber was cut and removed several years ago by the Urania Lumber Company, Ltd., the south half was logged by teams and the north half was logged with skidder, great care was exercised in the logging operations, undoubtedly the best that I have ever seen, it was not left entirely barren, and the young timber all bruised and skinned up, the young timber was protected and left intact, something rarely seen on the average lumbered tract."

"... This tract has an average of five sound seed trees per acre, 10 inches and up DBH and a total average of thirty-two young trees and saplings per acre from three to ten inches DBH about two-thirds of which are pine and one-third hardwood, it also has numerous scions and seedlings and if fires are
Figure 9. Pine Seedlings and Saplings, Hardtner Tract. Source: Louisiana Conservation Commission, Report of the Conservation Commission of Louisiana, September 1, 1912 - April 1, 1914.
PINE SEEDLINGS AND SAPLINGS, HARDTNER TRACT
kept out it will within a few years have an excellent stand of young timber over the entire area . . . ." 

Undoubtedly Hardtner left a good deal of small timber intact in his earlier logging operations. Chapman observed in his report to the Conservation Commission on Urania lands under reforestation contract in about 1922 that "In some instances this increase in growth has been phenomenal . . . and there is sufficient timber on the ground to justify a logging operation with teams." 

Although power skidding was adopted in 1917 at Urania, it was apparently abandoned in the 1930's because of its destructive effects on young trees. Also, it is part of the high-overhead railroad-spur type of logging which, once set up, compels the operator to take all he intends to get before moving his heavy equipment and expensive installations. Mule or ox team logging with truck transportation tends to incur a fixed rate of cost per log, rather than a heavy total cost whose allocation per log is lessened the more the logs brought in.

Until recently the Urania tracts have been managed as uneven-aged stands due to the young timber left standing, with gradual restocking from the scattered loblolly and shortleaf seed trees. Actually, small group selection rather than individual tree selection has been the program. The increased efficiency of evenaged management in multiple section plots on an extensive basis has led to the gradual abandonment of this policy. However, during the early period, regeneration was accom-

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Figure 10. Conservative vs. Destructive Lumbering.  
CONSERVATIVE VS. DESTRUCTIVE LUMBERING.

Above complete devastation caused by "modern" logging in southern pine. No seed trees left, and no hope of second growth except by planting. About 300,000 acres of such land are logged clean every year in Louisiana, and the development of farming and stock-raising does not begin to keep pace with the destruction. The middle picture shows the result of conservative logging in shortleaf pine ten years ago, when trees smaller than eight inches were not considered worth cutting. The few trees left seeded up the whole cut-over area, and planting was unnecessary. The farmer who owned the cornfield kept out the fires, and nature did the rest. Below, longleaf pine only 27 years old, on hurricane tract. In ten to fifteen years this will make sawlogs, and today is big enough for ties, posts, pulpwood, fuel, etc.
Figure 11. Reforestation Projects at Urania Forest Preserve.
REFORESTATION PROJECT'S URANIA FOREST PRESERVE

Photographic views of United States Forestry Service Experimental Plots and Natural Reforestation from Seed Trees.
Reforestation Contract with Department of Conservation, port, 1924 - 1926.
Reforestation is a simple matter throughout Louisiana if there are seed trees and fire protection. The area pictured is under contract with the
plished by the leaving of small, young trees which existed in the virgin stands.

In summary, careful logging practices and fire prevention were the chief silvicultural costs to Urania Lumber Company for natural reforestation of cutover lands.

R. D. Forbes, Superintendent of the Division of Forestry of the Louisiana Department of Conservation, summed up the costs of reforestation in 1918 when he said:

"Reforestation, when planned far in advance of lumbering, requires little or no investment to begin with, and only a small yearly cost for fire protection in the case of short-leaf and loblolly pine, and of hog protection also in the case of longleaf. The seeding or planting of land to be reforested with pine is totally unnecessary if one to four seed trees are left to the acre, or better yet, all the young or stunted trees below 8 inches on the stump, and these trees can often be left without expense to the operator. The time to plan reforestation is before or during logging. If the matter is put off until after the land is logged clean, planting is of course the only way to reforest."10

CHAPTER V
ECONOMIC ASPECTS OF THE URANIA REFORESTATION PROGRAM

The Cutover Land Problem

J. G. Lee, Sr., then Professor of Forestry at Louisiana State University, declared in an address before the Southern Forestry Congress in 1922 that "The 'cut-over' land question is the biggest economic, social and industrial problem of the South, 155,000,000 acres."

In order to evaluate Henry Hardtner's approach to the cutover land problem and his decision to reforest his cutover lands by relying on natural regeneration after he had implemented cutting practices which left sufficient seed trees on the land, we must skip to 1917 in order to contrast his views with those of the majority of southern lumbermen, for it was not until 1917 that the cutover land problem was even being considered seriously by the southern lumber industry generally. It was in this year that the Cutover Land Conference of the South, initiated by the Southern Pine Association in cooperation with a railroad agency (The Southern Settlement and Development Organization) was held in New Orleans.

Forbes said of the meeting,

"It was not until over five million acres of pine land in Louisiana, and 90 million acres in the South, had been

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Figure 13. The Effect of Fire Protection on Cutover Forest Land. Source: Louisiana Department of Conservation, Eighth Biennial Report, 1926 - 1928.
PROTECTED LONGLEAF LAND
Protection from fire will bring back most of Louisiana's cut-over lands if it is started while there are seed trees or seedlings left.
cut over, that the owners of this vast acreage, together with public-spirited citizens and technical advisors, both State and Federal, met in April, 1917, to consider the problem of cut-over land utilization in a systematic way. 3

And what was the solution to the cutover land problem arrived at at the conference? The same solution which had been tried in the Lake States was proposed: sell the land as agricultural or grazing land.

Justin F. Denechaud of the Louisiana Agricultural Department pictured the cutover land as the future "market basket of the nation, with cattle raising the best use." 4 Other speakers recommended that the land be used for sheep raising and resolutions were duly offered to rid the lands of the enemies of sheep and cattle: dogs and ticks.

One of the resolutions of the meeting declared the tick a national menace and its eradication a patriotic obligation; another proposed a national dog tax of $1.00 per head as a safeguard for the sheep which one day might graze the cutover lands.

Hardtner's reforestation program at Urania was mentioned at the meeting by M. L. Alexander, Louisiana Commissioner of Conservation, but apparently no one considered reforestation seriously as a solution to the problem. No resolutions were reported for reforesting the cutover areas.

The proposal to sell the cutover lands as agricultural lands to settlers was the solution accepted by the majority of the lumbermen.

The Long-Bell Company's handling of their cutover lands offers an appro-

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4The Daily Picayune, April 12, 1917, p. 4.
This company set up a subsidiary, the Long-Bell Farm Land Corporation, "to facilitate the removal of this land from the expense account of the company." By 1930, approximately 165,000 acres (or about 40 per cent of the company's Louisiana holdings) had been sold as farm land at $20.00 per acre of which, however, "only about $3 per acre went to the company as profit, due to the fact that the selling costs averaged about $16 per acre." About one-half of the cutover land sold as farm land was repossessed by the Long-Bell Farm Land Corporation as the buyers defaulted. In addition to the cutover land sold by the Long-Bell Company, about one-fourth of the company lands in Louisiana reverted to the state for taxes.

Because the proposal to sell the cutover lands in Louisiana as agricultural lands was unfeasible, the cutover land problem with its corollary of tax delinquency was still a major forestry problem in the South throughout the 1930's.

Hardtner as early as 1911 had pointed out the damaging but obvious fallacy in the rationalization of absolute land use potential. He pointed out that there was at that time a tremendous acreage of land within fifty miles of New Orleans available to agriculture for the price of drainage and which was capable of producing one bale of cotton to the acre. Any reliance on any but the richest cutover lands for agricultural uses, he argued, would be so far off as to not interfere

Information about the Long-Bell Company was taken from Helene King, "The Economic History of the Long-Bell Lumber Company," unpublished thesis, Louisiana State University, 1936, pp. 18 ff.

with the raising of a forty- to sixty-year crop of timber.  

Hardtner himself before 1920 began grazing cattle on a part of his lands as a supplementary land use, but even on this land timber was still his main crop.

Forbes in 1918 estimated that 20 per cent of Louisiana's cutover lands were too poor to be classed as farmlands. While classing the remaining 80 per cent as potential agricultural land, he added:

"... while capable of producing crops, (it) cannot be profitably farmed for three or four decades, because of the large quantities of fertilizer required, or because markets and transportation facilities are lacking, or because capital cannot be had for removing stumps ($20 per acre for clearing $10 an acre land!) and otherwise preparing the soil for cultivation."

A participant of the Cutover Land Conference twenty-one years later reflected on the economic failure of the plan to utilize the cutover lands for grazing purposes:

"Looking back upon those deliberations of 1917 it seems obvious that the livestock program was doomed to failure from the start... a program essentially based on working against natural environment instead of with it... . During my peregrinations over the South in connection with this livestock program, I could not help but be impressed with the prolific growth of our Southern Pines, despite fires, razor-back hogs and general neglect. The idea constantly emerged from my sub-conscious to my conscious mind; that perhaps our livestock program was wrong; that this

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8Proceedings of the Second Southern Forestry Congress, op. cit., p. 95. In 1919 Hardtner experimented with controlling scrub hardwoods by running a herd of goats on his land but found the goats ineffective.

9Louisiana Department of Conservation, Fourth Biennial Report, 1918 - 1920, p. 10.
coastal plain area is a natural tree country and that we should work with nature to keep it in trees. But in the midst of such musings, the 40-year wait for a saw log would intrude itself, and I would go back to work on the livestock program.\textsuperscript{10}

Thus, the disposal of cutover forest lands by selling it as agricultural land was tried and failed. Although Hardtner tried to show that the market use from which these lands were being withdrawn was the only clearly profitable use for them, his arguments could not register on the over-expanded, heavily bonded timber industry\textsuperscript{11} which was looking for a badly needed pot of gold, not another investment. The majority of the lumbermen were bound by a bigger force, and the economic organization of the larger mills and the market conditions into which they had driven themselves made any increase in logging costs, whether to facilitate reproduction or for any other reason, completely out of the question. The temptation to improve a tight economic situation and get out from under a burden of debt by pawning off cutover lands as "agricultural land" on the public at a figure far above its value was entirely consistent with "opportunistic, catch-as-catch-can"\textsuperscript{12} forest business.

The results of this development were the 80 per cent "high pres-

\textsuperscript{10}Moore, \textit{op. cit.}, p. 13.

\textsuperscript{11}Greeley, William B. (Forests and Men, Garden City, N.Y.: Doubleday & Co., Inc., 1951, pp. 41-42) described Lake States lumbering just before it moved into the South as follows: "Its large capitalization forced not only maximum production, but constant production. Big sawmills and overhead organizations and obligations to capital could ill endure idleness. The organization lost its old-time flexibility to its markets."

\textsuperscript{12}Cary, Austin, "How Lumbermen in Following Their Own Interests Have Served the Public," \textit{Journal of Forestry}, XV (1917), 289.
Figure 14. A Typical Cutover Waste, A Condition of Much Land in West Louisiana.

Source: Louisiana Department of Conservation, Seventh Biennial Report, 1924 - 1926.
Fire and destructive logging have combined to render this land idle and unproductive. It must be artificially reforested.
suring" cost out of the $20 per acre collected for much of the cutover land sold, and the creation of rural problems of marginal agriculture, one of the major detriments to reforestation in many areas of the state to this day.

One observer in 1920 described attempts at farming some of the cutover land as follows:

"Anyone who has ever seen the cut over pine land, where the people are trying to farm ought to realize the sadness of this situation. I don't know which is the sadder, the devastation of pine lands, or the people who are trying to live on them. Year after year these people go on . . . and try to farm on this land. It is so poor that it will scarcely grow peanuts, but still they go on there and raise a little cotton and raise corn, and they try to raise cattle." 13

Hardtner's Concept of Interest in Relation to Forestry Investments

When Ashe in 1909 estimated that the Urania longleaf pine lands "offered a 5 per cent investment only in the event of stumpage attaining a value of $8.50 per M feet by 1970," the financial outlook for a reforestation investment on the Urania lands was not bright.

Ashe's opinion represented the best scientific view of the day, but it was heavily influenced by German forestry and German economic views. European forestry had not been faced with the problem of a virgin forest subject to rapid exploitation as a brooding presence over the price of timber, making the cost of growing timber prohibitive. As long as virgin timber was available, the cost of timber was the cost of logging and manufacturing plus the cost of capital and profits. Because of the traditional attitudes of landholders that the clearing of any land was a blessing, there was no ground rent or cost of growing charged

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for stumpage, but merely a nominal competitive "market will bear" price varying from 50¢ per thousand board feet on up.

As Ashe saw it, Hardtner was faced with the problem of trying to raise timber to sell on a market that would not make it economically feasible, especially if initial planting investments were added to the costs of the land. The disheartening item in these early calculations, as now, is the spectre of compound interest which builds up the cost of an initial investment to staggering proportions over the life of a forestry investment. Ashe's figures were based on the cost necessary to grow timber plus compound interest compared with current stumpage prices.

Hardtner, however, used a different method of calculation by comparing the cost of growing timber plus compound interest with current stumpage prices upon which interest was also compounded. The following tables are taken from a speech of Hardtner's in 1911 in which he tried to demonstrate the economic feasibility of reforestation by using this method of calculation:

"The following figures show what the results would be of buying an acre of pine containing 14,000 feet at $4 per thousand, its lowest present value, and holding it for five, ten, fifteen, and twenty-five years, with a two per cent or twenty mill tax rate, and money worth six per cent compound interest. There are very few lumbermen whose timber shows a less cost than $4 and $5 would be nearer correct.

<table>
<thead>
<tr>
<th>Holding for five years</th>
<th>Tax</th>
<th>Interest on Taxes to End of Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probable assessed value for five years at $25</td>
<td>$2.50</td>
<td>$0.487</td>
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<td>Present value $56 and compound interest for five years</td>
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<td>$74.92</td>
</tr>
<tr>
<td>Tax for five years</td>
<td></td>
<td>2.50</td>
</tr>
<tr>
<td>Interest on taxes for five years</td>
<td></td>
<td>2.8</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>$77.90</td>
</tr>
</tbody>
</table>

The stumpage value of pine five years from now must be about $5.20 in order to pay cost of holding the land.

**Holding for ten years**

<table>
<thead>
<tr>
<th>Probable assessed value for five years at $25</th>
<th>$2.50</th>
<th>$1.196</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probable assessed value for five years at $30</td>
<td>3.00</td>
<td>0.585</td>
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<tr>
<td>Total for ten years</td>
<td>5.50</td>
<td>2.083</td>
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</table>

Present value $56 and compound interest

<table>
<thead>
<tr>
<th>Taxes for ten years</th>
<th>$100.29</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest on Taxes for ten years</td>
<td>5.50</td>
</tr>
<tr>
<td>Total cost</td>
<td>$107.37</td>
</tr>
</tbody>
</table>

The stumpage value ten years from now must be about $7.70 to pay cost of holding the timber.

**Holding for fifteen years**

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<th>Probable assessed value for five years at $25</th>
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<th>$2.85</th>
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<tbody>
<tr>
<td>Probable assessed value for five years at $30</td>
<td>3.00</td>
<td>1.80</td>
</tr>
<tr>
<td>Probable assessed value for five years at $35</td>
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<td>5.68</td>
</tr>
<tr>
<td>Total for fifteen years</td>
<td>$9.00</td>
<td>$5.33</td>
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</table>

Present value $56 and compound interest

<table>
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<tr>
<th>Taxes for fifteen years</th>
<th>9.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest on taxes for fifteen years</td>
<td>5.33</td>
</tr>
<tr>
<td>Total cost</td>
<td>$113.54</td>
</tr>
</tbody>
</table>

The stumpage value fifteen years hence must be about $10.60 in order to pay the cost of holding the timber.

**Holding for twenty-five years**

<table>
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<th>Probable assessed value for five years at $25</th>
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<th>$7.08</th>
</tr>
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<td>3.00</td>
<td>5.59</td>
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<td>Probable assessed value for five years at $35</td>
<td>3.50</td>
<td>3.99</td>
</tr>
<tr>
<td>Probable assessed value for five years at $40</td>
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</tr>
<tr>
<td>Probable assessed value for five years at $50</td>
<td>5.00</td>
<td>1.98</td>
</tr>
<tr>
<td>Total for twenty-five years</td>
<td>$18.00</td>
<td>$20.04</td>
</tr>
</tbody>
</table>
Present value $56 and compound interest
for twenty-five years .................. $240.35
Taxes for twenty-five years ................ 18.00
Interest on taxes for twenty-five years ................ 20.04
Total cost .................. $276.39

Stumpage value twenty-five years from now must be about $19,88 to equal cost of holding."

Hardtner added,

"The state fixes an assessment of only $1 per acre for the period of thirty years in order to encourage owners of denuded lands to reforest these lands as a safe business investment yielding reasonable profits. If an investment in pine timber at $1 per thousand would run up to $19,88 in twenty-five years, it can readily be seen that there is a handsome profit in raising timber for the market at a cost of $10 per thousand feet."

Since Hardtner calculated stumpage prices plus compound interest, he did not have to rely on a sub-market interest rate and ignore the cost of his land in justifying the potential return on his forestry investments. To the extent that he understood the full meaning of his calculations, he must be considered a self-trained economist.

Hardtner's figures differ from accepted calculations of the possible return on an investment by compounding the present market price at the going rate of interest to predict future price levels. This places an entirely different emphasis on the value of the investment, then, if all costs are compounded at six per cent over the anticipated life of the investment, using present market price to determine the costs which can be incurred and still permit a profit to be made.

Hardtner's point was that the compounding of interest represents nothing more than the re-investment of an accrued return on capital. If

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a productive process cannot furnish goods for the market for the cost of production which includes, under free enterprise, the cost of capital (the going rate of interest), then the productive process must suspend operations. The obvious conclusion would be that if the growing of timber could not be justified by these calculations, then the land would have no value as timber land and that whatever value it had would be a speculative one for agriculture or grazing. Hardtner's figures go further. They actually recognize that there are different markets involved at the time of the calculations and at the time of the fulfillment of the investment cycle.

As the supply of virgin timber diminishes within the low-cost transportation zone, the price must rise by the cost of transportation until the cost of transporting the "fund" resource, virgin timber, equals the cost of creating the "flow" resource, the timber crop. The weight and bulk of timber and its use as a bulk material make transportation a very important item in lumber pricing. German sustained-yield forestry was not put out of business by American exploitation of virgin timber, and culled, low-grade stands of second-growth white pine in the eastern states have become the most valuable stands of timber in the United States, solely because of their location.  

While the virgin timber market determined the price of lumber and therefore stumpage and timber land values, it was generally seen before 1900 that virgin timber stands in the United States at the rate of cutting which existed during the first decade of the century would last only some forty to fifty years. However, it was known that the virgin stands

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16 Greeley, op. cit., pp. 121-122.
of the whole world would last much longer and that the cost of transportation is the limiting factor which would determine the feasibility of growing timber as opposed to importing it. The economic problem was to calculate the economic cost of growing timber.

As a matter of fact, the world supply must have been recognized and the fear for the future, frequently characterized as a "timber famine," should have been understood as a very long way off, dependent on the exhaustion of the vast Canadian and Siberian forests and the inconceivable quantities of the tropical rain forest. But though there might be wood from these sources for a century or two, at what price? And if the price were high enough, the investment in growing timber at home would be less than the cost of transportation on imported lumber. If the costs of growing timber did not exceed the transportation costs on imported timber, then the growth of home timber, as in Germany in the early nineteenth century, could be a stable and safe way to invest capital.

One of the costs of growing timber, because of its long cycle, is the return to capital, which must be compounded as each year's increment is carried as re-invested capital. However, as long as the stand of timber is growing and what is left reproduces itself by the same percentage increment, the physical re-investment is keeping up with the compounding of interest. When, however, the stand begins to stagnate, the standing timber is not re-investing itself in active growth. Compound interest merely means, then, a long-term period of re-investment until a stand of timber is well stocked with growing wood. As it becomes overstocked, the capital becomes watered. The best time to market timber, therefore, becomes the balance between the highest average produc-
tivity of timber in relation to the average market return of capital.

The main problem Hardtner had to face in setting out to grow timber as a crop was that he had to be prepared to reinvest over a long period in growing stock which, of course, was no problem to anyone interested in sustained-yield timber production for a stable mill of rational dimensions. By first being convinced that foreign virgin timber sources could not undersell the cost of growing timber, he could be sure that the only other source of cheaper timber would be from the speculative holding of mature virgin timber stands for a future market. Hardtner then figured that the future price of timber would be controlled by either speculatively-held virgin stands or the cost of growing timber. It is obvious from the literature of the day that the latter was not seen as an active possibility, so that the future price of timber should always be equal to the present cost of timber plus the cost of capital invested in holding timber speculatively, i.e., present value plus interest at the going rate compounded annually. Kirkland suggested the same mechanics for calculating future prices in 1917. Using this method, it makes little difference how long it takes to grow timber as long as the price of withheld timber keeps compounding right along and the cost of growth is less than the price of timber expected to be grown.

This approach would have validity only as long as the end price is assumed to be less than the price resulting from the transportation barrier barring foreign timber. Even here, then, the growth rate and

the cost of reproducing a well-stocked timber stand are important.

The simple basis of Hardtner's enterprise was his feeling that a stable, permanent mill was desirable and that it could compete successfully by cutting virgin timber and holding enough cutover land to provide a continual yield. The company that bought virgin timber at market stumpage rates and held it to provide a twenty-year lease on life for its mill was eaten up by interest on capital tied up in unproductive investment. Hardtner became aware that, given an idea of the time it took to grow saw-timber, all that need be bought at present to supply the required lumber for a mill nineteen years in the future was the acreage of pole and sapling timber which would provide saw-timber in nineteen years. This, of course, was cheaper than buying virgin timber and holding it. As we have seen, Chapman was working with aspects of this idea in his advocacy of the economic feasibility of the second cut for virgin stands. Hardtner carried it a step further and assumed that if it was feasible to invest in pole or sapling stands for twenty years, then it would be profitable to invest in cutover land to provide the regenerating polewood of twenty years for saw-timber at forty years. He knew that timber under then existing conditions had little value until it reached merchantable size, but he assumed that as soon as the lumber industry became organized, timber would be valued fairly uniformly in terms of age and size class as it approached merchantability.

In short, Hardtner realized that it would not pay to hold mature timber except as a speculative gamble. Compound interest eats you up when you are holding an unproductive timber stand. But if timber is held that is growing rapidly, the timber compounds as fast as the interest.

What was Hardtner's secret? As it appears, the prime basis for all
of the Urania Lumber Company's policies was the knowledge of the growth rate of second-growth timber under given stand conditions. In addition, it may be argued that good fortune in getting natural regeneration may have been one of the economic factors of key importance.

We must face some very important questions before we assume anything so simple as the above. Why, with Hardtner buying cutover lands as early as 1904 and 1905, and advocating conservation at every opportunity, was it 1922 before other companies in the state began taking advantage of reforestation contracts, at which time many of them had to resort to hand planting because of years of shortsighted inefficiency? Why was Hardtner ignored when he was willing to show anyone who would listen how reforestation offered a paying basis for cutover land use? This is the point where forest economics as the science of efficient price relations becomes inadequate and forest economics as the analysis of the ideas and influences which determine forest industry decisions on a social level must be resorted to.

We have seen that the only requirement for practically free regeneration of pine lands was the intent to reforest before rather than after logging, plus fairly simple fire protection policies. Yet many lumber companies were painfully planting lands a decade later which could have been in second-growth saplings if they had intended to keep their mills operating. Of course, these companies did not intend to throw away future profits by not considering future forest production; they simply had not given sound thought to the period that far ahead.
CHAPTER VI
CONCLUSIONS

The difficulty of the problem of isolating the fundamental and original contributions of the Hardtner program points up the importance of a clear grasp of both the ecological conditions of the time and the economic and scientific point of view of the day.

Our concern is to discover in what ways Hardtner's analysis of the lumber industry and his concept of the life process of the southern pines differed from that of his contemporaries, and in what respects his conclusions differed. In this connection, let us first examine the possible individual differences in Hardtner's purposes in the lumber industry or unique sentiments which might account for his views in other than social or scientific terms.

Hardtner can be personally distinguished on the grounds of his German heritage. While this in itself might well have given him a propensity to respect German science and might have contributed to a stronger sense of literary and scholarly interest because of the European orientation of his father's education, there is nothing to indicate that this phase of Hardtner's background did more than make him better prepared to recognize other people's work and prepare him to rely on research.

Though many of the influential foresters in the United States at the time were university-trained men of German origin, Hardtner was apart from this segment. He had attended the public schools of Pineville, Louisiana, and had taken a business course at Soule Business College in New Orleans. His speeches indicate that he did considerable reading about both American
and European forestry problems during his chairmanship of the Commis-
sion on Natural Resources in 1908-10. However, he achieved this
position because of his prior interest in reforestation.

Secondly, Hardtner was born and reared in Pineville, Louisiana,
in intimate contact with the woods which he later logged. Any sensi-
tive person who has been reared in close contact with a natural environ-
ment can easily understand the feeling of discomfort which must inevi-
tably accompany widespread "utilization" and the concern for the changes
being wrought in the landscape. However, his nostalgia for the great
pine forests and his sense of the beauty of the longleaf pine did not
prevent him from being first a lumberman ready to use these resources.
He was first a lumberman, but he rebelled at the necessity of having to
lay the land in waste in order to utilize the trees. This revulsion at
the destructiveness of lumbering methods of his day was expressed in an
article he wrote for American Forestry in 1910:

"Go to the forests of LaSalle, Catahoula, Jackson, Winn,
Grant, Rapides, Vernon, Sabine, Calcasieu, Bienville, Caldwell,
Livingston, St. Tammany, Tangipahoa, St. Helena, and
Washington parishes, where the pine forests flourished in
imperial magnificence, and watch the 'up to date' method of
butchery. Virgin forests which produce from ten to twenty
thousand feet of timber per acre are being absolutely den-
muded just as completely as you would strip a bird of its
feathers."

"... What has the lumberman done? Proceeded to cut up
the forests just as fast as he can, not leaving even seed to
reforest his lands; running his mills night and day; produc-
ing more lumber than the country needs, operating without
profit and leaving a desperate country behind him."¹

It was this aspect of Hardtner's personality which spurred his in-
terest in the perpetuation of the forest, and drove him to seek a practical

¹Hardtner, Henry E., "The Crisis in the Southern Forests," American
Forestry, XVI (1910), 26.
means of justifying it in order to succeed in the highly competitive and growing lumber industry of his day.

Viewed strictly as a social phenomenon, the analysis of Hardtner's investments involves basic issues. As an expression of the expansion of German culture, a socio-economic adjustment to stable forest management, the explanation would be facilitated. However, when we recognize that the abstracted techniques of German forestry were at that very time being applied by brilliant, well-educated foresters such as Schenck and Fernow in the United States, without marked financial success, the European explanation must be minimized.

At the other extreme of isolated social tradition, if we assume that Hardtner's stimulus and success were products of the rough and tumble American system of development where competition and the dynamic suggestiveness of mechanical and ecological facts drives producers inexorably to a higher level of efficiency, and makes them always receptive to new technical developments which will raise profits and improve competitive positions - if this be an explanation - then it is difficult to understand why Hardtner was so lonely in his project for so long. The others who came along during the second decade of his profitable saw-timber venture were most frequently pulpwood producers. This suggests that the time element in the productive process is the social value which needs analysis.

If we grant that cultural dissemination is an inadequate explanation of the Hardtner exception, we must turn to the problem of social or economic change and define the Hardtner approach either as an example of individual eccentricity, or an illustration of one of the ways in which economic progress takes place.
From the mid-nineteenth century blossomings of the timber industry, dynamic expansion had characterized it. Quick liquidation of investments and conversion to cash, and then re-investment on a short-term cycle were the rule of the industry as it plunged into essentially "free" stumpage, either by fraud, outright theft, or ridiculously low prices based on the immediate lack of any other company's competing for the vast backlog of virgin timber. Charles Mohr wondered at the unblushing openness with which both government and privately-owned timber tracts were logged illegally. The cost of stumpage was essentially nominal except for the cost of access. This set the pace of the timber industry, and even when it moved into Louisiana in the 1880's, stumpage land sold for as low as $1.25 per acre on lands carrying ten to twenty thousand board feet of lumber per acre. However, the speculator who bought such tracts was likely to find them cut over without his knowledge, if they were not subject to frequent inspection, because of "errors in surveys."

With the anticipated depletion of the Lake States and realization that the South could also become exhausted, stumpage began to assume significant market value. Speculative holding of stumpage became popular with the turn of the century. Although many large sawmill companies had acquired vast tracts of timber in the South in the 1880's, this was not an expression of popular recognition that stumpage was valuable, involving the development of a market recognized by small businessmen and farmers. This occurred first in the cypress industry and spread to

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In the process of virgin exploitation, when accessibility brings large areas into economic reach of the market in vast bites as a result of expensive credit-financed transportation and milling facilities, there is a driving pressure for liquidation and development which soon brings others into the large area, and a stumpage market is belatedly established. With the establishment of a stumpage market, the principles of economic practice change. Those industries which continue to carry stumpage as "free" unproductive virgin raw material are eaten up by taxes and interest resulting from the accession of market value to the stumpage, and the market price is kept down by the actual existence of "free" stumpage with the credit-liquidation cycle of virgin exploitation.

The imposition of taxes and interest charges is essentially an application of a social standard of productivity and value and cannot long stand unless expected productivity will cover taxes and interest charges on current valuation. Thus, the stumpage values created were primarily speculative values — values based on the expectation that stumpage prices would increase with scarcity. What Hardtner did was to recognize that there was a natural productivity in the land, and that these speculative costs of holding stumpage for the future cut of a mill or for future sale could be offset by the productivity of the forest. Hardtner realized that any productivity of the land would defray the six per cent cost of holding virgin stumpage and thus that a one or two per cent net productivity of wood on the lands being held would be an important contribution to defraying the cost of holding stumpage to guarantee a mill’s future. The relatively cheap expedients of careful
logging - leaving small trees standing and fire protection - were all that was required, and since competing manufacturers did not follow his example, the productivity he obtained defrayed the carrying costs of his future stumpage, and he found himself competing with the benefit of essentially "free" stumpage while others paid approximately six per cent for theirs. In other words, Hardtner paid out six per cent on market valuation, but was drawing twelve per cent because he had both the speculative and natural productivity increments. Hardtner thus had a competitive advantage which he invited other lumbermen to eliminate, but he had no takers.

Three influences, all revolving around the "time" issue, seem to explain the lack of cognizance of Hardtner's simple arithmetic.

1. The industry was geared to rapid growth and uncertainty with a consequent short-run emphasis on quick turnover and liquidity.

2. The credit basis of the lumber industry re-enforced this propensity, and while large entrepreneurial profits were gleaned, re-investment in virgin stumpage emphasized the speculative aspect, rather than the natural process of timber growth.

3. Social growth, population expansion, and value enhancement by settlement had geared American finance to invest in social increment (speculation), which had always been a major facet of any investment in the rapidly growing country.

Moreover, in this context we can see the cutover land problem as

While natural regeneration and growth on an "involuntary forestry" level did take place and a few lumbermen developed and maintained advanced practices, the market was not set by these and the industry cannot be said to have recognized the advantages of natural increment as opposed to the holding of stagnant virgin stands.
more than just an example of the amorality of land developers and the
gullibility of settlers. Land speculation had developed in response
to rapid settlement and was unable to adjust to the closing of the
frontiers of economically arable land.

The history of the lumber industry seems to indicate that indivi-
duals will tend to follow custom in both the short run and the long
run, custom being logic based on a past analysis. However, occasionally
an individual, out of personal perverseness, a complex of cultural
backgrounds involving different customs, or because of a habit of sys-
tematic thought and keen observation, will question custom, i.e.,
promises, and such an individual will almost inevitably find that con-
ditions have changed, and that the old premises are not as valid as
they used to be. Such a man was Henry Hardtner. History is full of
prophets, right but ignored, and obviously in a society where the
market is set by the average view, insight or inclination, the excep-
tional man will profit by his own wisdom, but will not change the
aggregate unless there is an impetus to imitation. Hardtner's urgings,
and those of many of his contemporaries, were ignored because people
did not want to see, rather than because there was anything so difficult
to understand.

Recognition and sincere interest in the profitability of a new way
of doing things came as the cutover lands became worthless as a source
of profit when sold to development companies or stockmen, and when agri-
cultural overproduction and more strict regulation of fraud made sales
risky and difficult. Simultaneously, low timber prices caused by chronic
oversupply brought lumbermen to the point of actually searching for new
ways of reducing costs and increasing profits. They clung to cutover
lands for a long time as their hope of increased returns, first for agriculture, then fruit and pecan orchards and stock grazing, and today the holding of land speculatively for oil development has removed the pressure for re-examination of assumptions which have been outdated for half a century, and allows the acceptance of new methods of land management to be postponed.

It would seem that the tendency of the lumber industry has been to change its course of development only when social pressures force it to do so. In a small, competitive market the exceptional individual forces receptivity to change by very obvious improvements which threaten to drive competitors out of business. In a large industry with a large number of mammoth concerns, the insight of one individual may be a boon to himself, but will not affect the market or force changes because of the general complex variations of particular advantages and market conditions which de-emphasize differences and make expansion and market adjustments long-term, complicated matters involving vast arrangements and great quantities of capital.

It is apparent from the Hardtner example that forest operations are inseparably bound to the developing market utilization and social relationships from joint land-use possibilities. If there are going to be cattle in the woods, or frequent fires, or hogs, the land manager must consider these factors just as he would problems of fusiform rust or tip moths, rather than railing against such factors because they are "human influences." Within a framework of social purpose, such problems must be considered in terms of forestry, or efficiency of result over effort. A social purpose is inherent in silviculture so that one hesitates to sacrifice the forest to rid the trees of bark beetles, since
the production of wood cannot be lost sight of in silvicultural policy. Forestry is thus inseparably bound up with a totality of non-urban land-use problems, such as non-agricultural land use from hunting and trapping, cattle grazing, and transportation problems. The problems of forest policy can only be handled as part of a more comprehensive consideration of supplementary industries in and around the woods, as well as in terms of parish taxation problems and the distance of market centers for different forest products. The history of the social conditions which make up the economic environment of a forest may be just as basic to working out sound programs as the ecological history of forest areas may lead to an understanding of remedies to achieve desired silvicultural objectives in efficient ways.

The particular circumstances which made up the Hardtner example, such as the relationship of remaining virgin timber to the structure of the industry, the future market and the cutover land problem, are subject to more meaningful abstraction in terms of economic theory, but they are no less problems of forestry. The forest investor who ignores such problems as will critically affect his operation perhaps is a true specialist, but he may be a bankrupt one.

One of the most meaningful aspects of the Hardtner investment is the illustration of relationships involved in the transition from a mining to a reproducing or regenerative industry. The situation has certain aspects of more particular application to economic theory. The timber industry as it developed into virgin fields opened up large bodies of measurable stumpage almost instantaneously. This development process was chiefly dependent on transportation facilities. Immediately upon the development of economic access, a vast amount of stumpage was given
economic reality, and it was immediately on the market subject to the
demand toward liquidation of unproductive assets as in mining theory
generally.

However, in the case of timber, the problem of the pressure toward
liquidation is even more pernicious since vast forest areas have a uni-
formity which subjects them to the rapid development of mass facilities,
whereas there is an element of uncertainty of the extent of any particu-
lar mineral deposit and the availability of others in the immediate
neighborhood which keeps a restraining influence on the pressure toward
liquidation.

The efficiencies of the large sawmill were counterbalanced by its
heavier log requirements and the increasing cost of transporting logs
from greater distances. The complex of increasing and decreasing costs
tended to set a mill life cycle of around twenty years, balancing the
costs of carrying timber reserves for raw material over the period and
the losses sustained in junking the mill and moving on against the sav-
ing from setting up a new, more modern mill close to a new source of
virgin timber, with a low woods-to-mill hauling cost.

When a forest was first opened up, only a few of the mills that it
could potentially accommodate would immediately move into the area and
they took up stumpage for practically nothing. Speculators took up the
rest, and by the time the virgin mill capacity was built up, stumpage had
achieved a market value. The mills which bought up stumpage for prac-
tically nothing held an advantage, since they had been enriched enough
by the speculative increase that they did not suffer from the burden of
carrying their stumpage. Later comers, however, did.
The industry had built up a rule-of-thumb adjustment, actually an application of marginal analysis, which held that the best coordination between the cost of setting up a mill and the cost of holding a timber stand was a mill whose capacity would handle the guaranteed virgin cut in fifteen to twenty years. The loss would be too heavy if a large, efficient mill had to be junked much sooner, since only key machinery could be salvaged. The losses were balanced against the cost of carrying the virgin stumpage which was necessary to guarantee a log supply to the mill against competitors and speculators.

The monumental insight of Henry Hardtner was his recognition that this pattern of the industry was an institutionalized adjustment to essentially "free" stumpage, and that when an area was over half saturated with sawmill capacity, a stumpage market would develop along with the speculative boom, and the cost of holding stumpage would become prohibitive. Hardtner in 1911 tried to point out to lumbermen that it was costing them $92.54 to hold an acre of well stocked timberland for fifteen years if the market rate of interest was used as the cost of capital.

The fact of the matter was that the lumbermen were finding it unprofitable to cut low-grade timber under these overhead conditions in the face of competition from virgin stands which at that time had not established a market price by reaching a stage of development where transportation and mill capacity allowed a choice to the seller of stumpage. The average carrying cost of an acre of timber carrying 1,000 M feet of timber at $4.00 per thousand over a twenty-year mill life would be $43.68 per acre, or $3.12 per M feet at six per cent interest, assuming twenty acres were started with, and one was cut each year.

Thus, what Hardtner saw was that virgin sawmilling would become
prohibitive on a long-term basis once a stumpage market was set up. Of course, the small "peckerwood" portable mill which could count on picking up stumpage as it needed it did not face this cost of carrying a guaranteed source of timber for the marginally requisite life of a large efficient mill. The recognition of this situation was the basis of Hardtner's understanding and application of what Mattoon called the idea of forest growth:

"Among the ideas that Henry Hardtner advanced and practiced ahead of his time in conducting a lumber business was that of forest growth. The universal custom of lumber concerns was to acquire and hold old-growth timber for far-ahead operations. In the decade of 1910-1920, Henry Hardtner was thinking and acquiring young growth timber for his supply in future operations when his old-growth would be gone. This is a far cheaper method, he rightfully maintained, than to buy and hold old timber over a long period of years."

As can be seen, Hardtner was aware that if the timber being held for, say the twentieth year's cut, was growing at a rate equivalent to the market rate of interest and that if an acre would carry 114 thousand feet of timber in twenty years, then the cost of carrying these 114 thousand feet for twenty years would not only be erased, but the cost of the original stand of less than 2,000 board feet (Doyle rule) would have paid a return, so the difference would be between the compounded interest on the pole wood stand and compounded interest on the cost of virgin stumpage.

To carry this one step further, if a stand twenty years short of commercial maturity could have a market value, then why not one twenty years short of this market value? In other words, the principal of growth recognized that the span of timber investment belonged within the

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economic grasp of the active market in the United States. Hardtner saw the problem in terms of general economics as a problem of price and markets rather than merely one of efficient yield per acre over time. It was not until the growth of the pulpwood industry developed an economic rotation of under twenty years that discounted market value began to be attached to seedling and sapling timber in most areas.

The idea of forest growth has its full meaning, as Hardtner saw it, in a particular context involving the early stage of development of virgin timber resources. Essentially, it is a concept that allows calculated demonstration of the value of reforestation to an individual firm, putting land in a productive state while it is being held for future use.

The anticipated development of a timber and timberland market as virgin areas become developed is no guarantee that the expected market price will cover the costs of holding incurred by speculators or liquidating lumber companies. While money invested in stumpage at six per cent and held for twenty years should return over $3.00 for every $1.00 invested, there are enough other factors involved in the lumber market that the prevailing cost of capital does not necessarily exercise a decisive influence, and while the return may be three to one after twenty years, this may represent a degree of inflation rather than interest.

However this may be, the central point is nonetheless valid that within the framework of the individual firm, a six per cent compounded cost for holding unproductive capital assets is a reality, a cost which must be based upon speculative or inflationary advances in capital assets. Within the framework of the firm, its planning period, initial
costs and contractual interest rate, an institutionalized or crystal-
lized set of cost relationships is set up within which framework it
can be shown that there will be a dependable saving by initiating growth
on all held assets.

Thus, since a six per cent cost exists, a four per cent growth which
can be kept compounding also will reduce the cost. An eight per cent
growth, compounding, will erase the cost and become an asset. While
such a problem in its mathematical detail becomes one of accounting
rather than economic theory, the elements involved must be considered
in theory. The rate of compounding or growth of timber of various spe-
cies on various sites under various management programs is a technical
issue in the province of forestry.

The significant fact is that Henry Hardtner presented these rela-
tionships in their abstract form and developed a convincing argument that
growth of timber was valuable, no matter how small an increment, as long
as it covered the costs of the program of growth initiation. The only
essential of the program was foresight, or pre-logging intent plus some
labor supervision and fire protection. "Involuntary forestry" resulting
from leaving small or defective trees which later served as seed
sources was not adequate for several reasons. Chapman gives six reasons
for the inadequacy of the minimum diameter cutting rule which is a form

5Eugen v. Böhm-Bawerk (The Positive Theory of Capital, New York:
G. E. Stechert & Co., 1930, p. 257) developed the idea of the round-
aboutness of production as representing the efficiency of foresight,
thus making possible the payment of interest in increasing amounts for
capital held over time.

6This concept combines an element of validity with the laissez-faire
rationale of an "invisible hand" which makes self-interest consistent
with natural process.
of "involuntary forestry": (1) lack of inspection of saw crews, (2) diameter limit leaves old suppressed trees with poor crowns because they are small, (3) trees are not selected for wind resistance when left and many blow down when left isolated, (4) in stands of over-mature timber there are often virtually no small trees to leave, (5) those trees left are apt to be a total loss due to fires consuming the slash and debris left after logging, and (6) while leaving this nucleus for a second cut, no effort is made to protect smaller timber, which is often smashed in felling, slashed down for skids to support temporary spurs in wet weather, and burned by slash fires.

The value of the Hardtner growth idea lies in defining the character of the relationships during a rather short period of development of virgin areas. It pointed up the fact that relatively inexpensive policies are practical and productive of great savings by keeping land in active forest production which carelessness and lack of information turned into virtual wastelands for over a generation in much of the South.

These considerations will have meaning in the development of the virgin forests of Canada and Alaska and also in tropical regions where little is known of the more complex ecological cycles and the generally assumed overpowering growth potential in tropical areas which encourage the initial exploiters of virgin forest areas to shrug away any concern or responsibility for the possibility of weed tree successions that will destroy the future productivity of the area. Hardtner showed that his policy was particularly profitable over the long run while competing on

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7 Chapman, Prolonging the Cut of Southern Pine, p. 10.
a market which had not adopted such a long-term cost-saving program.

The reforestation program which developed in the state during the 1920's appears to have been chiefly in response to the requirements of the young pulpwood industry, rather than for the saw-timber market toward which Hardtner was aiming. The problem remains, then, of why Hardtner's ideas, valid for saw-timber, were not generally applied for this use.

In answering this question we should get at the failure of the lumber industry to initiate reforestation during the development of virgin areas. The two arguments that cutover lands were worth more in agriculture and that the profit margin in lumbering after 1907 was too small to permit any avoidable expense are not satisfactory. The cutover land selling program represented a chronic hope of making a fortune by skimming the public and most of the profits in such sales probably went to promoters. The lumber companies would have been better off having kept these lands and reforested them. The farming and grazing fixation was a reaction against the long-time lapse involved in a forest investment.

As to the argument that the profit situation in the lumber industry after 1907 did not justify any outlays which were not absolutely necessary in the short run, the fact is that most of the companies operating in Hardtner's time had made fortunes on advances in stumpage values, having bought land with from 10,000 to 25,000 board feet per acre for as little as $1.25 per acre in the 1880's, and for as little as $10 or $15 during the first decade of the twentieth century. The value of these lands had risen to from $40 to $100 per acre as the market price for stumpage became perfected. It can therefore be presumed that while there
was little profit for latecomers or in terms of current market values, many of the companies, like Urania Lumber Company, were in good economic condition and if they had not overcapitalized by unnecessarily declaring stock dividends, they could have reinvested extensively in reforesting their cutover lands.

The long lapse of a forestry investment is beyond the financial span of activity of all but the very young entrepreneurs in the South, and although the pulpwood market has alleviated this situation, the problem still affects the growth of timber primarily for saw-logs, with pulpwood as a byproduct. The time element in the timber market is not a prohibitive hardship on large corporations managed in terms of presumed perpetuity, but for the smaller organization and small landholder, a smoothing out and uniformly distributing of the market value of growing timber over its span of years would be advantageous. A 75 per cent of market value parity program based on the uniform descending progression of maturity value at current market prices of saw-timber suggests itself as a sound use of parity price supports. Since all such timber can be stored on the stump and remains in a productive condition and is constantly increasing in value, the net effect of such a program would be a market price emphasizing the saw-timber value of growing timber. It would also tend to eliminate distress selling by small landholders, and uncompetitive buying by mills in areas where resulting low stumpage payments are a deterrent to the stable development of the industry, and would lead to the eventual development of a more competitive market. It would make the southern lumber industry less dependent on coarse-grained, warp-prone, oversized pulp logs grown for weight or volume per acre rather than quality for lumber because of the time pressure of the
longer-term saw-log cycle.

The development of the pulpwood industry in the South has both its advantages and disadvantages to the lumber industry. On the one hand, it has provided the lumber operator with a market for the thinnings from his forest stand which helps defray the cost of holding timber until it reaches saw-log size. On the other hand, it discourages holding timber for saw-log size by inducing distress selling. One writer posed the problem as follows: "Can the second-growth pine forest of the South serve two demanding masters, the lumber industry which requires large, high quality trees, and the pulpwood industry, which operates on a small-tree economy?" 8

The interest rate expressed in various specialized money markets tends to be an approximation of the physically productive rate at given values. In isolated theory, if the value of the physical product is insufficient to cover the interest rate, the production will be discontinued unless there is sufficient demand to raise the price to give the physical increment a value adequate to cover interest charges. It is difficult to argue, then, that the interest rate can be too high, and as Hardtner knew, the individual who lengthens his planning period reduces his actual and his bookkeeping costs while selling at a market set by higher costs of production.

The economic problem which restricts extension of the planning period is the short interest cycle to which all physical production is tied if it is dependent upon the money market for capital. In other words, an economic venture must be able to liquidate or actually do so annually

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before it is a good credit risk on an annual money market developed around the seasonal trade and productive structure of an agricultural society. The short cycle of production tends to fail to average its expectations for any oncoming year during the prosperous years. Therefore, on a long-term investment, leeway must permit the avoidance of depressed markets for contractual liquidation.

It seems, also, that the interest rate contains enough optimism to be considered as formed in view of a chronic expectation of an optimum level of prosperity, and is only valid for investments liquidated under such conditions.

Annual compounding of interest under such circumstances presumes annual liquidation and reinvestment, and under such circumstances it is difficult for an investment to show a credit on the books every year. As prices rise and fall on a variable market, custom in the investment field tends to limit the extension of the planning period except by self-financing corporations or individuals with resources which can be frozen for rather long periods of time.

Under customary views of the day, reforestation did not look good on paper to investors bound to annual interest payments. As in other phases of forestry from land use to standards of intensiveness of silvicultural practices, public policy can perhaps best be concentrated on breaking custom which tends to shorten the planning period. Any encouragement of long-run planning will increase efficiency. The degree to which forest investors will place confidence in intangible future expectations of developing physical commodities is as much an institutional as a scientific problem.  

Even before Henry E. Hardtner's death in 1935, it had become apparent that his reforestation program, deviating as it did from the customary views of the day, had proven successful not only from the standpoint of profitableness to the Urania Lumber Company, but as a successful pioneering venture in forestry economics which served as an example to the entire South.

Urania stands as a symbol of a man's determination to build a stable community around a logging camp, a determination which bore fruit even in the heyday of the "cut-out and get-out" policy of the lumber industry.
SELECTED BIBLIOGRAPHY

Books


, History of Forestry (Toronto: University Press, 1907).


Horn, Stanley F., This Fascinating Lumber Business (New York: The Bobbs-Merrill Co., 1943).


**Bulletins**


Brief History of Conservation in Louisiana, undated pamphlet on file in the office of the Louisiana Forestry Commission, Baton Rouge, Louisiana. It is believed to have been published privately by the Urania Lumber Company.

Chapman, H. H. and Ralph C. Bryant, Prolonging the Cut of Southern Pine, Yale Forest School Bulletin 2, April, 1913.

Foster, J. H., Forest Conditions in Louisiana (U.S. Department of Agriculture Forest Service Bulletin 111, 1912).


_______, Seventh Biennial Report, 1924 - 1926.

_______, Eighth Biennial Report, 1926 - 1928.

Louisiana State Board of Agriculture and Immigration, A Brief Description of the Forests of Louisiana and the Timbers They Contain, 1912.


Thomson, Roy B., An Examination of Basic Principles of Comparative Forest Valuation, Duke University School of Forestry Bulletin 6, January, 1942.
Newspaper Articles

The Daily Picayune, May 13, 1913.

_________ , April 12, 1917.


Periodicals

Cary, Austin, "How Lumbermen in Following Their Own Interests Have Served the Public," Journal of Forestry, XV (1917).


"South's Timber Disappearing," American Forestry, XVIII (1912).


Kerr, Ed, "1600 People and No Jail!" Forests & People, III (1953).


Speeches


Moore, A. G. T., Grow Green Gold - The Development of Forest Conservation Thought and Practices by Southern Lumbermen (reprint of a speech delivered before the faculty and student body of the New York State College of Forestry, Syracuse, New York, November 16, 1938).

Unpublished Documents

Application by the Urania Lumber Company to the Whitney-Central Trust and Savings Bank, New Orleans, 1910, for a loan of $700,000. On file at Urania Lumber Company, Urania, Louisiana.


"Biography of E. J. Hardtner," (an autobiography), undated mimeographed pamphlet in the writer's possession.


"Reports and Correspondence of Urania State Forest, 1913," bound volume of unpublished documents and correspondence on file at Urania Lumber Company, Urania, Louisiana.


Personal Interviews

Q. T. Hardtner, Jr., President, Urania Lumber Company.

Glenn Tannehill, Forester, Urania Lumber Company.
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Stanley Todd Lowry was born at Laredo, Texas, on June 26, 1927. He was graduated from Martin High School, Laredo, Texas, in 1942. He received the Bachelor of Arts degree from The University of Texas in 1945. He was awarded the LL.B. degree from The University of Texas in 1950.

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EXAMINATION AND THESIS REPORT

Candidate: Stanley Todd Lowry

Major Field: Economics

Title of Thesis: HENRY HARDTNER, PIONEER IN SOUTHERN FORESTRY, AN ANALYSIS OF THE ECONOMIC BASES OF HIS REFORESTATION PROGRAM

Approved:

[Signatures]

Major Professor and Chairman

Dean of the Graduate School

EXAMINING COMMITTEE:

[Signatures]

Date of Examination: Jan. 20, 1956