1968

A Survey and Analysis of the Taxation of Basic Natural Resources in the States of Arkansas, Louisiana, Michigan and Texas.

James Frederick Butler
Louisiana State University and Agricultural & Mechanical College

Follow this and additional works at: https://digitalcommons.lsu.edu/gradschool_disstheses

Recommended Citation
https://digitalcommons.lsu.edu/gradschool_disstheses/1473

This Dissertation is brought to you for free and open access by the Graduate School at LSU Digital Commons. It has been accepted for inclusion in LSU Historical Dissertations and Theses by an authorized administrator of LSU Digital Commons. For more information, please contact gradetd@lsu.edu.
A SURVEY AND ANALYSIS OF THE TAXATION OF BASIC NATURAL RESOURCES
IN THE STATES OF ARKANSAS, LOUISIANA, MICHIGAN AND TEXAS

A Dissertation

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
Doctor of Philosophy

in

The Department of Economics

by

James Frederick Butler
B.A., Arkansas State Teachers College, 1955
M.B.A., University of Arkansas, 1958
August, 1968
ACKNOWLEDGMENTS

Special appreciation is expressed to Dr. Bernard F. Sliger, Dean of Academic Affairs, and formerly Chairman of the Department of Economics, Louisiana State University, Baton Rouge, for his inspirational direction in the conception and development of the subject of the study. His expression of confidence in the writer was largely responsible for the successful completion of the task.

Grateful acknowledgment is also expressed to Professor W. J. Truitt for his unselfish and invaluable aid in the preparation of the work throughout its development. The suggestions and counsel provided by Professor Truitt frequently provided both challenge and meaning for the various phases of the study.

Appreciation is also expressed to the remaining members of the dissertation committee: Dr. Jan Duggar, Dr. P. F. Boyer, Dr. James P. Payne, and Dr. R. F. Smith. In all matters surrounding the preparation of the study, these gentlemen were both helpful and generous at all times.

Finally, the writer wishes to thank the officials of the various public agencies in the survey states for their cooperation and assistance in providing records, reports and information used in the preparation of this study. Without their cooperation, much practical insight into operations and problems of policy would have been lost to the study.
FOREWORD

Although the following study is intended to have general applications to the subject of resource taxation, four states are selected for detailed consideration -- Arkansas, Louisiana, Michigan and Texas. The bases for these selections should be noted for the information of the reader.

Michigan appears, not because she is a leader in the collection of resource taxes, but because she was a pioneer in the development of special forest taxation. Her system of forest taxation represents one of the most sophisticated structures of special taxes in this resource area.

Arkansas and Louisiana exemplify those states who have adopted extensive applications of resource taxes, especially severance taxes.

Texas and Louisiana are the leading states in volume of resource-tax yields, and are among the few states in which resource taxes account for a substantial percentage of total tax collections.

A varied portrayal of resource-tax applications and policies is gained from the consideration of these states. Although the four states could be hardly called a "cross-section" of states applying resource taxes, their cases do run a broad spectrum of applications and yields for this type of tax.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Introduction: Special Aspects and Policy Problems of Resource Taxation</td>
<td>1</td>
</tr>
<tr>
<td>Taxes Levied Against Natural Resources</td>
<td></td>
</tr>
<tr>
<td>Policy Problems: Some Significant Considerations</td>
<td></td>
</tr>
<tr>
<td>II. Economic Significance of Resource Industries for the Survey States</td>
<td>30</td>
</tr>
<tr>
<td>Timber and Forest Products</td>
<td></td>
</tr>
<tr>
<td>Mineral Resources</td>
<td></td>
</tr>
<tr>
<td>Fisheries</td>
<td></td>
</tr>
<tr>
<td>III. Taxation I: Renewable Resources</td>
<td>72</td>
</tr>
<tr>
<td>Forest Taxation</td>
<td></td>
</tr>
<tr>
<td>Fisheries Taxation</td>
<td></td>
</tr>
<tr>
<td>IV. Taxation II: Mineral Taxation</td>
<td>89</td>
</tr>
<tr>
<td>Mineral Fuels</td>
<td></td>
</tr>
<tr>
<td>Metals and Other Minerals</td>
<td></td>
</tr>
<tr>
<td>Nontax Revenues: Leases and Royalties</td>
<td></td>
</tr>
<tr>
<td>V. Notes on Shifting, Incidence and Effects</td>
<td>109</td>
</tr>
<tr>
<td>Basis for Tax Shifting</td>
<td></td>
</tr>
<tr>
<td>Property-Tax Shifting and Incidence</td>
<td></td>
</tr>
<tr>
<td>Severance-Tax Shifting and Incidence</td>
<td></td>
</tr>
<tr>
<td>Effects of Resource-Tax Shifting</td>
<td></td>
</tr>
<tr>
<td>VI. Summary, Evaluations and Conclusions</td>
<td>144</td>
</tr>
<tr>
<td>Fiscal Significance of Resource Taxes</td>
<td></td>
</tr>
<tr>
<td>Policy Effectiveness Examined</td>
<td></td>
</tr>
<tr>
<td>Suggestions for Modification of Taxes</td>
<td></td>
</tr>
<tr>
<td>General Summary</td>
<td></td>
</tr>
<tr>
<td>Bibliography</td>
<td>167</td>
</tr>
<tr>
<td>Vita</td>
<td>172</td>
</tr>
</tbody>
</table>
## LIST OF TABLES

<table>
<thead>
<tr>
<th>Table Number</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. State Severance Tax Collections, 1965</td>
<td>4</td>
</tr>
<tr>
<td>2. Land Areas in the Survey States</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>b. Growing Stock</td>
</tr>
<tr>
<td></td>
<td>c. Growth and Cut Compared</td>
</tr>
<tr>
<td>4. Output of Timber Products in the Survey States, 1962</td>
<td>35</td>
</tr>
<tr>
<td>5. Forest-Land Ownership by Class of Owner, Survey States and United States Total, 1962</td>
<td>39</td>
</tr>
<tr>
<td>5b. Percentage Distribution of Ownerships</td>
<td>40</td>
</tr>
<tr>
<td>7. Estimated Proved Recoverable Reserves of Natural Gas: Survey States and United States, 1965</td>
<td>55</td>
</tr>
<tr>
<td>8. Estimated Proved Recoverable Reserves of Natural-Gas Liquids: Survey States and United States, 1965</td>
<td>56</td>
</tr>
<tr>
<td>9. Estimated Proved Recoverable Reserves of Crude Oil: Survey States and United States, 1965</td>
<td>58</td>
</tr>
<tr>
<td>11. Summary of Fisheries Operations, 1964, for the Survey States</td>
<td>69</td>
</tr>
<tr>
<td>12. Severance Taxes on Timber Compared for the Survey States</td>
<td>74</td>
</tr>
<tr>
<td>13. Mineral Severance Tax Collections, Fiscal 1966, for the Survey States</td>
<td>91</td>
</tr>
<tr>
<td>14. Severance Taxes: Comparison of Rates of Tax on Commonly-Taxed Minerals in the Survey States</td>
<td>92</td>
</tr>
</tbody>
</table>
## LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure Number</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tax Shifting: Constant and Increasing Costs</td>
<td>111</td>
</tr>
<tr>
<td>2</td>
<td>Tax Shifting Under Monopoly</td>
<td>113</td>
</tr>
<tr>
<td>3</td>
<td>Long-Run Equilibrium: Monopolistic Competition</td>
<td>116</td>
</tr>
<tr>
<td>4</td>
<td>Backward Shifting: Perfectly-Inelastic Supply</td>
<td>118</td>
</tr>
</tbody>
</table>
ABSTRACT

The taxation of natural resources raises questions of policy and application which are unique among taxes levied on production. This is especially true at the level of basic extraction of the resources, and it is this level of resource taxation which is the subject of this study. In addition to the usual questions of repressive effects upon enterprise, taxation of basic resources raises questions of conservation and the orderly exploitation of commodities which are, by nature, subject to depletion, and often not subject to renewal by human effort.

Concern for the special problems of natural resources dates from the Nineteenth Century in the United States, but the adoption of special forms of taxation for basic-resource industries dates from about 1911, with the development of special types of forest taxation in the state of Michigan, and in other areas where the timber industry has suffered the ravages of uncontrolled logging. The so-called "yield-tax" variation on property taxes, by which the timber owner is relieved of part or all the annual burden of the ad valorem property tax, paying instead a specified sum (or percentage of value) at time of harvest of the timber, was largely developed at this time. The aim of this form of tax was to relieve the timber owner of harsh burdens of property tax until he was best able to pay.

Severance taxes (privilege taxes on the act of removing natural resources from the soil or water) were developed during the 1920's, and
are applied to a wide variety of natural resources among numerous states. The tax may be applied either in addition to or in lieu of other taxes, depending on the policy chosen.

The survey states selected for this study vary widely in the importance of their natural resource industries, and in the manner in which they tax such industries. Texas and Louisiana possess massive abundance in natural-resource wealth, particularly minerals. Arkansas and Michigan realize substantially smaller amounts from the basic resource industries, though Michigan's industries are more productive of wealth than those of Arkansas.

Taxation of natural resources in the survey states differs widely, both in scope of application and yields realized from the taxes. Texas and Louisiana receive substantial sums from the taxation of minerals industries, and these taxes (severance taxes, for the most part) are important elements in the tax structures of the states. By contrast, Arkansas and Michigan realize only very minor portions of their tax revenues from natural-resource levies.

While Arkansas, Louisiana and Michigan levy severance taxes on timber resources, Texas does not. Michigan and Louisiana provide yield-tax modifications of the property tax for timber producers, but Arkansas and Texas do not offer such special option to this group.

Applications under the minerals severance levies of Arkansas and Louisiana are extensive, covering a broad number of categories. Texas levies severance taxes against petroleum products and sulfur, but does not extend this tax to other minerals categories. Michigan's severance tax is limited to petroleum products.
The study seeks to analyze patterns of shifting, incidences and effects for severance taxes, noting the nature of market structures in which the products are traded, and the economic power of owners, developers and processors as pertinent factors in determining these patterns.
CHAPTER I

INTRODUCTION: SPECIAL ASPECTS AND POLICY PROBLEMS IN THE TAXATION OF NATURAL RESOURCES

"The value of land...expresses the exchange value of monopoly. It is not in any case the creation of the individual who owns the land; it is created by the growth of the community. Hence, the community can take it all without in any way lessening the production of wealth."¹

Thus did Henry George describe the appropriateness of a "single tax" on the value of "land" and the economic rents derived therefrom, to the exclusion of all other forms of taxation.² The suggestion of Mr. George notwithstanding, the tax structures of modern nations comprise a variety of tax sources, although land taxation does appear to be virtually universal as a basis for taxation. For the purposes of this study, it will be desirable to utilize the expanded definition of "land" used by the economist: that is, a term embracing all natural resources. At the same time, it is desired to exclude the consideration of man-made improvements to the land, such as structures, augmentations to land fertility and other things arising out of the expended efforts of individuals. In embarking on a study of the taxation of natural resources for the four survey states -- Arkansas, Louisiana, Michigan, and Texas -- it would appear proper to develop some criteria for judging the effectiveness of such taxation in achieving policy goals regarded as appropriate by consensus of students in the field of resource taxation.

¹George, Henry, Progress and Poverty, Book VIII, Ch. III

²Ibid., Book I, Ch. III.
With the above consideration in mind, the present chapter is devoted to a survey of the special character of resources taxation as distinguished from other taxes, and to the unique problems associated with this form of taxation. The subject of "land" taxation, as it applies to natural resources, has become substantially more complex and difficult in practice than Mr. George may have anticipated when he said:  

"...With perhaps the exception of certain licenses and stamp duties...which can be relied on for only a trivial amount of revenue, a tax upon land values can, of all taxes, be most easily and cheaply collected. For land cannot be hidden or carried off, its value can be readily ascertained, and the assessment once made, nothing but a receiver is required for collection."

A. Taxes Applied to Natural Resource Industries: Severance, Yield and Related Levies

Natural resources possess a unique character, and, therefore, have given rise to unique forms of taxation. To the extent that they are to be considered a part of the common and social wealth of a region, so has society demanded that a portion of the value arising from their exploitation and development is due to the community. This is partly recompense for the loss of this wealth, and partly for the purpose of furthering public projects to replace and/or conserve such resources. This duality of motive in the taxation of natural resources should become apparent in the examination which follows.

Severance Taxes. These levies constitute the most active and most productive of revenue among the taxes on resources, though their

---

yield among all tax sources for states is quite modest (of $48.8 billions of total state revenue, and $26.1 billions in tax revenues for the states in 1965, severance taxes accounted for only $503 millions). For a handful of states, however, the severance tax is a major source of tax revenue, and, indeed, of total state revenue. In 1965, for example, of total tax revenues in the state of Louisiana of $581 millions, severance taxes accounted for $179 millions, or 30.8 percent; for Texas, the totals were $1,187 millions, $202 millions and 17 percent; for New Mexico, $188 millions, $28 millions and about 15 percent. These, however, are exceptions; most states levying severance taxes do not depend upon them heavily as a source of tax revenue. Table I following gives more detailed evidence of this generalization for those states levying severance taxes, and reporting revenues from them in 1965.

The severance tax is customarily levied on the act of severing natural resources from the earth, principally when the objective is clearly connected with a commercial purpose. The levy of the tax is generally upon the "severer" of the resource, not necessarily upon the owner (though, by implication, the owner may bear all or part of the burden if the severer is successful in shifting the tax backward. See Chapter V on shifting and incidence of the tax). Marquis characterizes the severance taxes as properly "...privilege taxes imposed additional to other taxes..." and not

---


6 Ibid.
Table I

Severance Tax Collections in Dollars for 1965 and Rank in Dollar Volume of Collections
(Thousands of Dollars)

<table>
<thead>
<tr>
<th>Rank</th>
<th>State</th>
<th>Dollar Volume Collections in 1965</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Texas</td>
<td>202,285</td>
</tr>
<tr>
<td>2</td>
<td>Louisiana</td>
<td>179,085</td>
</tr>
<tr>
<td>3</td>
<td>Oklahoma</td>
<td>38,483</td>
</tr>
<tr>
<td>4</td>
<td>New Mexico</td>
<td>27,457</td>
</tr>
<tr>
<td>5</td>
<td>Minnesota</td>
<td>17,637</td>
</tr>
<tr>
<td>6</td>
<td>Mississippi</td>
<td>11,986</td>
</tr>
<tr>
<td>7</td>
<td>Arkansas</td>
<td>4,614</td>
</tr>
<tr>
<td>8</td>
<td>North Dakota</td>
<td>3,406</td>
</tr>
<tr>
<td>9</td>
<td>Alaska</td>
<td>3,123</td>
</tr>
<tr>
<td>10</td>
<td>Utah</td>
<td>3,118</td>
</tr>
<tr>
<td>11</td>
<td>Montana</td>
<td>2,886</td>
</tr>
<tr>
<td>12</td>
<td>California</td>
<td>1,283</td>
</tr>
<tr>
<td>13</td>
<td>Colorado</td>
<td>1,250</td>
</tr>
<tr>
<td>14</td>
<td>Michigan</td>
<td>1,046</td>
</tr>
<tr>
<td>15</td>
<td>Nebraska</td>
<td>1,029</td>
</tr>
<tr>
<td>16</td>
<td>Oregon</td>
<td>737</td>
</tr>
<tr>
<td>17</td>
<td>Kansas</td>
<td>530</td>
</tr>
<tr>
<td>18</td>
<td>Virginia</td>
<td>356</td>
</tr>
<tr>
<td>19</td>
<td>Indiana</td>
<td>310</td>
</tr>
<tr>
<td>20</td>
<td>South Dakota</td>
<td>288</td>
</tr>
<tr>
<td>21</td>
<td>Kentucky</td>
<td>285</td>
</tr>
<tr>
<td>22</td>
<td>Idaho</td>
<td>174</td>
</tr>
<tr>
<td>23</td>
<td>Wisconsin</td>
<td>130</td>
</tr>
<tr>
<td>24</td>
<td>Florida</td>
<td>89</td>
</tr>
<tr>
<td>25</td>
<td>Wyoming</td>
<td>73</td>
</tr>
<tr>
<td>26</td>
<td>New Hampshire</td>
<td>54</td>
</tr>
<tr>
<td>27</td>
<td>Missouri</td>
<td>30</td>
</tr>
<tr>
<td>28</td>
<td>Nevada</td>
<td>12</td>
</tr>
</tbody>
</table>

Total All States Reporting ....................... 503,370²

2. Figures do not add to total due to rounding.
as a substitute for other taxes. The tax "...operates as a lien on the
severed...products until paid, or, in some states, until the products are
sold."7 Williams8 identifies the severance tax as an "...occupation,
privilege, or license tax..."9 not to be confused with a property tax,
as it is charged against the act of severing, and not the severed property
itself.10 Thus, the apparent intent is to assess the social cost inherent
in the removal of natural resources, in part at least, against the person
or firm actually removing them. There is no assurance, however, that the
severer will ultimately bear all or even part of this burden directly, as
the commercial nature of his activity provides a basis for tax shifting.
The subject of shifting of taxes on natural resources will be considered
more fully in the chapter devoted to that subject (Ch. V), but it may be
appropriate to briefly consider the possibilities open to the severer
attendant to the severance tax.

The severer, as an exploiter of the natural resource, frequently
secures his rights to such exploitation from the owner of the resource
lands by leasehold claims to the mineral or other resources, paying the
owner a consideration for the privilege. To the extent that a severance
tax reduces the net expectations of the severer negotiating such leasehold
(and attendant royalty agreements), he may seek to "capitalize" the burden

7Ibid., Col. 2.
8Williams, Ellis T., "Trends in Forest Taxation", National Tax
9Ibid., p. 129.
of the tax by a reduction in the amounts offered for the resources; i.e., based on the expected reduction in net proceeds for all materials he may remove during the entire recovery period. To the extent that the owner has no comparably-remunerative use for the lands, and few bidders appear for the resources, the extent of the backward shift tends to be magnified. Backward shifting of a severance tax presents a potentially-damaging prospect when fully or largely implemented, as suggested by Marquis:

"...while a severance tax of as much as 50¢ on lumber selling at $60 per M at the mill might not seem exhorbitant, it assumes greater relative importance when shifted to the timber owner selling stumpage for $10."

Conceivably, such a levy might render only marginal resource lands uneconomic, but there are also implications for conservation, which will be examined in the subsequent section of this chapter devoted to that subject.

Gronouski notes that the application of severance taxes to mineral fuels (e.g., oil, natural gas, coal) and to timber is most common, although "...a few states, notably Arkansas and Louisiana, use this method for taxing a wide variety of natural resources."

Yield Taxes. This category of tax is not customarily an additional form of taxation, but rather constitutes a form of property taxation in lieu of the traditional ad valorem property tax—levied annually. Basically, the yield tax is a property tax, but one which is levied so that it falls due at the time the resource property is converted (or harvested).

---


13Ibid., p. 348.
Thus, properties classified under the yield tax would be taxable only once; the resource owner is relieved of the annual burden of a tax on property which is either not ready for harvest (as in the case of standing, immature timber), or cannot most economically be marketed due to present conditions of demand (as in the case of petroleum or other mineral reserves). The yield tax has not been a generally big producer of revenues, either for the states' general funds or for the local governments' property-tax collectors, and, indeed, appears not to have been intended for this purpose. Williams\(^{14}\) suggests that the early concern for the "problems of forestry" was a principal underlying cause for the development of the yield-tax concept.\(^{15}\) A study conducted under the sponsorship of the Forestry Service of the U. S. Department of Agriculture, and published in 1933 details special forest tax laws existing at that time, and reveals that most yield taxes only reduced the burden of property taxation, or, at the very least, provided for more favorable timing.\(^{16}\)

The most extensive application of the yield-tax principle has been in the area of forest and timber products, and much of the form of yield taxes is derived from the specific needs of forests and forestry. Development and conservation, rather than fiscal yield, appear to have been the overriding considerations throughout the development of yield taxes on timber. Williams dates the development of the yield-tax concept

---

\(^{14}\)Op. Cit.

\(^{15}\)Ibid., p. 113.

from a "movement for timber exemption" from ad valorem property levies in
the state of Nebraska during the years 1859-61, though "...occasional
attempts to deal with forest problems... had been made previously."\textsuperscript{17} The
"Fairchild Report" identified 14 laws designated "yield-tax" in 13 states
(Michigan had two such laws) as of July 1, 1933, with 33 states in all pro-
viding some special property-tax benefits to forest owners.\textsuperscript{18}

Numerous differences prevailed among the tax laws noted by the
Fairchild Report, though one point of rather general similarity was the
levy based on ad valorem rates against the market values of products sold.\textsuperscript{19}
Elegibility requirements differed widely: Some, such as that for Alabama,
were quite liberal and inclusive, allowing "...land suited for forest cul-
ture; use must not be incompatible with forestry."\textsuperscript{20} Other yield-tax laws,
such as that for Massachusetts were much more highly restrictive.\textsuperscript{21}

"Property assessed at not more than \$25 per acre and including
not over 20 cords per acre, but so stocked with trees as to pro-
mise a specified minimum stand per acre."

The state of Oregon had a similarly-restrictive law, seeming to categori-
cally exclude actively-used commercial forest, listing:\textsuperscript{22}

"All land in the state classified by (the) Board of Forestry on
its own initiative and accepted by the tax commissioner as chief-
ly suitable for forestry which does not contain any mature forest
crops in merchantable quantities."
\textsuperscript{17}"Trends in Forest Taxation", p. 113
\textsuperscript{19}Ibid.
\textsuperscript{20}Ibid.
\textsuperscript{21}Ibid.
These latter stipulations were quite characteristic of many of the early attempts at yield-tax application. Their purpose, clearly, was to encourage the rehabilitation of cut-over lands and to foster management of new stands of young timber. What they decidedly did not do was to offer incentive or encouragement to the more-or-less recent practice of selective cutting and simultaneous replantings in commercial tracts so as to assure continuing harvest. The laws attacked the consequences of poor forestry practices, rather than the causes; the statutes were remedial, but not preventive.

The extent of relief from the ad valorem property tax also was subject to wide variations as between states, with some exempting only the trees themselves from annual assessment and leaving the bare land fully liable to the tax, while others retained annual payment schedules, but reduced the ad valorem levy to a very nominal figure; still others merely deferred the ad valorem levy on trees until the year in which harvested, at which time the full, accrued taxes were applicable. Some states without a yield tax as such also granted some relief or deferral privileges in special legislation for forestry industries.

Once the forest owner has qualified his tract for listing, and has been placed under yield tax classification, the option of declassifying or removing such property from classification (as he might desire to do in the event of some opportunity for commercial exploitation) is subject to considerable differences as between the several states. Some

\[\text{23 Ibid.}\]

\[\text{24 Ibid.}\]
plans, such as that of Mississippi, are largely or fully voluntary, with
declassification at the owner's option rather easy; others, such as those
of Kentucky and Louisiana, are construed as contractual obligations.25
These latter plans frequently included penalty fees or taxes provided
when withdrawal occurred prior to the maturity date of the contracts,
which were designated to run for as few as five, or as many as fifty
years, or more.26 Perhaps this "locking-in" effect, as well as other
features of the yield-tax laws helps to explain why the participation
under these laws has fallen short of expectations, based on actual versus
potential classification. This result will be pursued in the section on
"Policy Problems" following next in this chapter.

Other Tax Exceptions and Preferences. Although the yield-tax
concept has met its most extensive application in the case of timber,
other natural resource operations are sometimes allowed relief or special
treatment under the property tax. One such set of special regulations is
described by Gronouski27 as applied in the state of Michigan. For Michi­
gan's metallic (iron and copper) mines, the value of underground metallic
deposits is assessed, not by the local tax assessor, but by the Geological
Survey Division of the Michigan Department of Conservation. This assess­
ment is forwarded to the local assessor, who is required to enter the
figure on the tax books.28 This procedure has the twofold purpose of

26 Ibid.,
28 Ibid., pp. 344-6.
forestalling exhorbitant assessments (or inaccurate ones, due to the lack of technical know-how of local assessors in determining mine values) by the localities, and that of assuring uniform tax treatment for companies in competition with one another within the state. The Geological Survey Division does not, however, seek to set valuation on the bare land on which the mine is situated, nor, necessarily upon the equipment and other improvements to the property.  

In the case of nonmetallic minerals, no similar provision for GSD appraisal exists, the assumption being that such deposits are of "massive abundance" and that their discovery adds little to the value of the property. Gronouski takes exception to this view, contending that taxation of the richer deposits on such an assumption of "massive abundance" is to belie their ability to "...add substantially to the value of the property."  

The rather obvious discrimination in favor of metallic mines in the state of Michigan is perhaps better understood when this preoccupation is considered in the context of its leadership position and competitive situation among producers of these metals. Michigan is consistently a high-ranking producer (No. 1 in 1965) of domestic iron ores, but subject to intense and increasing competitive pressure from neighboring producers and from Canada. In copper production, Michigan is one of the lesser

---

30Ibid.
31Ibid.
producers (6th of 8 producers in 1956), and is beset by competitive dis-
advantage of relatively modest quality of ores.\textsuperscript{33} Logically, other states
would stress those minerals that yield substantial values in much the same
way.

Michigan also provides incentive through exemption from property
taxes for a maximum of ten years to any newly-discovered metallic mineral
ore (but not to the land in which it is located), "...when it is not part
of an operating mine...", or, if it is a part of an operating mine, the
exemption may be claimed "...until the mine comes into a 10-year (terminal)
recovery period as determined by the mine's average annual rate of extrac-
tion."\textsuperscript{34} Such a practice would appear to materially dilute the property-
taxe base, but it should be recognized that the exemption comes before the
value of the minerals had been subject to inclusion on the tax rolls, and
thus much resistance (though by no means all) by local officials may be
forestalled.

The existing variances and exceptions among the several states
of the nature described above would not serve the purposes of maximum
annual yield from the property tax, and their policy application does not
appear to contemplate this. They are, instead, more likely to act as pro-
motive and/or conservation measures. The motivation may be similar to that
which produced the federal "percentage depletion allowance" for natural
resource owners, and those whose income is largely derived from the develop-

\textsuperscript{33}Ibid.

\textsuperscript{34}Gronouski, \textit{Op. Cit.}, Loc. Cit.
merit of natural resources, though one critic suggests that the percentage depletion allowance provided only the opportunity for short-run, tax-sheltered profits for vertically-integrated producers (through raising crude oil prices as high as possible, and taking most of their profits at that tax-sheltered level), or, as a long-run, speculative boon to the owners of (oil bearing) properties.

B. Policy Problems in Natural Resources Taxation: Some Significant Considerations

As suggested in the preceding discussion, much of the taxation of natural resources is heavily permeated with policy considerations. In this section of the study, attention will be given to some important elements of policy, and their relation to taxation. Results of some tax policies will be studied, and some critical proposals for improving policy will also be examined. For purposes of the discussion, policy problems have been grouped under two principal headings: policy differences in dealing with renewable and non-renewable resources; and considerations of conservation, incentives to production and fiscal yield.

Renewable versus Non-renewable Resources. A significant aspect of the taxation of natural resources which contributes to its complexity is the basic difference in the needs and ends associated with the treatment of renewable resources as distinguished from those which are exhaustible but not renewable. Implicit in the tax policies for timber and forest

---


36Ibid., pp. 103-7.
products, and the limited number of cases in which the products of river
and seacoast are taxed, is the imperative of replacement and regeneration
as the products are removed, and in all too many cases, the need also pre-
vails for rebuilding depleted stocks. Thus, not only is the forest yield
tax a means of deferring the burden of tax upon the owner of immature
forests, or cut-over land replanted to new growth, but the revenues from
this tax are, in most states, dedicated to the purposes of conservation
and forestry.\(^{37}\) Increasingly, it is the practice to allocate timber
severance tax revenues to purposes of forestry, also.\(^{38}\) The ultimate
yardstick of the success or failure of policies designed to foster pre-
servation of renewable resources, or to rebuild stocks of such resources
if depleted, are the actual data on the accessions or depletions of the
resource stocks, coupled with data on the scope, growth and economic
success of the enterprises engaging in the exploitation of the affected
resources. That is, it is not enough to say that the volume of timber,
or acreage of timberland are stable, increasing or diminishing; additional
data regarding the scope and vigor of timber operations, and their econo-
mic significance to the state or region are necessary to complete the
determination of the effectiveness of policies designed to engender the
perpetuation of useful stocks of timber resources.\(^{39}\)

Non-renewable resources, though they are incapable of replace-
ment by man, have been the subject of conservation and orderly exploitation


\(^{39}\) To be considered in the section immediately following.
through special tax treatment, publicly-sponsored or financed research into improved methods of exploitation, and other policy applications. The success or failure of policy in this area is not so readily determined as in the case of, say, forestry; however, the economics of the industry -- costs, technology, wastes, returns, etc. -- may serve to indicate whether optimum conditions of conservation and orderly exploitation prevail. Public monies spent on research in schools of mines, geological research agencies of state and federal governments, and in other areas may return rich dividends in prolonging the life of limited resource stocks, and in the utilization of stocks previously-uneconomic qualities.

**Conservation, Incentives and Fiscal Yield.** In the taxation of natural resources, three rather distinct guiding (and often conflicting) benchmarks for policy have presented themselves. First, when one thinks of the term "tax" the most obvious conclusion is that this is a basis for raising public revenue, and so it should be. However, in the case of taxes affecting any productive sector of the economy (a feature, it may be argued, of any tax), an equally-important consideration is the assurance of minimum repressive effects to the orderly conduct and basic efficiency of the industry yielding the tax. Finally, and because of the exhaustible nature of most resources, the motive of conservation -- assuring optimum utilization of scarce, often irreplaceable wealth -- is a strong consideration. Because of its great import, the motive of conservation will be studied first.

---

An area in which conservation has traditionally been interwoven with the tax structure is that of timber and forestry resources. Williams\textsuperscript{41} dates the "modern" period in forest taxation from the movement in the state of Nebraska previously mentioned (p. 8 above). The final development of the yield tax to serve in lieu of basic ad valorem property taxes dates from about 1910 in Nebraska and several other states, as a means of relieving the owner of standing timber from an annual tax bill, deferring property taxation until the timber "crop" is harvested.\textsuperscript{42} Forest severance taxation developed along somewhat similar lines, with one of the earliest being a Louisiana tax enacted in 1910 as "An Act to Create a Conservation Fund..." by an annual levy "...upon those engaged in severing timber and minerals from the soil" (Act 196 of 1910).\textsuperscript{43} The legislation under which most severance taxes are now levied on timber generally provides for the allocation of part or all of the collections to forestry purposes.\textsuperscript{44}

As a comprehensive and effective conservation measure, the yield tax can hardly be described as an unqualified success, if judged on the basis of experience in classification of eligible forest tracts. In the case of Louisiana, for example, classification proceeded on a slow, rather disappointing scale prior to the passage of a mandatory provision in 1951,\textsuperscript{45}

\textsuperscript{41}"Trends in Forest Taxation".
\textsuperscript{42}\textit{Ibid.}, p. 113.
\textsuperscript{44}Marquis, "Severance Taxes on Forest Products...", p. 317, and Williams, "Trends in Forest Taxation", p. 130.
after which classifications increased to the extent that, by 1959 it was estimated that 40 percent of the forest land in Louisiana was classified under the amended set of classifications.\textsuperscript{45} Establishing communication with forest owners provides a more compatible base for "selling" the yield tax to those who desire to qualify their land under such laws. Programs involving the yield-tax concept conducted on a largely- or wholly-voluntary basis have tended to fare rather poorly in enlisting participation, and mandatory programs have met with some resistance, as well. Marquis\textsuperscript{46} cites several basic causes for the lack of success for forest-land participation under yield taxes:\textsuperscript{47}

1. Lack of Knowledge on the part of forest-land owners, either of the existence or substantive features of the laws;
2. Administrative Restraints ("red tape"), especially in the "voluntary" programs -- a mass of reports, forms, investigations, etc.;
3. Excessive Restrictions on the use of classified lands (e.g., prohibition of grazing) and misunderstandings about imagined restrictions;
4. Lack of Sympathy of, or outright opposition by, local officials -- spiteful raising of bare-land assessments, etc.;
5. Overly-Restrictive Eligibility Requirements, such as limitation to very small tracts only, exclusion from use as resorts, etc., and;
6. Absence of Tax Advantage -- Immediate plans for substantial removals of timber; underassessment at local levels or low millage rates, etc.

Answering these criticisms requires substantial overhaul of current yield tax laws, in Marquis' opinion. He proposes the following answers in correcting the shortcomings of current laws: a) broadening and liberalizing

\textsuperscript{45}Hayes, Ralph W., "Progress in Land Classification in Louisiana Under the 1954 Forest Tax Law", LSU Forestry Note No. 40, August, 1960, p. 3.


\textsuperscript{47}Ibid., pp. 10-12.
coverage; b) modernizing the plans in accordance with present forestry practice (especially the allowance of selective cutting -- "thinning" -- on tracts with immature trees); c) striving for equitable tax treatment of classified lands (by local assessors); and, finally, d) the enlisting of popular support for the programs.48

Based on the observations above, it would appear that the exclusion by yield-tax programs of any coverage for forest lands in process of actual commercial exploitation is an area deserving of some serious attention. Especially in the case of smaller, privately-owned tracts, the owner is virtually forced to consider the "harvesting" of his timber as a short-run venture, with no incentive to engage in forest management while the cutting is actually going on. Rather, the ad valorem levy constitutes a valid reason to exploit his stand quickly. The modern practice of "sustained-yield" forestry, wherein new plantings are made simultaneously with the cutting of mature trees, and attendant care for growing trees not yet ready for harvest, is much to be preferred from the standpoint of timing over the rapid denuding of the land, with the ultimate necessity to "start from scratch" on production of a new forest. The latter course may require as much as fifty years or more to produce trees suitable for lumber and building products; in the meantime, the land produces neither income nor appreciable taxes.

It was noted earlier that severance taxes on timber are devoted in large part to providing funds for carrying on forestry and conservation projects, but the effects of a tax on the operation of forestry enterprises

---

48Ibid., pp. 41-50.
are also a proper subject for policy study. One possible effect of a severance tax suggested by Marquis is that, if it makes the marginally-productive resource less attractive, it may result in foregoing development of the poorer deposits or tracts in favor of an increased rate of exploitation for the higher-grade, more profitable resource supplies.\textsuperscript{49}

While this may contribute to a more efficient level of exploitation in the case of some resources, the implication for forestry may be the neglect of many beneficial, but lightly remunerative, forest practices, such as the necessary thinning (as pulpwood) of trees in an immature stand, or "salvage cutting" in a producing commercial forest.\textsuperscript{50} Care in setting rates should also be exercised in view of the very real possibility that the tax may be shifted back to the owner, possibly discouraging his operation, or causing him to conduct operations contrary to conservation needs.

Conservation among the non-renewable resources infers policies which will make most attractive the exploitation of resource supplies with minimum waste and maximum recovery of resource supplies. Incentives to the active exploration, discovery and efficient exploitation of new resources would also be indicated as desirable policy attributes. On the one hand, many severance tax laws for non-renewable resources seek a mixture of differential rates in accordance with the economic recovery value of the resource (for example, the Louisiana rates of severance tax for crude petroleum of varying specific gravities, and differing recovery methods), while on the other hand, tax exemption may be offered, or deferral of tax

\textsuperscript{49}Marquis, "Severance Taxes on Forest Products..", p. 318, col. 1.

\textsuperscript{50}Marquis, "Severance Taxes on Forest Products..", p. 318, cols. 1 and 2.
application granted for new operations (e.g., the metallic mines property tax deferral in the case of Michigan). Taxes levied against non-renewable resource wealth may best serve the needs of conservation if they neither discourage the orderly development of resources, nor produce a climate in which the producer feels compelled to extract what he can in the shortest possible time, abandoning the desolated lands to no further economic usefulness, and having wasted much of their formerly-abundant wealth.

A rather controversial question dealing with conservation and the economics of resource industries not directly connected with taxation, but having peculiar application to the crude petroleum and natural gas industries may be worthy of attention at this point. The characteristics of these two mineral fuels, the one a liquid, the other either a gaseous or liquid substance in its natural state, possess the potential of simultaneous recovery from a single pool or "dome" by several operators in the same field. Under these circumstances, an operator who removes the oil or gas from one of these deposits thus denies that portion to the others producing from the same field. This "first come, first served" characteristic is given legal stature under the so-called "common law rule of capture", which upholds the right of any legitimate claimant to any quantities which he may withdraw.51

Obviously, if all the developers in a given pool were to pursue their self-interest independently, the temptation would exist to engage in a contest with one another to determine which producer could pump the most product at the expense of his rivals, so long as the reserves lasted.

This characteristic is termed by Davidson to be the negative "user cost of the rule of capture"; that is, the user cost is associated with not pumping, as distinguished from those which are associated with pumping. The interests of conservation obviously dictate the finding of a solution to this potentially-wasteful situation, and the solutions chosen by several oil- and gas-producing states (notably Texas, Oklahoma, Louisiana and California) employ the practice of "prorationing" or establishing "oil allowables" for most normally-producing fields. The aim of prorationing is to assure that no producer in a producing field will extract more than his "fair share" of the production from existing wells. The relevant state statutes are reinforced by the federal "Connally Hot Oil Act", which "prohibits interstate commerce in oil and oil products produced in violation of state prorationing laws." Davidson contends that prorationing is an inferior solution to the problem, and that the interests of conservation would be better served by the practices of "unitization", that is, of forcing the leaseholders of a given field to form a unified management "...for the specific purposes of operating the wells as a single production unit." This solution, says Davidson, would not only overcome the "negative user cost" imposed by the

52 Ibid., p. 94.
53 Ibid., p. 85.
54 Ibid.
55 Ibid.
rule of capture, but would allow the other user costs\textsuperscript{56} to regulate the operation of each field for attaining optimum efficiency in production and marketing.\textsuperscript{57} Adelman\textsuperscript{58} echoes Davidson's criticism of prorationing, asserting that the practice produces "...a systematic bias...in favor of drilling more wells than necessary; the more wells drilled in any pool, the greater the allowables for the pool."\textsuperscript{59} An additional premium is placed on the more expensive, deeper wells, which enjoy a higher allowable.\textsuperscript{60}

Adelman sees as a further ill engendered by prorationing the preference accorded by the state of Texas to the "so-called 'stripper' or marginal wells", which are exempted from prorationing restrictions, and thus have achieved a dominant role in establishing cost structures for crude petroleum in that state.\textsuperscript{61} He suggests that eliminating prorationing (under the system of unitization proposed by Davidson) would result in improved efficiency for the industry by removing from production many of the marginal wells (which Adelman felt should not have been

\textsuperscript{56}Davidson characterizes the other user costs as a) "the user costs inherent in all raw materials"--the return on presently-used materials, weighed against possible future returns had the materials not been used now; and, b) the "user cost of ultimate recovery" -- weighing the actual rate of recovery against that rate which would yield the greatest ultimate recovery from the pool. (\textit{Op. Cit.}, pp. 91-2).

\textsuperscript{57}Ibid.


\textsuperscript{59}Ibid., p. 104.

\textsuperscript{60}Ibid.

\textsuperscript{61}Ibid.
developed in the first place), along with the inflated costs associated with such wells. Clearly, there is much substance in the criticisms of Davidson and Adelman, and the purposes of conservation would be well-served by a serious review of the consequences of prorationing on the total structure of crude oil and gas production techniques. If, as these two critics suggest, prorationing is responsible for both a wasteful rate of extraction in the better wells, and a cost structure inflated by the sheltered presence of marginal wells, then obviously prorationing is not achieving the purpose of conservation (nor even operating efficiency from the standpoint of cost), and new solutions should be sought -- perhaps the use of unitized management suggested by Davidson. Needless to say, the same types of solution would be equally-applicable to the natural gas producers as to crude oil producers.

The matter of Incentives to Production would seem to have, by inference, been suggested in many of the policies consistent with conservation aims discussed above. Any measure affecting expectations in the development of natural resources, either by owners or producer-developers, must necessarily have ramifications for conservation, and vice versa. The words of Henry George concerning the positive effect which a tax levied upon the "whole of rents" of land may have "...by compelling those who hold land on speculation to sell or let for whatever they can get..." do not appear to contemplate the total abandonment of lands producing modest, but acceptable returns, such properties often reverting to the state

---

62 Ibid., p. 105 and Appendix 2, p. 117.
through tax delinquency. Neither does George seem to consider the possibility that the owner (and/or developer) would be goaded into a quick, wasteful and destructive exploitation, often culminating in the abandonment of the ravaged lands to the state. Thus, a sound tax policy for incentives would encourage orderly exploitation of resources, neither producing conditions tantamount to confiscation, nor generating a climate conducive to the rape of resources in a feverish attempt to realize a quick profit and abandon the lands to the state's guardianship after they are desolated beyond economically-productive yield.

Finally, there is the question of fiscal yield of resource taxes. It is perhaps appropriate that this policy question was deferred for last consideration, inasmuch as dollar yields on resource taxes have often been virtually incidental to the other policy goals. A tax which yields the maximum short-run revenues may, in the long run, be poorest in benefits to the community if it causes the other goals of conservation and incentive to be disregarded. Five or ten, or even twenty years of fat receipts from property or severance levies, followed by the exodus of the industry, loss of payrolls and other benefits, and perhaps even the ultimate decline and fall of the very community, is not a desirable end result. Granted that for many communities tied to non-renewable resources the ultimate loss of the resource industry is an inevitability, even the eventual

---


65 Especially so in the case of forestry taxation, with yield being literally "ploughed back" into the development of the industry (see Williams, "Timber Trends..." and Marquis, "Severance Taxes...").
loss of the principal industry need not be hastened by a climate of oppressive taxes. For the community supported by renewable resources, such as forest and timberlands, sound management may assure that the loss of this support will never occur.

Still, the question may well be raised: For a locality in a principal natural resource region, with little or no other property or commercial basis for local tax support, and faced with rising costs of government and community services, how may such an area possibly forego the increasing demands for revenue from the only practical available source -- i.e., the resource industry? There appears to be no simple, panacea-like solution to this truly perplexing by-product of conservation and production-incentive resource-tax policy. The most obvious (and most difficult) solution would be for the region so affected to diversity the tax base, attracting new industries, both subsidiary to and nonrelated to the resource supply, as a means of making the community more fiscally "shock-proof". Thus, a timber producing area could logically host a furniture or wood products manufacturer; a mining region might logically attract a processing or fabricating plant, especially if it is blessed with a location near a principal market. Subsidiary and/or service industries would logically follow the basic plants, once the breakthrough had been made. Examples of this type of activity may be taken from the location of furniture manufacturers in Michigan,\textsuperscript{66} petroleum refining and dis-

\textsuperscript{66}An interesting footnote to this situation is the fact that Michigan, having declined in significance as a timber producer, must now import raw materials from other states for her furniture industry (See Barlowe, Raleigh, "Forest Yield Taxes," \textit{Michigan Tax Study Staff Papers}, Lansing, Mich., 1958, p. 361). Here is a case in which the "back-up" industry has paid real dividends.
tribution plants in Louisiana, Texas and other oil-producing states, and metals processors in Michigan, Indiana and Arkansas.

A second solution to the problem of deficient local revenues which may be and has been applied is the cooperative support by other levels of government, involving supplemental payments to replace revenues which might have been forthcoming in the absence of yield or other tax modification in support of resource policy. Such programs have been operated in varying degrees in several states, with a plan in New Hampshire being one of the most interesting, if not particularly blessed with fiscal soundness. The New Hampshire yield tax as applied in a 1949 Act exempted standing timber from taxation under the ad valorem property tax, but guaranteed "...that the towns would lose no revenue as a result..." of the law. Perhaps the localities have not been the losers under this plan, but, by 1954 the proceeds of a relief fund created by a special revenue bond issue were "...nearly at an end..." due to "...rising tax rates (local) over the state..." and a decline of timber cutting, which was to have retired the bond issue. Although most transfer payments would possibly have a less risky, even speculative, character (it may be noted at this point that New Hampshire showed some gaming spirit by passing the first modern state lottery), they do in fact constitute transfers, not the production of added tax revenues. The claim against the state's revenue

---


68 Ibid., pp. 151-2.

69 Ibid.
sources simply displaces the claim against local sources, and the general task of finding adequate revenues to finance public services remains. The federal government also participates in a transfer program to localities (to replace property taxes which would have arisen from forest preserves located in the assessment area), and also payments of severance taxes on timber taken from public lands are made to state and local governments.\textsuperscript{70}

Problems in the allocation of revenues from resource taxes as between the various levels of government are a natural consequence of the multi-level administration of government in this country, and the social viewpoint regarding ownership claims to natural resources. The local governments -- townships, counties, school districts and parishes -- are prone to demand a share in revenues, especially those derived from customary sources of local-government support, such as the ad valorem property tax. Further, where the local government is authorized to levy license or occupational fees, gross receipts or income taxes, sales taxes, and other, less common local-government taxes, these units will be prone to exploit this power among the resource industries along with others. The increasing pressure on local government finance for more and more expensive services is likely to make these units even less inclined to forego taxes which they feel are their due.

The State, on the other hand, views a more complex, larger picture of the tax treatment of natural resource industries than the mere

\textsuperscript{70}Williams, Ellis T., "National Forest Contributions to Local Governments", \textit{Land Economics}, Vol. 31, No. 3, August, 1955, pp. 204-14. The severance tax can be collected on such cutting without Constitutional questions, largely because the tax is laid upon the severer, not the owner, and is not a property tax (Marquis, "Severance Taxes on Forest Products.", pp. 315-16). This right was affirmed in \textit{Wilson et. al. v. Cook} (1946) 327, U.S. 474.
raising of revenue. While the locality in which resources are located tends to take a somewhat proprietary view of such resources, the state is apt to regard them as a part of the total largess of the commonwealth; that is, not as belonging solely to the locality in which an accident of nature and geography has lodged them. Further, the state has traditionally taken a greater concern for the conservation and husbanding of scarce resources, although policies directed to this end may, and often do, reduce the short-run fiscal "payoff" in the form of tax revenues.71

The basis thus exists for debate between the privileges of the locality and the state regarding resource matters. The various states may resolve this problem in different ways, but the State is likely to prevail in most instances, if for no other reason than its customary sovereignty in tax matters over the local units, and the fact that legislators from other parts of the state have the power to outvote those from the affected area. Admittedly, there may be some exceptions to this rule, but, in the main, the state has the balance of political power. Some concession to the localities is apparent, however, in the return of a portion of state-collected revenues to the locality in which the collections originated,72 and under other arrangements.

The objections to allocation formulae have by no means been stilled by actions of the state intended to placate the localities, but

71 In the case of forest yield taxes, the deferral of property levies on immature timber stands, ultimately to be collected as the timber is harvested.

72 For example, the turnback of a portion of the severance tax in Louisiana to the Parish from which the minerals or timber were severed ("Severance Tax-General", Legal Dedication, Louisiana State Tax Handbook, p. 81).
there seems reason to believe that no revolutionary changes in the relative power positions of the two levels of government will be forthcoming soon, especially with the concentration of population in the urban areas, and the reapportionment of many state legislatures to reflect this trend in political structure. The opposite view -- that disproportionate political influence held by sparsely-settled, resource-rich areas will diminish rapidly -- appears to be more in keeping with the true trend direction. To say that this will impose undue hardships on the resource-rich areas does not appear proper, however. Perhaps it may be more accurate to say that, resource policy will now tend to be conducted on a more objective, socially-oriented basis, rather than on a locally-oriented (which has often meant "narrowly-oriented") basis.
CHAPTER II

ECONOMIC SIGNIFICANCE OF NATURAL RESOURCES
FOR THE FOUR SURVEY STATES

The impact of natural resources on the economies of the four
survey states -- Arkansas, Louisiana, Michigan and Texas -- is the subject
of this chapter. It is the principal aim of this discussion to provide a
more complete knowledge of the role of resources within the several states,
and to compare the magnitude of resource industries as between the states.
This knowledge will help to place in more meaningful perspective the en­
vironments in which the taxation of natural resources for the four states
occurs. Further, more insight into the ends and goals to be sought
through resource taxation policies should result from this knowledge.
For purposes of classification, the study will give separate consideration
to timber and forest products, mineral resources, and fisheries and other
resources, in successive sections.

A. Timber and Forest Products

Areas, Products and Volume. All four states are active in the
production of timber and forest products, although the size of forest area
and magnitude of harvest varies, as does the relative importance of the
industry to each state. Area in commercial forests for the State of Arkans­
sas constitutes 64.3 percent of the state's total land area (see Table 2
on the following page), in Louisiana, the percentage is 57.4, in Michigan
about 54 percent, but in Texas the total forest area constitutes only
about 14.3 percent of the vast (168 million acres) area of that state. In
absolute terms, the forest area in Arkansas is 21.6 million acres; Michigan
Table 2
Land Areas by Major Class of Land for the United States, Arkansas, Louisiana, Michigan and Texas -- Jan. 1, 1963¹

<table>
<thead>
<tr>
<th>State</th>
<th>Total Land Area²</th>
<th>Forest Land</th>
<th>Crop Land</th>
<th>Other³</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Commercial</td>
<td>Productive Reserved</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Area</td>
<td>Forest</td>
<td>Unproductive</td>
<td></td>
</tr>
<tr>
<td>U. S.</td>
<td>2,271,343</td>
<td>758,865</td>
<td>508,845</td>
<td>16,880</td>
</tr>
<tr>
<td></td>
<td>1,168,000</td>
<td>234,012</td>
<td>448,305</td>
<td>1,064,173</td>
</tr>
<tr>
<td>Ark.</td>
<td>33,599</td>
<td>21,591</td>
<td>21,530</td>
<td>61</td>
</tr>
<tr>
<td></td>
<td>23,368</td>
<td>234,012</td>
<td>448,305</td>
<td>1,064,173</td>
</tr>
<tr>
<td>La.</td>
<td>28,868</td>
<td>16,756</td>
<td>16,512</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>7,385</td>
<td>4,907</td>
<td>7,385</td>
<td></td>
</tr>
<tr>
<td>Mich.</td>
<td>36,492</td>
<td>19,699</td>
<td>19,121</td>
<td>240</td>
</tr>
<tr>
<td></td>
<td>6,836</td>
<td>9,957</td>
<td>6,836</td>
<td></td>
</tr>
<tr>
<td>Texas</td>
<td>168,218</td>
<td>23,954</td>
<td>11,991</td>
<td>21</td>
</tr>
</tbody>
</table>

1. Partial data from a summary of all states
2. From 1959 Census of Agriculture
3. Includes pasture and rangeland, swampland, industrial and urban areas, and other nonforest areas.


has 19.7 million acres in forest; Louisiana a bit more than 16.7 million; and Texas almost 24 million acres of forest land. All except Texas have a favorable ratio of commercial forest land to total forest acreage; that is, forest land which is physically capable of producing usable timber and is available for that purpose.¹ As suggested by this rather broad basis of classification, the commercial forest area may vary widely in the actual amounts of merchantable timber available for various uses in any given

year. The poor ratio of Texas' total forest land to commercial forest land is better understood when placed in the context of climate differences across that giant state. The bulk of Texas' commercial forest land is located in East Texas (accounting for all but about 500,000 of her 12 million acres in commercial forest lands), in a region roughly bounded by the prairies adjacent to the gulf coast on the South, northward to the Red River, and on the East by the Louisiana border, extending to a western limit varying between 80 and 120 miles distance "..to the point where rainfall becomes generally insufficient to support good commercial forests." 2 Apart from the so-called "lost pines" section of West-central Texas, there are no contiguous timber stands of any great magnitude outside the Eastern region. 3 In view of the above situation, the discussion of Texas' timber resources will be devoted to the East-Texas area.

The survey states are in very different stages of development of their forest industries. While Michigan was one of the earlier states outside the Northeast to develop her forest industries, ranking first nationally in lumber production during much of the decade ended in 1889, the excesses of this period resulted in a rapid depletion of her most favored wood species -- white pine -- and her fortunes were subject to a rapid decline. 4 At her peak production in 1889, the annual sawtimber cut  

2"Forests of East Texas", Forest Survey Release 77, Southern Forest Experiment Station (Philip A. Briegleb, dir.), June, 1956, p. 3.  
3Ibid.  
(see definitions, Table 3 on following pages) at sawmills was approximately 5.5 billion board feet; the decline to a low ebb in 1932 was precipitous, with the cut in that depression year only 160 million board feet.\(^5\) As may be noted in Table 3a, sawtimber cut in 1962 was a modest 495 million board feet. Meanwhile, the pulpwood industry has become more and more important in the timber picture, the cut for this purpose rising from 797 thousand cords in 1954 to 1.09 million cords in 1962.\(^6\) Veneer production is in decline, with cooperage apparently having become insignificant (less than 1,000 board feet in 1962), as indicated in Table 4.

The timber industries of Arkansas, Louisiana and Texas, in contrast to the case of Michigan, appear either not to have reached a climax, or to evidence a rejuvenated status compared to prior periods. In the State of Arkansas, the 1958 harvest exceeded one billion board feet of sawlogs for the first time,\(^7\) and by 1962 the harvest was 1.2 billion board feet (Table 4). Pulpwood, the second-leading industrial wood, accounted for 1.2 million cords in 1959,\(^8\) and had increased substantially to a cut of a little more than 1.7 million cords in 1962 (Table 4). The pulp and paper industry has grown rapidly in Arkansas since World War II, and is now one of the leading industries using forest products. Together, sawtimber and pulpwood account for about 90 percent of the industrial output

\(^5\)Ibid.  
\(^8\)Ibid., p. 14.
Table 3


(Amounts in million board feet - international 1/4-inch log rule)

<table>
<thead>
<tr>
<th>State</th>
<th>Net annual growth(^2)</th>
<th>Net annual cut(^3)</th>
<th>Net volume Jan. 1, 1963</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total</td>
</tr>
<tr>
<td>United States...</td>
<td>54,853</td>
<td>48,401</td>
<td>2,536,799</td>
</tr>
<tr>
<td>Arkansas........</td>
<td>2,369</td>
<td>1,607</td>
<td>42,348</td>
</tr>
<tr>
<td>Louisiana.......</td>
<td>2,985</td>
<td>1,368</td>
<td>52,280</td>
</tr>
<tr>
<td>Michigan........</td>
<td>1,036</td>
<td>495</td>
<td>26,496</td>
</tr>
<tr>
<td>Texas............</td>
<td>1,918</td>
<td>850</td>
<td>31,625</td>
</tr>
</tbody>
</table>


(Amounts in million cubic feet)

<table>
<thead>
<tr>
<th>State</th>
<th>Net annual growth(^2)</th>
<th>Net annual cut(^3)</th>
<th>Net volume, Jan. 1, 1963</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total</td>
</tr>
<tr>
<td>United States...</td>
<td>16,265</td>
<td>10,148</td>
<td>627,882</td>
</tr>
<tr>
<td>Arkansas........</td>
<td>707</td>
<td>424</td>
<td>12,702</td>
</tr>
<tr>
<td>Louisiana.......</td>
<td>839</td>
<td>390</td>
<td>15,204</td>
</tr>
<tr>
<td>Michigan........</td>
<td>415</td>
<td>166</td>
<td>12,520</td>
</tr>
<tr>
<td>Texas............</td>
<td>528</td>
<td>234</td>
<td>9,034</td>
</tr>
</tbody>
</table>

1. Sawtimber comprises all live trees of commercial species which contain at least one saw log defined as follows: Softwoods must be at least 9.0 inches in diameter, breast height (dbh), except in California, Oregon, Washington and Coastal Alaska, where the minimum is 11.0 inches, d.b.h. Hardwoods must be at least 11.0 inches, d.b.h in all states.

Growing Stock comprises all live sawtimber trees, poletimber trees, saplings and seedlings meeting specified standards of quality or vigor; excludes cull trees.

2. Comprises natural growth and excludes catastrophic losses.

3. Sawtimber and poletimber trees (where applicable) removed from inventory by harvesting, land-use change, or silviculture treatment.

Table 7

Total Output of Timber Products for the United States, Arkansas, Louisiana, Michigan and Texas, 1962

<table>
<thead>
<tr>
<th>Product</th>
<th>Total U.S.</th>
<th>Arkansas</th>
<th>Louisiana</th>
<th>Michigan</th>
<th>Texas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saw Logs (Th. bd. ft.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All species</td>
<td>34,132,537</td>
<td>1,205,695</td>
<td>981,426</td>
<td>319,000</td>
<td>605,514</td>
</tr>
<tr>
<td>Softwoods</td>
<td>27,334,886</td>
<td>760,041</td>
<td>592,772</td>
<td>73,000</td>
<td>444,721</td>
</tr>
<tr>
<td>Hardwoods</td>
<td>6,797,651</td>
<td>445,654</td>
<td>388,654</td>
<td>246,000</td>
<td>160,795</td>
</tr>
<tr>
<td>Veneer logs (Th. bd. ft.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total all species</td>
<td>5,917,126</td>
<td>34,576</td>
<td>35,572</td>
<td>21,760</td>
<td>34,811</td>
</tr>
<tr>
<td>Softwoods</td>
<td>4,931,562</td>
<td>---</td>
<td>---</td>
<td>162</td>
<td>366</td>
</tr>
<tr>
<td>Hardwoods</td>
<td>985,564</td>
<td>34,576</td>
<td>35,572</td>
<td>21,598</td>
<td>34,445</td>
</tr>
<tr>
<td>Pulpwood (Th. cords)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All species</td>
<td>43,126</td>
<td>1,730</td>
<td>2,006</td>
<td>1,090</td>
<td>1,430</td>
</tr>
<tr>
<td>Softwoods</td>
<td>33,212</td>
<td>1,382</td>
<td>1,580</td>
<td>430</td>
<td>1,163</td>
</tr>
<tr>
<td>Hardwoods</td>
<td>9,914</td>
<td>348</td>
<td>426</td>
<td>660</td>
<td>267</td>
</tr>
<tr>
<td>Miscellaneous Industrial Woods (Total)* (th. cu. ft.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All species</td>
<td>505,443</td>
<td>27,671</td>
<td>19,021</td>
<td>23,473</td>
<td>20,863</td>
</tr>
<tr>
<td>Softwoods</td>
<td>252,290</td>
<td>12,947</td>
<td>12,256</td>
<td>4,454</td>
<td>12,731</td>
</tr>
<tr>
<td>Hardwoods</td>
<td>253,153</td>
<td>14,724</td>
<td>6,785</td>
<td>19,019</td>
<td>8,132</td>
</tr>
</tbody>
</table>

*Miscellaneous Industrial Woods (Products)

| Cooperage (Th. bd. ft.) |          |          |          |          |       |
| All species             | 215,976   | 18,578   | 5,000    | ---      | 906   |
| Softwoods               | 20,756    | ---      | ---      | ---      | ---   |
| Hardwoods               | 195,220   | 18,578   | 5,000    | ---      | 906   |
| Piling (Th. Lin. ft.)   |            |          |           |          |       |
| All species             | 41,530    | 2,175    | 4,783     | 260      | 2,769 |
| Softwoods               | 36,172    | 1,972    | 4,783     | 10       | 2,769 |
| Hardwoods               | 5,358     | 203      | ---       | 250      | ---   |
| Poles (Th. pieces)      |            |          |           |          |       |
| All species             | 6,695     | 544      | 400       | 20       | 652   |
| Softwoods               | 6,616     | 544      | 400       | 20       | 652   |
| Hardwoods               | 40        | ---      | ---       | ---      | ---   |

(footnotes at end of table)
### Table 4 (continued)

<table>
<thead>
<tr>
<th>Product</th>
<th>Total U.S.</th>
<th>Arkansas</th>
<th>Louisiana</th>
<th>Michigan</th>
<th>Texas</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Miscellaneous Industrial Woods (Products) continued.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Posts (Th. pieces)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All species</td>
<td>168,749</td>
<td>16,242</td>
<td>5,837</td>
<td>3,500</td>
<td>16,465</td>
</tr>
<tr>
<td>Softwoods</td>
<td>70,360</td>
<td>8,064</td>
<td>3,034</td>
<td>3,100</td>
<td>5,668</td>
</tr>
<tr>
<td>Hardwoods</td>
<td>98,389</td>
<td>8,178</td>
<td>2,803</td>
<td>400</td>
<td>10,857</td>
</tr>
<tr>
<td><strong>Mine timbers (th.cu.ft.)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All species</td>
<td>48,401</td>
<td>146</td>
<td>---</td>
<td>2,505</td>
<td>---</td>
</tr>
<tr>
<td>Softwoods</td>
<td>8,089</td>
<td>24</td>
<td>---</td>
<td>1,353</td>
<td>---</td>
</tr>
<tr>
<td>Hardwoods</td>
<td>40,312</td>
<td>122</td>
<td>---</td>
<td>1,152</td>
<td>---</td>
</tr>
<tr>
<td><strong>Other industrial (Th.cu.ft.)³</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All species</td>
<td>197,607</td>
<td>11,556</td>
<td>4,800</td>
<td>17,920</td>
<td>3,214</td>
</tr>
<tr>
<td>Softwoods</td>
<td>74,998</td>
<td>2,243</td>
<td>484</td>
<td>558</td>
<td>630</td>
</tr>
<tr>
<td>Hardwoods</td>
<td>122,609</td>
<td>9,313</td>
<td>4,316</td>
<td>17,362</td>
<td>2,584</td>
</tr>
<tr>
<td><strong>Fuelwood (Thousand cords)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All species</td>
<td>29,922</td>
<td>1,529</td>
<td>1,169</td>
<td>600</td>
<td>777</td>
</tr>
<tr>
<td>Softwoods</td>
<td>11,248</td>
<td>146</td>
<td>267</td>
<td>25</td>
<td>223</td>
</tr>
<tr>
<td>Hardwoods</td>
<td>15,674</td>
<td>1,083</td>
<td>902</td>
<td>525</td>
<td>554</td>
</tr>
</tbody>
</table>

1. These estimates of total output include both roundwood and plant byproducts.
2. International 1/4 inch log scale. Saw logs assumed to equal timber tally.
3. Includes hewn ties, excelsior bolts, shingle bolts, turnery; and handle stock, shuttle blocks, chemical wood, farm timbers, and plant byproducts used for mulch, livestock bedding, etc.

for Arkansas forests, with the remainder being accounted for by veneer logs, cooperage bolts (mainly tight cooperage for such things as whiskey-aging casks) and pilings and posts.\textsuperscript{9}

Louisiana's forest-industry output of sawtimber in 1953 amounted to 1.4 billion board feet, and, by 1962 the cut was down markedly to 931 million board feet (Table 4), possibly due in part to the slack building activity in the state at this time. In the case of pulpwood, however, the expansion continued to an excess of 2 million cords in 1962 (Table 4). Pulpwood cutting is the dominant wood use in the forests of the Northwestern and Northcentral parts of the state, comprising about two-thirds of the cut, and in other regions pulpwood accounts for virtually half the timber cut.\textsuperscript{10} Other products sharing in the timber cut are veneer logs, cooperage bolts, poles, piling and posts.

In Texas forests, sawlogs are the principal timber product, but pulpwood, especially pine pulpwood, is a high-ranking and growing category.\textsuperscript{11} Trees cut for lumber are also largely pine, virtually all second-growth stock, and for the most part cut in the Southeastern region.\textsuperscript{12} The lumber cut in East Texas appears to be declining among the small, portable-mill operations, in favor of permanent, stationary mills, with the 1962 cut of sawlogs at a level of 605.5 million board feet.\textsuperscript{13} Pulpwood production

\textsuperscript{9} Ibid.


\textsuperscript{11} "Forests of East Texas", p. 14.

\textsuperscript{12} Ibid.

\textsuperscript{13} Ibid. and Table 4.
accounted for one-third of the 1954 softwood cut, with much of the cut shipped to paper mills in Louisiana and Arkansas (about 40 percent).  

Texas is a leading producer of poles and piling. She ships the cut trees principally to East Texas wood-preserving plants, with production in 1962 of 2.7 million linear feet of piling and 652 thousand pieces of pole production, virtually all softwoods in both cases (Table 4). Her production of cooperage, in line with other states' experience in loose cooperage (for crates and boxes), has declined, amounting to less than one million board feet in 1962.

The importance of forest and wood-products industries for the states of Louisiana and Arkansas is readily apparent when it is noted that the lumber and wood-products industries account for about 26 percent of the total manufacturing employment in each state. For Arkansas, this represents a relative decline from the 1950 percentage of 41.6, but this has been largely caused, not by a decline in timber activity, but by the expanding industrial base in that state. Although their number is indeterminate, and varies widely, woods workers not included in the above figures should swell the numbers of workers supported through forest industries even more. Texas' smaller output of wood products would suggest a lesser employment percentage, and the much smaller scale of timber and wood-products production in Michigan in comparison to vast manufacturing base, would indicate a very small percentage employment.

---

15 Ibid., p. 15.
Table 5

Forest Land Area and Ownership of Commercial Forest Land, United States, Arkansas, Louisiana and Michigan: 1963

(In Thousands of Acres. As of Jan. 1)

<table>
<thead>
<tr>
<th>State</th>
<th>Total forest land</th>
<th>All ownerships</th>
<th>Federally owned or managed</th>
<th>State, county, and municipal</th>
<th>Private</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total</td>
<td>National forest</td>
<td>Other</td>
</tr>
<tr>
<td>United States</td>
<td>758,865</td>
<td>508,845</td>
<td>113,176</td>
<td>96,804</td>
<td>16,372</td>
</tr>
<tr>
<td>Arkansas</td>
<td>21,591</td>
<td>21,530</td>
<td>2,641</td>
<td>2,373</td>
<td>268</td>
</tr>
<tr>
<td>Louisiana</td>
<td>16,576</td>
<td>16,512</td>
<td>704</td>
<td>575</td>
<td>129</td>
</tr>
<tr>
<td>Michigan</td>
<td>19,699</td>
<td>19,121</td>
<td>2,540</td>
<td>2,420</td>
<td>120</td>
</tr>
<tr>
<td>Texas</td>
<td>23,954</td>
<td>11,991</td>
<td>719</td>
<td>618</td>
<td>101</td>
</tr>
</tbody>
</table>

1. Partial reproduction of a table including data for all states.
2. Comprises all land which was a) producing, or physically capable of producing usable crops of wood, b) economically available on date shown or prospectively, and c) not withdrawn from timber utilization.

Ownership, Reserves and Management. Although the bulk of forest lands are in the hands of individual owners, such as farm operators, and others not connected directly with the forest industries, public ownership, and ownership by wood-using industries have become quite significant in the commercial forests of the survey states, as indicated by the summary table below, and by Table 5 on the preceding page. The relative shares of each type of owner are indicated as follows:

Table 5b

<table>
<thead>
<tr>
<th>Ownership class</th>
<th>Percent of Commercial Forest Owned, by Class</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>U.S.</td>
</tr>
<tr>
<td>Private...</td>
<td>72.2</td>
</tr>
<tr>
<td>Farm......</td>
<td>29.7</td>
</tr>
<tr>
<td>Wood-using Industry..</td>
<td>13.1</td>
</tr>
<tr>
<td>Other......</td>
<td>29.4</td>
</tr>
<tr>
<td>Public......</td>
<td>27.8</td>
</tr>
<tr>
<td>Federally-owned or managed...</td>
<td>22.2</td>
</tr>
<tr>
<td>State, county and Municipal...</td>
<td>5.6</td>
</tr>
</tbody>
</table>

Source: Table 5

Several observations are in order regarding the distributions of forest-land ownership in the four states. First, it should be apparent that ratios of public-to-private ownership are below the national average for the states of Arkansas, Louisiana and Texas, markedly below for the latter two states, and higher than the national average for Michigan. Michigan's public ownership of forest lands is somewhat unique, in that
state and local governments account for the majority of acres (19.7 percent of the total of 33 percent for all public owners), while nationally the preponderent public owner is the federal government. These state and local holdings are mostly state-owned tracts held in the Northern Lower Michigan area. For the State of Arkansas, publicly-held lands are primarily in the Ozark and Ouachita National Forests, and in the state's parks system. For Texas, public lands are located principally in the Southeastern region, and managed so as to build up the growing stock. As noted, both Texas and Louisiana have very small percentages of commercial forest land in publicly-owned holdings (respectively, 6.3 and 5.4 percent).

The very substantial portion of commercial forest area in all the survey states owned by nonfarm, non-wood-industry owners reflects both the incidence of reversion of abandoned farmlands to forests, and the absentee ownership characteristic of such holdings which has manifested itself in spotty forest management. Forest management has been most conspicuously practiced on the public lands and those held by the wood-using industries, with most of the balanced growth and yields appearing on those lands.

---


18 "Forests of East Texas", p. 7.

19 For example, Findell (Op. Cit., p. 8) noted that by 1955, 70 percent of the replanted area in the State of Michigan was publicly-owned; Sternitzke (Op. Cit., p. 6) identified the Ozark and Ouachita regions (half publicly-owned) and the Southwestern region (2/5 owned by forest industries) as leading in both reforestation and pine volume.
In terms of volume of standing live timber, a comparison shows Louisiana to be the leader of the four survey states (see Tables 3a and 3b) in both the sawtimber and growing-stock measures. Arkansas and Michigan are in a virtual tie for second-place in volume of growing stock, with Texas last by a considerable margin. In sawtimber volume (mature trees) however, Texas is ahead of Michigan, reflecting the rebuilding task facing the latter state's forest industry.\(^{20}\) Michigan's softwood production is a problem area, dating back to the last century, when ruthless logging operations in their heyday all but eliminated her famed white pines. Many of the former white-pine stands have been supplanted by volunteer growth of aspen, a wood less-desired by the wood-using industries.\(^{21}\) In East Texas, the Southeastern region appears to be progressing much more than the Northeastern region, the former held in principally-large tracts by private owners and wood-using industries, while the Northeast is characterized by small holdings by farmers and others.\(^{22}\)

One characteristic of forestry industries among the states which has both predictive and descriptive values for the quality of forest management, and the probable future expectations for sustained (or increasing, or decreasing) yields is the ratio of net annual growth to net annual cut for sawtimber and growing stock. These ratios are portrayed below:


\(^{22}\)"Forests of East Texas", pp. 1,2.
Table 3c

Ratio of Net Annual Growth to Net Annual Cut, 1962: Sawtimber and Growing Stock

<table>
<thead>
<tr>
<th></th>
<th>U.S.</th>
<th>Arkansas</th>
<th>Louisiana</th>
<th>Michigan</th>
<th>Texas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sawtimber......</td>
<td>1.13</td>
<td>1.47</td>
<td>2.18</td>
<td>2.09</td>
<td>2.26</td>
</tr>
<tr>
<td>Growing Stock...</td>
<td>1.60</td>
<td>1.67</td>
<td>2.15</td>
<td>2.50</td>
<td>2.26</td>
</tr>
</tbody>
</table>

Source: Tables 3a and 3b

The above ratios do not, however, portray some significant qualitative and quantitative characteristics of the forest volume within the states. In the State of Arkansas, for example, softwoods have been gaining in volume steadily, with 80 percent of the gain in softwood timber occurring on tracts held either by public agencies or by the wood-using industries, largely in Western Arkansas. At the same time, hardwood volume has been declining in the sawtimber-sized classes for the state, both as a result of overcut (with the cut exceeding growth by as much as 69 percent in 1958) and the removal of hardwood trees (either as a silviculture measure in lands better suited to pines or other softwoods, or clearing of farm lands, especially in the Delta Regions) from forest lands.

24 Ibid., p. 9.
Louisiana's forest land is rated as 50 percent well-stocked\textsuperscript{25} (containing at least 70 percent of the number of good trees, including seedlings and saplings, required for full stocking), as compared to about two-thirds of Arkansas' forest land,\textsuperscript{26} and an area approaching 70 percent for Michigan.\textsuperscript{27} and 59 percent for the East Texas forests.\textsuperscript{28} The Southwestern section of Louisiana is in process of rebuilding (though not infrequently without direct management) following a heavy cutting during the 1930's.\textsuperscript{29} Finally, although Louisiana's hardwood stands are nearly half of sawtimber size, the largest concentration lies in the bottomland stands (three-fifths of total volume) along the Pearl River, Mississippi River, and elsewhere where logging operations are "difficult".\textsuperscript{30}

Michigan's forest problems, in addition to the dearth of good-quality softwood sawtimber, include an unbalanced volume in softwoods, with saplings and seedlings in abundance, but a dearth in poletimber-sized trees to serve both the current needs of the pulpwood industry, and the necessary subsequent growth to sawtimber size, a category which is already deficient.\textsuperscript{31} Finally, balance in the cutting of trees has been cited as lacking, with some trees (especially yellow birch, sugar maple, spruce and

\textsuperscript{25}"Forests of Louisiana", p. 6.
\textsuperscript{26}Sternitzke, \textit{Op. Cit.}, p. 4.
\textsuperscript{27}Findell, \textit{Op. Cit.}, pp. 2,3.
\textsuperscript{28}"Forests of East Texas", p. 5.
\textsuperscript{29}"Forests of Louisiana", p. 8.
\textsuperscript{30}Ibid., p. 4.
balsam fir) being overcut, and others (such as oak, aspen, paper birch and soft maple) undercut to the extent that even necessary selective thinning is inadequate.\textsuperscript{32}

In the East Texas forests, the Northeastern region comprises a problem area, consisting of numerous small-sized tracts notable for the absence of sound forest management. Chronic overcut of softwoods between 1935 and 1955 resulted in a 39 percent decrease in softwood volume in this area, while the Southeastern region showed a 23 percent gain in this category.\textsuperscript{33} The fact that the Southeast is characterized by larger tracts, and numerous tracts owned and managed by government or wood-using industries, gives some indication as to why this two-sided picture exists for East Texas forests. Thus, the Northeast contains less than 50 percent well-stocked stands, while the Southeast shows better than 65 percent well-stocked stands.\textsuperscript{34}

To summarize, it appears that timber and forest products are, and will continue to be significant for each of the states' manufacturing and employment (perhaps a good deal more for the three Southern states, if present indications may be credited, than for Michigan). Some forest problems are common to all the states (need for education in scientific forest management, problems with insects, fire and disease, and presence of cull trees, for example), while others, such as Louisiana's "difficult" logging in the swamplands, or the competition between rich Delta farming

\textsuperscript{32}Ibid., pp. 9, 10

\textsuperscript{33}"Forests of East Texas", Table 3, p. 6.

\textsuperscript{34}Ibid., pp. 5, 6.
potential and needed hardwood stands occupying the land in Arkansas, are unique to each state.

It appears that efforts are being made to expand methods of sound forestry management by government, industry and private agencies in each state, but the success has been larger with those groups who might be expected to grasp opportunities for more efficient forest operations -- the public agencies (as an example to private owners, to some extent) and the wood-using industries. Small tracts should provide a steadily-diminishing contribution to total volume and cutting for the timber industry, continuing the trend that emerges in each of the four forest surveys consulted for this study.

The conditions and expectations surrounding the conduct of forest operations should provide helpful perspective for adjudging the effectiveness and appropriateness of forest tax policy, and rates of taxation, to be examined in Chapter III of this study. The way in which such taxes have been shaped by, and at the same time have contributed to the shaping of, forest practices and conditions in each of the several survey states should now be somewhat easier to ascertain.

B. Mineral Resources

Mineral resources, as non-renewable by nature, present not only the questions of conservation and efficient use, but additionally raise the considerations of available reserves and the depletion period at current production rates. Some attention will be given to these matters, as well as the production, employment and economic impact of mineral resource industries to the survey states. For purposes of classification, mineral
production has been scheduled in three classifications: mineral fuels, metallic minerals, and other minerals. Summary data on minerals production for the survey states, and for the United States, for the year 1965 are presented on the pages immediately following (Table 6), and frequent reference will be made to these descriptive figures.

Mineral Fuels. The significance of mineral fuels to the states of Texas and Louisiana is very evident from an examination of Table 6, with the two states ranking first and second, respectively in value of mineral fuels production in the nation. This is based largely on the strength of crude petroleum, but also includes natural gas and natural gas liquids leadership. These substances are also very important to Arkansas' minerals yield, accounting for almost half her total for minerals. By contrast, Michigan's mineral-fuels production accounts for only about 10 percent of the total value of her minerals value. In absolute terms, Texas' mineral fuels accounted for almost 4.3 billions of dollars for 1965, and comprised about 37 percent of production value for the entire nation in that year. Louisiana's 2.8 billion-dollar yield placed her second to Texas, and accounted for about 20 percent. Among the survey states, Arkansas was third with 88 million dollars from mineral fuels, and Michigan last with 56 millions, neither being significant nationally.

Arkansas was the only one of the four survey states to record coal production in 1965, though Texas' production of some lignite was noted among the "items whose value cannot be disclosed" for security purposes (Table 6, p. 48). Arkansas apparently had some lignite produced under somewhat similar conditions, but the bulk of her production was bituminous coal. The producing coal mines (six were active in 1965) were located in
Table 6

Mineral Production in the United States, Arkansas, Louisiana, Michigan and Texas for the Year 1965

(Value in thousands of dollars; Quantities as indicated)

<table>
<thead>
<tr>
<th>Mineral</th>
<th>United States</th>
<th>Arkansas</th>
<th>Louisiana</th>
<th>Michigan</th>
<th>Texas</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. MINERAL FUELS:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coal (Bituminous and Lignite)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Th. short tons</td>
<td>512,088</td>
<td>226</td>
<td>---</td>
<td>---</td>
<td>W</td>
</tr>
<tr>
<td>Value</td>
<td>2,276,022</td>
<td>1,643</td>
<td>---</td>
<td>---</td>
<td>W</td>
</tr>
<tr>
<td>Natural Gas (millions of cubic feet)</td>
<td>16,032,755</td>
<td>82,841</td>
<td>4,466,786</td>
<td>34,558</td>
<td>6,636,555</td>
</tr>
<tr>
<td>Value</td>
<td>2,494,542</td>
<td>12,922</td>
<td>812,955</td>
<td>8,674</td>
<td>858,396</td>
</tr>
<tr>
<td>Natural Gas Liquids:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural Gasoline and cycle products (th. gallons)</td>
<td>7,288,070</td>
<td>27,787</td>
<td>1,431,836</td>
<td>9,054</td>
<td>3,772,471</td>
</tr>
<tr>
<td>Value</td>
<td>494,354</td>
<td>1,578</td>
<td>102,731</td>
<td>607</td>
<td>256,959</td>
</tr>
<tr>
<td>LP gases (th. gallons)</td>
<td>11,257,267</td>
<td>69,752</td>
<td>1,300,038</td>
<td>76,299</td>
<td>5,847,601</td>
</tr>
<tr>
<td>Value</td>
<td>417,249</td>
<td>3,139</td>
<td>46,101</td>
<td>3,815</td>
<td>204,666</td>
</tr>
<tr>
<td>Peat (Short tons)</td>
<td>603,746</td>
<td>---</td>
<td>---</td>
<td>230,950</td>
<td>---</td>
</tr>
<tr>
<td>Value</td>
<td>6,080</td>
<td>---</td>
<td>---</td>
<td>2,134</td>
<td>---</td>
</tr>
<tr>
<td>Petroleum (crude)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Th. 42-gal. barrels)</td>
<td>2,848,462</td>
<td>25,950</td>
<td>594,830</td>
<td>14,728</td>
<td>1,000,749</td>
</tr>
<tr>
<td>Value</td>
<td>8,158,150</td>
<td>68,974</td>
<td>1,841,714</td>
<td>41,091</td>
<td>2,962,119</td>
</tr>
<tr>
<td>Value of other Mineral Fuels:</td>
<td>35,652</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>W</td>
</tr>
<tr>
<td>Total Value Min. Fuels:</td>
<td>14,045,000</td>
<td>88,256</td>
<td>2,803,501</td>
<td>56,321</td>
<td>4,282,140</td>
</tr>
</tbody>
</table>

Footnotes at End of Table
Table 6 (continued)

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Production / Value of Production</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>United States</td>
</tr>
<tr>
<td>Bauxite (long tons-dried equivalent)</td>
<td>1,653,840</td>
</tr>
<tr>
<td>Value</td>
<td>18,652</td>
</tr>
<tr>
<td>Copper (recoverable content of ores, sh. tons)</td>
<td>1,351,734</td>
</tr>
<tr>
<td>Value</td>
<td>957,028</td>
</tr>
<tr>
<td>Iron Ore (usable, thous. long tons)</td>
<td>84,472</td>
</tr>
<tr>
<td>Value</td>
<td>804,498</td>
</tr>
<tr>
<td>Wilver (recoverable content of ores, th. Troy oz.)</td>
<td>39,808</td>
</tr>
<tr>
<td>Values</td>
<td>51,469</td>
</tr>
<tr>
<td>Other Metals Value</td>
<td>1,640,373</td>
</tr>
<tr>
<td>Total Metals Value</td>
<td>2,472,000</td>
</tr>
</tbody>
</table>

III. OTHER MINERALS:

<table>
<thead>
<tr>
<th></th>
<th>United States</th>
<th>Arkansas</th>
<th>Louisiana</th>
<th>Michigan</th>
<th>Texas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barite (th. short tons)</td>
<td>852</td>
<td>249</td>
<td>---</td>
<td>---</td>
<td>W</td>
</tr>
<tr>
<td>Value</td>
<td>10,192</td>
<td>2,379</td>
<td>---</td>
<td>---</td>
<td>W</td>
</tr>
<tr>
<td>Bromine and Bromine in compounds (th. lbs.)</td>
<td>328,115</td>
<td>32,254</td>
<td>---</td>
<td>W</td>
<td>W</td>
</tr>
<tr>
<td>Value</td>
<td>77,259</td>
<td>7,171</td>
<td>---</td>
<td>W</td>
<td>W</td>
</tr>
</tbody>
</table>

Footnotes at end of table
Table 6 (continued)

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Production / Value of Production</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>United States</td>
</tr>
<tr>
<td>Cement:</td>
<td></td>
</tr>
<tr>
<td>Portland (th. 376-lb. barrels)</td>
<td>366,802</td>
</tr>
<tr>
<td>Value</td>
<td>1,154,448</td>
</tr>
<tr>
<td>Masonry (th. 280-lb. barrels)</td>
<td>23,260</td>
</tr>
<tr>
<td>Value</td>
<td>65,979</td>
</tr>
<tr>
<td>Clays (th. short tons)</td>
<td>55,099</td>
</tr>
<tr>
<td>Value</td>
<td>203,772</td>
</tr>
<tr>
<td>Gem Stones (est)</td>
<td>NA</td>
</tr>
<tr>
<td>Value</td>
<td>2,218</td>
</tr>
<tr>
<td>Gympsum (th. short tons)</td>
<td>10,035</td>
</tr>
<tr>
<td>Value</td>
<td>37,423</td>
</tr>
<tr>
<td>Helium (th. cubic feet)</td>
<td></td>
</tr>
<tr>
<td>Crude</td>
<td>3,566,734</td>
</tr>
<tr>
<td>Value</td>
<td>39,848</td>
</tr>
<tr>
<td>Grade A</td>
<td>819,100</td>
</tr>
<tr>
<td>Value</td>
<td>28,880</td>
</tr>
<tr>
<td>Lime (th. short tons)</td>
<td>16,794</td>
</tr>
<tr>
<td>Value</td>
<td>232,939</td>
</tr>
<tr>
<td>Magnesium Compounds from sea water and brine (exc. for metals) sh. tons, MgO equiv.</td>
<td>664,021</td>
</tr>
<tr>
<td>Value</td>
<td>47,555</td>
</tr>
</tbody>
</table>

Footnotes at end of table
### Table 6 (continued)

<table>
<thead>
<tr>
<th>Mineral</th>
<th>United States</th>
<th>Arkansas</th>
<th>Louisiana</th>
<th>Michigan</th>
<th>Texas</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>III. OTHER MINERALS (cont.)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perlite (short tons)</td>
<td>339,384</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>1,000</td>
</tr>
<tr>
<td>Value</td>
<td>3,352</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>8</td>
</tr>
<tr>
<td>Salt (Th. short tons)</td>
<td>37,687</td>
<td>---</td>
<td>8,126</td>
<td>4,171</td>
<td>6,964</td>
</tr>
<tr>
<td>Value</td>
<td>215,699</td>
<td>---</td>
<td>41,812</td>
<td>36,087</td>
<td>30,771</td>
</tr>
<tr>
<td>Sand and Gravel (th. short tons)</td>
<td>908,049</td>
<td>12,806</td>
<td>14,298</td>
<td>37,545</td>
<td>32,649</td>
</tr>
<tr>
<td>Value</td>
<td>457,416</td>
<td>15,836</td>
<td>16,405</td>
<td>27,296</td>
<td>36,075</td>
</tr>
<tr>
<td>Stone4 (Th. short tons)</td>
<td>780,012</td>
<td>21,806</td>
<td>7,452</td>
<td>34,713</td>
<td>39,520</td>
</tr>
<tr>
<td>Value</td>
<td>1,203,618</td>
<td>26,778</td>
<td>10,905</td>
<td>36,438</td>
<td>53,659</td>
</tr>
<tr>
<td>Sulfur (Frasch-process mines - long tons)</td>
<td>7,251</td>
<td>---</td>
<td>3,577</td>
<td>---</td>
<td>3,674</td>
</tr>
<tr>
<td>Value</td>
<td>146,921</td>
<td>---</td>
<td>71,966</td>
<td>---</td>
<td>83,282</td>
</tr>
<tr>
<td>Talc and Soapstone (sh. tons)</td>
<td>862,875</td>
<td>w</td>
<td>---</td>
<td>---</td>
<td>64,211</td>
</tr>
<tr>
<td>Value</td>
<td>6,343</td>
<td>w</td>
<td>---</td>
<td>---</td>
<td>204</td>
</tr>
<tr>
<td>Value of other Minerals not listed above, U.S.</td>
<td>82,138</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>Total Value Other Minerals</strong></td>
<td>4,117,000</td>
<td>56,861</td>
<td>152,004</td>
<td>238,997</td>
<td>357,660</td>
</tr>
<tr>
<td><strong>Value of Items withheld from disclosure, incl. items designated $W$</strong></td>
<td>xx</td>
<td>16,019</td>
<td>23,350</td>
<td>53,490</td>
<td>78,328</td>
</tr>
<tr>
<td><strong>TOTAL VALUE ALL MINERALS</strong></td>
<td>21,433,000</td>
<td>179,110</td>
<td>2,978,855</td>
<td>565,560</td>
<td>4,718,129</td>
</tr>
</tbody>
</table>

Footnotes following page
Table 6 (concluded)

| NA: Not Available | xx: Not Applicable | W: Withheld to avoid disclosure of individual company confidential data; included with "value of items that cannot be disclosed."

1. Figures are for bituminous coal production in Arkansas, lignite production in Arkansas and Texas are withheld to avoid disclosure of confidential data.
2. Refers in each case to the minerals not produced by the four survey states.
3. Total is incomplete, due to the withholding of value data on confidential items.
4. "Stone" in this case excludes abrasive stone, bituminous limestone, and ground soapstone. These items appear elsewhere, or in the "items that cannot be disclosed" data.
5. In addition to the "W" items, the following are included in the "items that cannot be disclosed" column:
   - For Arkansas: Abrasive stone, phosphate rock, soapstone, tripoli, and lignite;
   - For Louisiana: stone (crushed miscellaneous);
   - For Michigan: Bromine, calcium-magnesium chloride, iodine, potassium salts;
   - For Texas: Native asphalt, graphite, magnesium chloride (for metal), pumice, sodium sulfate, and uranium ore.

Western and Westcentral areas of the state, primarily in three counties -- Franklin, Johnson and Sebastian. Total production was only about 226 thousand tons, with Johnson county mines accounting for about 129 thousand, Franklin about 87 thousand, and Sebastian about 10 thousand.\textsuperscript{35}

Coal-mining in the state accounted for only an average of 109 employees in the mine, working an average of 185 days, or a total of about 20,000 man-days, with most operations being surface of "strip" mines (less than 4,000 tons came from underground operations in 1965).\textsuperscript{36} Arkansas' total production accounted for less than 0.5 percent of the national output, and yielded $1.6 millions in value (Table 6).

Although only Arkansas and Texas were identified as producers in 1965 among the survey states, the state of Michigan also has some known coal deposits of possible commercial value in the Central portion of Lower Michigan, but apparently the exploitation of these deposits is not economically feasible at this time.\textsuperscript{37} Most of the Texas and Arkansas production currently goes to gas and coke plants, with small quantities to retail dealers and other users.\textsuperscript{38} Recently, speculation has arisen concerning the possible effects of the Arkansas River Navigation Project upon the coal mines located in the vicinity of the river, with rumors of tentative contracts between mine owners and Japanese industrial interests for delivery


\textsuperscript{36}Ibid., Loc. Cit. and p. 123.

of coal to that nation (a major coal-user in recent years) in the 1970's, when the Navigation Project is scheduled for completion. Arkansas' coal reserves are calculated at only about 2.4 billion tons as of 1960, and only about half of that is recoverable, according to industry norms.\[39\]

Michigan's known reserves were only 205 million tons, with about 102 million recoverable by the industry standard. These figures compare with national figures of 1,660 billion tons total, or 830 billion tons recoverable.\[40\]

In the production of natural gas, Texas leads not only the survey states, but the nation as well, in the volume and value of production, with Louisiana second in both categories. Texas' production of 6.6 trillion cubic feet in 1965 accounted for about 41 percent of national production, with Louisiana's 4.5 trillion cubic feet comprising just short of 28 percent of the national total. Thus, between the two states, more than two-thirds of the total output of natural gas is accounted for. Arkansas is a distant third among the survey states, with 83 billion feet, and Michigan's production was a modest 34.6 billion cubic feet. Natural gas is found abundantly in many areas of Louisiana and Texas, sometimes in wells producing dry gas, and virtually always is found in conjunction with crude oil deposits.\[41\]

Arkansas's gas fields lie in the Southern, Southwestern and Western parts of the states, presently, and Lower Michigan's

---


40Ibid.

oil lands also contain many of her natural gas deposits.\textsuperscript{42} The production, especially, of Louisiana, and to a considerable degree, that of Texas have been augmented substantially by offshore discoveries. The reserves of natural gas proved as of the end of 1965 are indicated below:

Table 7

Estimated Proved Recoverable Reserves of Natural Gas -- Arkansas, Louisiana, Michigan, Texas and United States, Jan. 1, 1966

(Million cu. ft. at 14.73 psia at 60°F)

<table>
<thead>
<tr>
<th>State</th>
<th>Reserves</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arkansas</td>
<td>2,269,012</td>
</tr>
<tr>
<td>Louisiana</td>
<td>82,811,157</td>
</tr>
<tr>
<td>Michigan</td>
<td>745,804</td>
</tr>
<tr>
<td>Texas</td>
<td>114,335,292</td>
</tr>
<tr>
<td>Total U.S.</td>
<td>286,468,923</td>
</tr>
</tbody>
</table>

Source: Minerals Yearbook

Much the same relationship applies among the survey states in the production of natural gas liquids (often, but not always associated with oil-field operations). Again, Texas led both the survey states and the nation with a total of 9.6 billion gallons of combined categories, half the national production, and Louisiana was second with a combined total of 2.7 billion gallons. Arkansas and Michigan lagged far behind with 97 million and 85 million gallons, respectively. Data on reserves are as follows:

\textsuperscript{42}Ibid., pp. 16, 36.
Table 8

Estimated Proved Recoverable Reserves
of Natural Gas Liquids -- Arkansas, Louisiana, Michigan, Texas and U. S. as of Jan. 1, 1966
(Thousands of barrels)

<table>
<thead>
<tr>
<th>State</th>
<th>Barrels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arkansas</td>
<td>14,756</td>
</tr>
<tr>
<td>Louisiana</td>
<td>2,168,802</td>
</tr>
<tr>
<td>Michigan</td>
<td>4,916</td>
</tr>
<tr>
<td>Texas</td>
<td>3,648,624</td>
</tr>
<tr>
<td>Total U.S.</td>
<td>8,023,534</td>
</tr>
</tbody>
</table>

Source: Minerals Yearbook

Texas is the only state in the survey group producing helium, which is designated a "mineral fuel" by the Bureau of Mines. Of a total 1965 production of 3.5 billion cubic feet, Texas accounted for 1 billion cubic feet of crude helium; of 819 million cubic feet of Grade A helium, Texas produced 350 million cubic feet. This production yielded values of $10.33 millions and $12.25 millions, respectively for Texas' mineral industries. Other principal producers were Oklahoma, New Mexico and Nevada.

Peat is produced only by Michigan among the survey states, and she is the leading producer of this substance, again classified as a "mineral fuel" by the Bureau of Mines, but most of Michigan's output was used for agricultural purposes, such as potting soils, mulch and plant nutrients. In 1965, Michigan's production of 231 million short tons accounted for 38 percent of national yield. Michigan and the next six

---

44 Ibid.
producers account for three-fourths of the national total, though some 26 states reported production.46

Finally, and by no means least, Crude petroleum is produced by each of the survey states. Again, Texas was the undisputed leader in 1965, with production of 1,000 million barrels, more than 30 percent of the national total. Louisiana was second, both in the survey group and nationally, with a total of 595 million barrels, or about 21.6 percent of national yield. Arkansas’ production of 26 million barrels ranked her 13th among 31 identified producing states, and Michigan’s 15 million barrels placed 18th.47

In addition to inland producing areas of considerable magnitude, Texas and Louisiana also draw considerable crude oil from offshore drilling in the Gulf of Mexico. Producing wells may be found in numerous locations over much of the area of the states of Texas and Louisiana, but Arkansas’ production takes place mostly in the Southern and Southwestern portion of the state, in a limited number of fields at present. Michigan’s Lower Peninsula area produces oil in central and Southwestern sections.

Estimated proved reserves for crude petroleum are indicated in the following summary:

46Ibid.

Table 9

Estimates of Proved Recoverable Crude-Oil Reserves of the United States, Arkansas, Louisiana, Michigan and Texas, January 1, 1966
(Millions of barrels)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>31,352</td>
</tr>
<tr>
<td>Arkansas</td>
<td>201</td>
</tr>
<tr>
<td>Louisiana</td>
<td>5,246</td>
</tr>
<tr>
<td>Michigan</td>
<td>53</td>
</tr>
<tr>
<td>Texas</td>
<td>9,181</td>
</tr>
</tbody>
</table>

Petroleum products constitute the overwhelming payoffs for Texas and Louisiana among their minerals industries, accounting for about 91 percent of the value of Texas' unprocessed minerals value, and 94 percent of that for Louisiana. When the extensive refining, transportation, and associated value-adding industries of the two states are considered, the significance of the petroleum wealth of the two states is magnified many times over. In Arkansas, the value of petroleum products at the unprocessed level approaches 47 percent of her minerals value, but for Michigan, the petroleum production totals only about 10 percent of minerals value, prior to processing.

Metallic Minerals. This category would be somewhat sparsely-populated among the survey states, were it not for the presence of Michigan (see Table 6, p. 48). Michigan is the only survey state with a substantial metals industry of multiple-product significance. This is not to discount the importance of the bauxite production of Arkansas, in which she stands virtually alone among states of the Union. Louisiana and Texas, for all their massive mineral wealth, have no significant production in this group.
Arkansas, as indicated, has a virtual monopoly on the domestic production of bauxite ore, the greyish, claylike base for aluminum. Of total domestic production, Arkansas accounts for over 95 percent annually (the two other domestic producing states are Alabama and Georgia). This also describes her position in known reserves of bauxite ore for the U.S. It should be noted, however, that the production of bauxite ore in Arkansas, and in the nation (1,593 and 1,654 thousand long tons in 1965, respectively) represent a pittance of world production (36,530 thousand long tons in 1965). The U. S. aluminum-manufacturing industry thus finds it necessary to import substantial amounts of bauxite and alumina (semi-processed ore) to meet its needs. Jamaica led the world in bauxite production in 1965, with 8,514 thousand long tons, and several South American countries (Venezuela and Surinam, for example) led the United States in production. In Arkansas, bauxite ore is found principally in three counties in the central part of the state: Pulaski, Saline and Garland. In addition to the basic mining operations, two of the principal aluminum producing firms operate reduction and alumina plants in Saline and Garland counties. No plant to produce finished aluminum metal has yet been built in the state.

As a percent of value of Arkansas' minerals industries at the resource level, the $18 millions realized from bauxite constitute almost 10 percent, though it should be apparent that the processing and related activities would substantially enhance its total value to the state's

---


49 Ibid.
economy. Although they do not produce bauxite ore, the states of Texas and Louisiana are involved in the aluminum industry, with processing plants in each state for ores imported into Gulf ports from South America, principally alumina and other treatment plants.

Copper ore is produced only by Michigan among the survey states, and she does not rank among the leading producers (she was sixth in 1965, and for most years preceding, among eight producing states). Her 1965 production of 72 thousand short tons yielded a value of $51 millions (less than 0.5 percent of total output value for the U.S.), according to Table 6, p. 48. Copper production is carried on in mines in the Western Upper Peninsula, located in three counties: Houghton, Keweenaw and Ontonagon.

Michigan is also virtually exclusive among the survey states in her production of iron ore, ranking generally 1 - 2 with Minnesota in national production. Michigan's 1965 output was 13.5 million long tons of usable iron ore, out of a total industry production of 84.5 millions, or about 16 percent of the total. The yield of $145.5 millions of dollars constitutes Michigan's largest mineral payoff, and the largest resource-industry yield in value of product, as well. Michigan's iron-ore production, like her copper production, arises from ranges in the Upper Peninsula, centered in the counties of Marquette, and Menominee in the central portion, and Gogebic in the West. The volume is roughly accounted for in the order

---


53 Michigan Yearbook, Loc. Cit.
indicated, though all are fairly well-balanced in output. Modest operations attempting to extract iron ore from low-grade pyrites have been undertaken in Arkansas and Texas, but no value or quantity figures are available at this time.\footnote{Minerals Yearbook, 1965, Vol. I, p. 480.}

Silver production is carried on in Michigan's Upper Peninsula on a small scale by a limited number of firms.\footnote{Minerals Yearbook, 1965, Vol. I, p. 112, p. 832.} The value of this production in 1965 of $592,000 places it in a minor category.

In assessing metals production, Michigan clearly has the greatest stake in this minerals category, with about 34.7 percent of her total 1965 minerals value consisting of metals production. With the exception of Bauxite, which comprises about 10 percent of the minerals value for Arkansas, metals are not a major contributor to the minerals industries of that state. Nor does the small iron-ore development in Texas appear to present the likelihood of substantial volume in the near future. Louisiana has no commercial metals-ore production, though both that state and the state of Texas do have metals-processing activities.

Other Minerals. Because this category is so numerous, and contains many items produced in only very small quantities, attention will be given in the following discussion only to those minerals in which one or more of the survey states is a leading producer. One observation at the outset is that Texas produces the largest variety of minerals other than metals and mineral fuels, and derives the largest total value from this group. Next in order is Michigan, with a similarly-diverse variety and
a substantial value, followed by Arkansas in number of categories, but Louisiana in values (largely on the basis of her rich salt and sulfur production). Percentage importance of the "other minerals" category to the four states is as follows: Texas, 7.6 percent; Louisiana, 5 percent; Arkansas, 31.6 percent; and Michigan, 42 percent, which is striking evidence of the tremendous importance of mineral fuels in Louisiana and Texas, and of the balanced minerals production for Arkansas and Michigan.

Arkansas was second nationally in 1965 production of barite, a material whose major use has been as an abrasive component in drilling "mud" used for drilling oil and gas wells. Missouri ranked ahead of Arkansas in 1965, but the lead had changed hands between these two states frequently for several years, with neither enjoying a clear quantity advantage. Texas also produces this substance, but no figures were disclosed for 1965, to protect confidential company records. (Table 6, p. 48). Total production for Arkansas in 1965 was 249 thousand tons, or 29 percent of the national production of 852 thousand tons. Value of the Arkansas production was about $2.4 million. Texas is not among the leaders in barite production, but Nevada and Georgia are major producers.

In the production of Bromine and bromine in compounds, Michigan led the nation in 1965, followed by Texas, but, due to requirements for security of company data, no figures were made public for either state. Arkansas ranked third in production in 1965, with 32,254 thousand pounds,

57 Ibid.
58 Ibid., pp. 257-8.
or about 10 percent of total U. S. production of 328,115 thousand pounds, and produced a value of more than $77 millions.

Among producers of all types of cement, Texas ranked third nationally in 1965, with Michigan fourth. Texas' advantage over Michigan was in the production of Portland cement, with 30.8 million barrels producing $97 millions, compared to Michigan's 27.6 million barrels, producing $87 millions. In masonry cement, Michigan had a definite edge, with 2 million barrels and $5.4 millions, compared to Texas' 968 thousand barrels, producing $3 millions (Table 6, p. 48). Both Arkansas and Louisiana produced cement of both types, but data were withheld to protect company identities and records.

Michigan is the second-leading producer nationally of gypsum, an alkaline, talc-like substance used in such things as cement-making (masonry), dry wallboard, and some paint-making processes. Texas is fourth nationally, close behind Michigan's 1965 total of 1.3 million short tons and 13 percent of the total, with about 1 million tons and 10 percent of the national output. Arkansas also had production of gypsum in 1965, but data were withheld for protection of company records.

In the production of lime, Texas and Michigan are third and fourth nationally with the lead changing from time to time. In 1965, Texas' production was higher, with about 1.3 million short tons to Michigan's 1.1 million. Louisiana was not far behind with 842 thousand short tons, and Arkansas produced a modest 192 thousand short tons. Lime production is

58Ibid., pp. 273, 276.
rather generalized, with the majority of states contributing to the totals, so that the rankings are subject to frequent change.61 Texas, for example, accounted for only about 8 percent of the national total in 1965, Louisiana for about 6.5 percent, even though they were high-ranking states.

Michigan leads the nation in the production of magnesium compounds synthesized from sea water and brines, and Texas was third in 1965. Almost half the total for 1965 was produced by Michigan (see Table 6). Arkansas and Louisiana had no recorded production of these compounds.

Louisiana ranked first nationally in the production of salt in 1965, with a production of about 8 million short tons. Texas was second with about 7 million short tons. Michigan was also a substantial contributor with 4 million short tons. Arkansas did not record production of salt, and apparently has no commercially-significant deposits. The three survey states which did record production together account for half the national total (Table 6).

Michigan ranks second nationally in the production of sand and gravel, with 37.5 million short tons in 1965,62 but, because of the almost-universal production of these materials, her share is only about 4 percent of the total. Her 37.5 million short tons was closely-matched by 32.6 million for Texas, followed among the survey states by Louisiana's 14.3 million and Arkansas' 12.8 million.

Texas led the nation in production of sodium sulfate in 1965, but production figures were not made public for reasons of company

61 Ibid., pp. 597-601.
Two other states produce natural sodium sulfate: California and Wyoming.

Production of sulfur by the Frasch process (involving hydraulic recovery) is shared exclusively by two states: Texas and Louisiana, and their positions are virtually in a tie; Texas led with 3.7 million long tons in 1965, or about 51 percent, and Louisiana had 3.6 million long tons, or 49 percent. Production yielded $83 millions to Texas in 1965, and about $72 millions to Louisiana.

A summary of minerals production for the four states offers several significant characteristics indicative of the differential importance of these industries. First, it should be noted that Texas and Louisiana, with, respectively, $4.7 billions and $3 billions in values of product at the mine or well, of a national total of approximately $21 billions, are the two most significant resource-producers in the nation. Taken together, the two states alone account for one-third of all mineral values in 1965. Michigan's mineral value of 565.6 million dollars constitutes a bit more than 2.6 percent, while Arkansas' total of 179 million dollars constitutes only about 0.83 percent of the national total. Viewed in terms of the fifty states, the resource industries of Texas and Louisiana are much-greater-than-proportionate in their share of the total, Michigan is slightly more-than-proportional, and Arkansas is decidedly less-than-proportional to the average.

As previously noted, mineral fuels constitute the bulk of value for the minerals industries for both Louisiana and Texas (94 and 91 pers-
cent, respectively). For Arkansas, mineral fuels are also the leading category, providing 49 percent of the total. By contrast, Michigan's mineral-fuels are responsible for only about 10 percent of the total; instead, metals (34.9 percent) and other minerals (55.1 percent) produce the bulk of her mineral revenue.

Total employment in mining, as a part of nonagricultural employment serve to illustrate the basic-resource impact on the labor market at the mines and in the fields:

Table 10

| Employees in Mining Industries, 1964, and Total Nonagricultural Employment for the United States, Arkansas, Louisiana, Michigan and Texas |
|---|---|---|
| | Employees (thousands) | Percent in Mining Industry |
| | Total Non-agricultural | Mining |
| United States | 58,188 | 635 | 1.1 |
| Arkansas | 429 | 5 | 1.1 |
| Louisiana | 857 | 46 | 5.4 |
| Michigan | 2,473 | 13 | 0.5 |
| Texas | 2,532 | 110 | 3.8 |


Viewing the figures for mining employment, it should be apparent that, in numbers and percentages employed, basic mining and resource activities are not an overwhelming category. Louisiana had the highest percentage of nonagricultural workers, 5.4 percent, and Michigan had the
lowest, 0.5, while Texas was second with 3.8 percent, and Arkansas stood at about the national average of 1.1 percent. In numbers employed, of course, Texas and Louisiana had a substantial lead over the other two states.

But employment at the mine is by no means the full measure of the employment impact of resource industries. Industries drawing upon the resource base for their activities, such as transportation, refining or processing, service and equipment, and other associated functions may have much greater impact upon employment and incomes than is evident in a summary of those actively engaged in extractive activities. This comprises only the beginning of a chain of activity that extends all the way to the consumer.

C. Fisheries

This brief section is devoted to the study of the fisheries of the four survey states. A review of the results of the 1964 operations of commercial fisheries is presented in Table 11. Catch of fish and shellfish are indicated, along with some pertinent information regarding fishermen, equipment and processing plants.

From an observation of the table, it will be seen that commercial (as opposed to sport, or recreational) fishing is most important to Texas and Louisiana, in terms of volume of catch, value, and affected persons. The value of fisheries products for these two states is several times that of either Arkansas or Michigan. Louisiana's commercial fishing occurs in both the Mississippi River and Gulf fishery areas; that of Texas is principally in the Gulf area, though there is some commercial fishing on rivers
and streams, notably the Red River, but the bulk of her catch, as that of Louisiana, is derived from Gulf fisheries. For Louisiana, only 7 million pounds of her catch came from the Mississippi fisheries area, with a value of about 1.1 million dollars. These figures are consolidated into the totals on the table.

Texas and Louisiana are in a virtual tie for value of fisheries products, though Louisiana catches more poundage of fish, while Texas has an edge in shellfish, such as shrimp, oysters, clams, etc.

Michigan's commercial fisheries produced a total of 20 million pounds of fish in 1964, with a value of $2.5 millions. Michigan is included in the Great Lakes Fisheries area, and draws much of her volume from the waters of these huge inland bodies. She reported no significant shellfish catch by commercial fishermen, and apparently does not deal in these species commercially.

The fisheries of Arkansas are quite modest by comparison, even with the fisheries of Michigan. Her fisheries are all within the Mississippi River Fisheries region, comprised of the systems of the Mississippi: the Arkansas, White, Black, St. Francis and other rivers which are tributaries of the Mississippi. Her total catch for 1964 amounted to only 4 million pounds, comprising a value of about $500 thousand. Her production comes primarily from small operations, often of the family-operated type, with products sold fresh at nearby markets.

Processing plants and manufacturing operations for fish products are, of course, most numerous in Texas and Louisiana (Table 11), and process the largest variety of catch. Those plants in Arkansas, and many of those in Michigan, process mainly rough fish for dog and cat food.
Table II

Fisheries Data, 1964 for Arkansas, Louisiana, Michigan and Texas

<table>
<thead>
<tr>
<th>State</th>
<th>1964 Catch in Thousands of pounds; Value in thousands of dollars</th>
<th>Fishermen (thousands)</th>
<th>Fishing Craft Vessels</th>
<th>Wholesale and Manufacturing</th>
<th>Plants</th>
<th>Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fish catch</td>
<td>value</td>
<td>Shellfish, etc. catch</td>
<td>value</td>
<td>Total catch</td>
<td>value</td>
</tr>
<tr>
<td>Arkansas ......</td>
<td>3,896</td>
<td>477</td>
<td>135</td>
<td>18</td>
<td>4,031</td>
<td>495</td>
</tr>
<tr>
<td>Louisiana .....</td>
<td>704,845</td>
<td>13,817</td>
<td>78,070</td>
<td>22,552</td>
<td>78,087</td>
<td>36,852</td>
</tr>
<tr>
<td>Michigan ......</td>
<td>19,769</td>
<td>2,522</td>
<td>---</td>
<td>---</td>
<td>19,769</td>
<td>2,522</td>
</tr>
<tr>
<td>Texas (Gulf)...</td>
<td>73,152</td>
<td>2,114</td>
<td>71,918</td>
<td>27,414</td>
<td>145,070</td>
<td>29,582</td>
</tr>
</tbody>
</table>

In numbers of fishermen and craft, the preeminent positions of Texas and Louisiana are given further documentation, with Louisiana having nearly 12 thousand fishermen, and Texas more than 6 thousand, as compared to 1,300 in Michigan and 1,000 in Arkansas. The apparent similarity between the fishing employment in Arkansas and Michigan is dispelled when it is seen that Michigan's fishermen utilize not only smaller boats, but substantial numbers of larger lakes vessels. For Arkansas, most boats are of the flat-bottom type, variously called "john-boats", "bateaus", and other names, suited to use on relatively-small rivers and streams.

Mainstays of the Louisiana fishing industry are the menhaden, accounting for 25.6 percent of the value of the 1964 catch, the shrimp, accounting for 56 percent, and the oyster, accounting for nearly 9 percent of the value. The three species combined totaled almost 92 percent of the total value. For Texas, also, the menhaden and shrimp were the species producing the major share of value of the catch; in this case, the shrimp alone accounted for almost 90 percent ($31.2 millions of $35.6 millions) of the total.

Michigan's value leader in 1964 was the whitefish, comprising just less than 27 percent of the total. Next in order were the yellow perch (24.5 percent of value) and chubs (20.4 percent). The three leading species, then, account for about 72 percent of the total value of the catch.

---

64 Fishery Statistics of the U.S., p. 363.
65 Ibid.
Arkansas' leading commercial fish is the buffalofish, with 61.8 percent of the 1964 catch's value. Second-ranking catfish (and bullheads) account for an additional 25.6 percent, and the two species together form more than 87 percent of the value of catch, for the year 1964.67

This brief view of the fisheries industries has sought to place in perspective the comparative importance in scale and value of the activities of the survey states, as well as to denote some qualitative and quantitative contrasts among the states. This may provide some basis of understanding which will be helpful in the study of taxation for this industry, which will be considered in Chapter III. As will be observed, Louisiana has the most extensive system of taxes on fishery products, though Texas, rather surprisingly, does not tax fisheries extensively. In view of the size and scale of the industry of both these states, some question may be raised about that particular lack. For the other two states, the tax structure scarcely considers fisheries, perhaps due to their relatively minor significance.

67Ibid., p. 268.
CHAPTER III

TAXATION OF NATURAL RESOURCES I:
RENEWABLE RESOURCES -- TIMBER AND FISHERIES

Chapters III and IV deal with the taxation of natural resources by the four survey states -- Arkansas, Louisiana, Michigan and Texas. The present chapter is concerned with taxes levied on those resources of a renewable nature: timber and forest products, fisheries and other living resources. The following chapter (Chapter IV) considers the taxation of nonrenewable resources -- minerals and other resources extracted from the soil or water, and not subject to regeneration by human effort or management. This division of the study is intended not only to dramatize the essential differences between the two classifications of resources, but also to illustrate the different character of tax policies applied to the two categories.

A. Forest Taxation

Consistent with the secondary importance assigned to the revenue-producing function of timber taxes, and the concern for conservation and reforestation goals, the forest taxes of the survey states do not dramatically add to the general-fund revenues of those states. A most striking contrast to three of the states is the practice followed by the state of Texas, which levies neither a severance tax on timber nor a special yield-tax formula.

The disposition of revenues from special forest-applied levies differs for the three survey states applying such measures. Arkansas retains a practice once quite common for these taxes -- devoting timber-tax
revenues to the forestry fund. Michigan and Louisiana take a different approach to disposition of revenues, combining tax relief to timber owners through "in lieu" tax plans with a return of a portion of timber-tax receipts to the localities. The apparent intent is to replace a part of the resultant loss of ordinary property-tax revenues. The state of Michigan distinguishes between small, farm-type woodlots and commercial-sized holdings, providing different schedules of taxation for the two categories. Property-tax concessions are made by both Michigan and Louisiana to timber owners under reforestation agreements with the State, but this is not the case in either Arkansas or Texas.

Severance Taxes. Three of the states levy a tax of the severance type (Texas, as previously indicated, does not), though the features of the taxes differ widely. Michigan and Louisiana\(^1\) levy their taxes on value-based rates (ad valorem), while Arkansas assesses a specific (unit-measure) charge, varying with species of timber and type of timber product. Michigan's "stumpage" tax charges different rates for private and commercial severers. Alternative to the general timber-severance tax in Louisiana, all tracts under reforestation contracts with the State are taxed only under the state's "reforestation severance tax", a measure heavily flavored with the "yield-tax" principle. This latter tax excludes the standing timber under reforestation contracts from any and all other taxation, including ad valorem property levies of state or local

\(^1\)Though Louisiana prescribed a schedule of specific unit levies, practice of the Revenue Department currently is to apply the alternative percentage rates instead (see footnote 1 of Table 12).
Table 12

Severance Taxes on Timber and Forest Products
for the States of Arkansas, Louisiana and Michigan

<table>
<thead>
<tr>
<th>State</th>
<th>Arkansas</th>
<th>Louisiana (2)</th>
<th>Michigan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designation</td>
<td>Severance Tax</td>
<td>General Severance tax</td>
<td>Reforestation Severance tax</td>
</tr>
<tr>
<td>Basis of Tax</td>
<td>Privilege of Severing Timber</td>
<td>Privilege of Severing Timber</td>
<td>In Lieu of General Property tax and other taxes</td>
</tr>
<tr>
<td>Rates of Tax</td>
<td>Varies from 20¢ per cord on pulpwood to 50¢ per M board feet on pine sawtimber; complete schedule of unit charges</td>
<td>Virgin Timber: (^1) Varies from 15¢ a standard cord of pulpwood to $1.50 per M Bd. ft. of red gum; Other than virgin timber: 5% avg. stumpage mkt. value for pulpwood; 2 1/2% for all other.</td>
<td>Six percent of value, in lieu of all other taxes.</td>
</tr>
</tbody>
</table>

Footnotes at end of table
<table>
<thead>
<tr>
<th>State</th>
<th>Arkansas</th>
<th>Louisiana</th>
<th>Michigan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designation</td>
<td>Severance tax</td>
<td>General Severance Tax</td>
<td>Reforestation Severance Tax</td>
</tr>
<tr>
<td>Administration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assess:</td>
<td>Revenue dept.</td>
<td>Collector of Revenue</td>
<td>Collector of Revenue</td>
</tr>
<tr>
<td></td>
<td>(Misc. tax div.)</td>
<td>Revenue</td>
<td>Revenue</td>
</tr>
<tr>
<td>Collect:</td>
<td>Revenue dept.</td>
<td>Collector of Revenue</td>
<td>Collector of Revenue</td>
</tr>
<tr>
<td>Reports and Payments</td>
<td>monthly -- payment due</td>
<td>monthly, on or before the last day.</td>
<td>Taxes to be paid when forest products are severed.</td>
</tr>
<tr>
<td>Disposition</td>
<td>Classified as special revenues; payable to state Forestry fund.</td>
<td>Dedicated 75% to parish in which timber is cut; 25% to Gen. Fund.</td>
<td>Same as for the General Severance tax</td>
</tr>
<tr>
<td>Fiscal 1966 Yield</td>
<td>$884,849.25</td>
<td>$484,965.13</td>
<td>$108,444.45</td>
</tr>
</tbody>
</table>

1. An attorney general's opinion dated Jan. 12, 1955 asserted that there is little virgin timber remaining in the state, and, in practice Department of Revenue only applies "other" rates.
2. From Net proceeds after Collector of Revenue receives $400,000 from all combined severance-tax proceeds for cost of collection (RS 47:644).
3. Estimated. Exact figure to be obtained when possible.
Table 12 Sources

7. State of Louisiana, General Severance Tax, Reforestation Severance Tax, et al., Ch. 6, Subtitle II, Title 47, Louisiana Revised Statutes of 1950, etc., pp. 4-14.
governments. Table 12 characterizes special timber taxation measures of
the severance type as to their salient features.

In each of the taxes portrayed in Table 12, there are indica-
tions of the concern for establishment of good forestry practice, and the
recognition of the special needs of forest owners. Arkansas commits tim-
ber-tax revenues to the forestry fund, a practice which was operative in
Louisiana prior to a change in dedication in 1954. Now both Michigan and
Louisiana rely on general-fund and other bases of support for their for-
esty services. Perhaps the logic of this separation of severance reve-
 nues and forestry-fund supports is best described by Marquis, when he as-
serts that a "..strict dependence on only severance revenues.." to finance
needed services rendered by the state's forestry agency is not wise, due
to the fact that "..annual revenues are tied to the level of log produc-
tion..", which may fluctuate from year to year, not necessarily in unison
with conservation needs. 2 Thus, the revenues for both Louisiana's gene-
ral severance tax and her reforestation severance tax are allocated
three-fourths to the parish from which they are harvested and one-fourth
to the state general fund.

In Michigan, the revenues from stumpage levies against the pri-
 vate (woodlot) forest reserves -- to be discussed more fully under "yield
taxes" later in this chapter -- are payable to the treasurers of the town-
ships from which severance was made, while commercial owners pay their
taxes through the state's Conservation Department, one-half going to the
county of origin, and one-half to the state's general fund. These pay-

---

2"Severance Taxes on Forest Products", p. 317, col. 2.
ment schedules are partially in recognition of, and in payment for, property-tax losses incurred by the locality in conjunction with classification of the lands for forestry purposes.

Although Arkansas and Louisiana realize more in dollar terms from their timber-severance taxes than Michigan, in no case is the general fund conspicuously fattened. As previously stated, the Arkansas receipts go directly to the State's Forestry Fund, and Louisiana returns three-fourths of her proceeds to the parishes from which the timber was severed. Financing of forestry functions very probably more than absorbs an amount equal to the one-fourth left to the state general fund.

Yield Taxes. Two of the survey states, Louisiana and Michigan, have developed timber property tax structures embodying the yield-tax principle (See Ch. I). As noted in the earlier discussion, yield taxes are basically designed to provide a measure of relief from the extraordinary burden placed upon owners or resources, especially timber owners during the time between establishment of forest growth and the ultimate harvest, by an annual ad valorem property tax. Barlowe, for example, summarizes the status of the timber owner thus:3

...It is generally conceded that the average forest property which produces one crop of forest products every 25, 50 or 100 years is taxed much higher relative to the value of this product than the farm, which harvests a crop every year, or the commercial and industrial property which turns its inventory over several times during the course of a single tax period.

The need for modification of property-tax timing and burden, therefore, presents itself, even if, as Barlowe suggests, an "element of subsidy" accompanies it.  

Michigan applied the earlier yield approach, with its "woodlot law" enacted in 1911 (CL 320.251-62; MSA 13.181-92), which, in the original form authorized landowners of "up to 160 acres, half of which is improved and devoted to agriculture." to designate up to one-eighth (20 acres) "...as private forest reserves." The law was amended in 1917 to raise the proportion designated to one-fourth (40 acres), and the 5 percent stumpage tax was continued; the minimum forest stand requirement was raised from 170 to 1,200 trees of approved species per acre. The property tax assessment on listed lands was restricted to $1 per acre valuation by the same act (virtually making the measure an "in-lieu" tax, eliminating ad valorem liability). The latter Act yet serves as the basic authorization under which the private forest reserves program operates.

Michigan's "commercial forest reserves" act (CL 205.507; MSA 7.411 (7)) was enacted in 1925 for the purpose of providing yield-tax benefits similar to those enjoyed by woodlot owners to the commercial

---

4Ibid.
5Ibid., p. 362.
6Ibid.
forest developers.\textsuperscript{8} This Act authorized classification, after examination by the Department of Conservation, of:\textsuperscript{9}

...land containing no material natural resources other than forest growth, no portion of which is used for agricultural, mineral, grazing, industrial, recreational or resort purposes, and upon which the owner proposes to develop and maintain a forest either through planting of natural production or both...

Stipulations were also imposed regarding the fitness of the land for forest growth and its present condition as forest land.\textsuperscript{10} This obviously-restrictive law failed to achieve the rehabilitation of much of the land most in need of it, actually excluding much of it from qualification (such as cut-over lands, badly-eroded lands best suited to forests, etc.).

In 1939, the act was amended to approve the listing of:\textsuperscript{11}

...selectively logged lands, land carrying a stand of forest growth well advanced toward maturity, or lands carrying insufficient forest growth, but essential to the proper development of other forest property accepted for listing.

This liberalizing of the statute appears to have been a forthright recognition of the practical needs of modern commercial forest management, and enabled many of the most-needy forest lands to qualify.

The rates of ad valorem bare-land taxes charged to commercial owners has been subject to considerable indecisiveness of action by the lawmakers, with the original stipulation calling for an annual tax of five cents per acre on pine lands and 10 cents per acre on hardwood lands; this

\textsuperscript{8}\textit{Ibid.}
\textsuperscript{9}\textit{Ibid.}
\textsuperscript{10}\textit{Ibid.}
\textsuperscript{11}\textit{Ibid.}
was changed by a 1927 amendment to a uniform 10 cents per acre for all
classified lands, and in 1935 reduced to 5 cents uniformly. The present
rates are based on a 1958 amendment which provided for a sliding scale of
charges, dependent on the millage rate of assessment applied to other
property locally:

- 5 cents per acre if the local rate is less than 20 mills;
- 6 cents per acre if the local rate is between 20 and 25 mills;
- 7 cents per acre if the local rate is between 25 and 30 mills;
- 8 cents per acre if the local rate is between 30 and 35 mills;
- 9 cents per acre if the local rate is between 35 and 40 mills; and
- 10 cents if the rate is 40 or more mills.

Inasmuch as the land levy is paid to the locality, this sliding scale
would have the potential of tempting local assessors to raise the millage
rates to 40 mills or more in areas characterized by large numbers of
classified acres, but perhaps the return would be so nominal that it is
hardly remunerative to do so. At any rate, a uniform, but reasonable,
charge would be less subject to this sort of manipulation by local asses-

ors, and would avoid unfair competitive advantage to owners lodged in
low-millage areas.

The Michigan private and commercial forest reserves programs
are both of a "voluntary" character, with no stipulated contractual term
specified, and with no fixed agreement as to substantive provisions, other
than those general conditions noted above. Although this means that "..the
state may change the terms at any time, ..the owner who is adversely
affected." may withdraw his lands from listing without penalty.

---

13 Ibid.
14 Ibid., p. 365.
Barlowe suggests that, although voluntary listing is desirable, some stipulated contractual applications should be included in the interests of security to the timber owners. Further, the suggestion is made that the woodlot (private forest reserves) laws be modified, and their coverage enlarged, so that more listings will be encouraged. Presumably, this could be accomplished through increasing the allowable percentage of tracts which may be classified (to, perhaps 50 percent of the total acreage, or more), and liberalizing the requirement for cultivation of the part of the tracts which are not eligible for classification.

Louisiana first authorized state reforestation contracts in the constitution of 1921 (Art. X, Section 1), with enabling legislation enacted in 1922 (Act 90). A severance tax on reforested products was authorized by a 1926 constitutional amendment (Act 162), in lieu of other taxes, and with proceeds allocated three-fourths to the parish in which timber was severed, one-fourth to the state general fund. This was superseded by the 1948 amending act mentioned previously (Act 546), which dedicated timber severance taxes to the Louisiana Forestry Commission. The Act of 1954 (Act 759, a constitutional amendment) returned the allocation of revenues to the distribution provided by the 1926 law (Act 162),

15Ibid., p. 373.
18Ibid.
19Ibid.
and this is the present basis for distribution -- three-fourths to the parish of origin, one-fourth to the state's general fund. 20

The reforestation contracts in Louisiana are mandatory and binding in their provisions, with such contracts not to exceed 40 years. Timber produced on lands under contract is subject only to the reforestation severance tax, and may not be taxed under the ad valorem property tax. Though the land is not so exempted, it may be taxed only at a fixed, relatively nominal rate. 21

Louisiana's mandatory land classification under Act 759 of 1954 has provided for, in addition to land under reforestation contracts, four other classifications of forest land: "tidewater cypress", "hardwood lands", "long-leaf pine lands", and "other pine lands". 22 The taxation of timber on the classified lands is now based on rates of 2 1/2 percent on all timber except pulpwood, and 5 percent on pulpwood (average stumpage value in each case). The bare land in each case is subject to property taxation at the local level, with the stipulation of uniform assessment for all lands within a particular classification. 23 Thus, no property within, say, the tidewater cypress classification, may be assessed at a different valuation than other lands in this same classification, regardless of differences in local assessment practices. This has the effect

20Ibid.
23Williams, "Trends in Forest Taxation", p. 128.
of leveling assessments statewide on bare-land values for all timber tracts in the same classification.

The states of Arkansas and Texas have no counterparts to the yield-tax measures of Michigan and Louisiana, and, largely due to historically-low assessments in timber areas, timber owners probably have not been harmed appreciably by this lack. However, with the expansion of urban areas into previously-agricultural regions, it is probable that assessments will continue to be upgraded (as, for example, the general attempt to standardize the assessment ratios statewide in Arkansas at a minimum 20 percent ratio to actual value, dating from 1955), and the situation may demand some relief for timber owners in the foreseeable future.

The perfect approach to yield-tax or "in-lieu" tax treatment of forest resources quite obviously has not been found as yet, judging by the mixed policy results under those statutes presently applied. However, the unique character of this resource area deserves recognition, and the measures taken thus far to seek a more equitable and palatable tax treatment of the timber resource may be productive of salutary result. Continued study of the problem is clearly incumbent on students of forestry and taxation alike.

B. Fisheries Taxation

As implied previously, this section must be devoted largely to the system of fisheries taxation developed by the State of Louisiana, inasmuch as the other survey states have only a limited application of taxes which are directed at fisheries. This is not to say, however, that the states do not collect substantial revenues by other means, such as
licenses, fees and permits. As an example, the Wildlife Division of the Texas Parks and Wildlife Department collects a wide variety of fees and license charges from the extensive fisheries industry of that state, licensing such activities as commercial fishing, guide services, bait dealerships, processing-plant operations, boat operations for commercial purpose, and a variety of others.\(^\text{24}\) Sales of shell, sand and gravel by the Division in fiscal 1963 netted almost $2 millions, as a related activity.\(^\text{25}\) Similar activities by the Michigan Conservation Department's Fish Division, and Arkansas' Game and Fish Commission may be expected to yield non-tax revenues much in proportion to the scales of activity in commercial fisheries of those two states. However, none of the three states have developed extensive systems of taxes, of the severance variety or other, applied to fisheries.

Louisiana, in addition to the usual fees, licenses and permits, levies a variety of tax measures of the severance type upon fisheries activities, and is unique among the survey states in the number and variety of such levies. Louisiana's General Severance tax (Art. X, Sec. 1; RS 47:631) levies a tax on the commercial severance of shells. This tax accounted for a total revenue of $307,723.25 in fiscal 1966.\(^\text{26}\) Arkansas has only one application under her severance tax relating to fisheries -- a tax on mussel shells -- which has become inoperative with the decline of

\(^{24}\) Data are from the Wildlife Division, Parks and Wildlife Department of Texas, *Annual Report*, Fiscal years 1962-63.


the shell industry (which manufactured buttons and other things prior to the advent of plastics, but has been dormant as an industry roughly since World War II), and no revenue has been reported for some time.

Oysters are taxed in Louisiana under a special severance tax (Art. X; RS 56:10), administered by the Wildlife and Fisheries Commission of Louisiana, paid by "oystermen, boatmen, or individuals removing oysters from leased grounds or natural reefs or when sold by packers, canners, commissionmen, dealers or firms." The rate is \( \frac{2}{3} \) cents on each barrel of oysters taken from leased bottoms; 3 cents if taken from natural reefs. The yield on this tax for fiscal 1965 was \$11,145.60, and the receipts have varied within the range of \$10 thousand to \$20 thousand for the past several fiscal periods. Texas levies a nominal oyster tax through the Wildlife Division, but the yield was less than \$200 for fiscal 1963. Louisiana's Oyster Severance Tax is dedicated to the Conservation Fund, with surplus funds, if any, at the year's end to be transferred to the state General Fund.

Louisiana levies a severance tax on salt-water shrimp of 15 cents per barrel for shrimp taken from the waters of the state, and 50 cents a barrel on out-of-state shipments other than by common carrier (Art. X; RS 56:10).

---


28 Ibid.


RS 56:10, 56:505). The original levy was passed in 1940 (Act 143), and amended in 1946 to reflect the present rates (Act 78). The tax is to be paid by the "first purchaser, processor, wholesaler or other dealer who deals in buying, selling or handling salt water shrimp." The tax is collected monthly by the Wildlife and Fisheries Commission, and yielded $44,627.22 in fiscal 1965, down some considerable amount from normal collections, which run between $50 and $60 thousands, and perhaps the result of adverse conditions at "harvest" time. The tax is payable into the Conservation Fund, with annual ending surplusses, if any, payable to the General Fund.

It is perhaps belaboring the obvious to say that Louisiana has the most sophisticated tax structure for fisheries; she has virtually the only one among the survey states. It is somewhat surprising that Texas and Michigan have no severance-tax systems for fisheries products, considering the substantial size of their fishing trade. In the former case, it appears that Texas uses the fee system and licenses instead of severance levies, as such, and perhaps this is also the case for Michigan. If so, the purposes of public revenues are served, and the social interest in resources upheld, in the absence of taxes, as such. For Arkansas, it is

---

33 Ibid., p. 84.
34 Ibid.
not surprising that her public revenues from commercial fisheries are, like the private returns, quite modest.
CHAPTER IV

TAXATION OF NATURAL RESOURCES II:
MINERAL RESOURCES

Having examined the taxation of renewable resources, the impression may have been left with the reader that little, if any, substantial fiscal significance attaches to tax revenues from natural-resource activities. Rather, the implication thus far has been that, in the interests of conservation and promotion, revenue from taxation is sacrificed or "ploughed-back" into the industries in question. The present chapter should dispel much doubt as to the productivity of fiscal benefits from resource taxes, as the non-renewable resources are much more abundant revenue producers.

Several features of the natural resources industries studied in Chapter II suggest the probable results of taxation of mineral resources, with the reader already having a pretty good idea as to the major revenue-producers. Some surprises are in store, however, regarding the extent and rates of application of taxes to various minerals industries in the survey states. Texas and Louisiana, for example, with their abundant petroleum and natural gas wealth logically would, and do, obtain the lion's share of severance revenues from this industrial group. Similarly, Arkansas might be expected to derive much of her resource-tax revenue from the same industries, and, indeed, she does. A major surprise arises, however, when Michigan's resource-tax applications are examined. With abundance in a variety of minerals categories, and with petroleum industries accounting for only 10 percent of minerals value, one would suppose
that the bulk of her resource-tax revenues would be derived from sources other than petroleum. Michigan, however, does not levy severance taxes on any minerals industry other than the oil and natural-gas industries. Her rich metallic-minerals industries and others are not taxed on the basis of severance, either by specific-rate or ad valorem measure. Certainly, this practice is a strangely-selective approach to minerals taxation, and one which mitigates against one particular natural-resource industry in a rather discriminatory, even arbitrary manner. More will be said regarding this feature of Michigan's natural resource tax structure in the final chapter of this study. Table 13 on the following page presents the totals for severance-tax collections from minerals industries in the four-state group for fiscal 1965-66, and Table 14 compares rates on minerals commonly taxed.

A. Mineral Fuels Taxation

Because of their overwhelming importance to three of the four survey states (Arkansas, Louisiana and Texas) and because the remaining state (Michigan) levies severance taxes only on this classification, first consideration will be given to the manner in which the states tax the mineral fuels. The following discussion will center primarily on severance taxes, but will also examine selected other special features of resource taxation in the four states, as to applications, rates and yields.

Oil and Natural Gas Severance Taxes. Arkansas taxes oil and natural gas under her general severance tax (Ark. Stat. Ann., 1947 and Repl.; Sec. 24-2102). These revenues, and all severance-tax revenues
### Table 13

Mineral Severance Tax Collections -- Arkansas, Louisiana, Michigan and Texas -- Fiscal 1965-66  
(Thousands of dollars)

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Arkansas</th>
<th>Louisiana</th>
<th>Michigan</th>
<th>Texas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bauxite</td>
<td>$ 340</td>
<td>$ ---</td>
<td>$ ---</td>
<td>$ ---</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>(1)</td>
<td>81,978</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nat. Gas Liquids</td>
<td>(1)</td>
<td>14,862</td>
<td>1,099²</td>
<td>74,185³</td>
</tr>
<tr>
<td>Oil</td>
<td>2,854</td>
<td>103,421</td>
<td>131,217</td>
<td></td>
</tr>
<tr>
<td>Oil and Gas Regul.</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>1,810</td>
</tr>
<tr>
<td>Salt</td>
<td>---</td>
<td>255</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sand and Gravel</td>
<td>(1)</td>
<td>467</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Stone</td>
<td>(1)</td>
<td>5</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Sulfur</td>
<td>---</td>
<td>2,714</td>
<td>---</td>
<td>3,550</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>692</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>Total Severance (minerals)</strong></td>
<td>$ 3,885</td>
<td>$204,484</td>
<td>$ 1,099</td>
<td>$210,762</td>
</tr>
</tbody>
</table>

| **Total Tax Coll. (state)** | $252,917 | $658,571 | $1,467,654 | $1,267,084 |

| Percent of Total from Mineral Sev. | 1.6 | 31.1 | 0.1 | 16.7 |

1. Detailed figures not given for fiscal 1965-66; these items are included in the "miscellaneous" total.  
2. No separate figures given for Natural Gas and Natural Gas Liquids.  
3. Total not detailed for Natural Gas, Natural Gas Liquids and Oil; composite total.  

Data are from Table 9 -- "State Tax Collections in Detail".
### Table 14

Minerals Severance Taxes:  
Comparative Analysis of Rates on Minerals Commonly-Taxed by Two  
or More of the Survey States

<table>
<thead>
<tr>
<th>Minerals</th>
<th>Arkansas</th>
<th>Louisiana</th>
<th>Michigan</th>
<th>Texas</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rates Applied</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural Gas</td>
<td>0.3 cents per M</td>
<td>2 3/10 cents per M</td>
<td>2 percent of gross cash mkt. value</td>
<td>7 percent of gross value or 1 cent per M cubic feet, whichever is greater</td>
</tr>
<tr>
<td></td>
<td>cubic feet</td>
<td>cubic feet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural Gas Liquids</td>
<td>5 percent of value</td>
<td>2 cents per bbl.</td>
<td>2 percent of gross cash mkt. value</td>
<td>4.6 cents per bbl., gross production</td>
</tr>
<tr>
<td>Crude Oil</td>
<td>5 percent of value</td>
<td>18-26 cents per bbl., depending on specific gravity</td>
<td>2 percent of gross cash mkt. value</td>
<td>4.6 cents per bbl., gross production</td>
</tr>
<tr>
<td>Sulfur</td>
<td>---</td>
<td>$1.03 per long ton (2,240 lbs.)</td>
<td>---</td>
<td>$1.03 per long ton (2,240 lbs.)</td>
</tr>
</tbody>
</table>

1. Excluding those wells producing at less than standard pressure, which are taxed at 0.3 cents per thousand cubic feet.
2. Does not include the Oil Privilege Fee of one-eights cent per barrel on oil produced.

Sources: Report by the State Comptroller, Arkansas, 1965; Louisiana State Tax Handbook, 1964; 25th Annual Report, Department of Revenue Division (Michigan); Vernon's Annotated Statutes of Texas, 1960, and Replacements, Title 122A, Chs. 3, 4 and 5.
other than those for timber (see Ch. III), are distributed three-fourths
to the State General Fund, and one-fourth to the County Aid Fund for dis-
tribution to the counties of origin.\(^1\) The tax on natural gas is 0.3
cents per thousand cubic feet of natural gas severed, and the tax on oil
(crude) is 5 percent of market value "at time and point of severance",
except that wells producing 10 barrels or less per day are taxed at the
rate of 4 percent.\(^2\) Additional credits are allowed to oil and gas pro-
ducers for "amortized cost of construction, and expense of operating,
underground salt water disposal systems", and the producer may be allowed
a credit of 75 percent of the severance tax otherwise due "for a speci-
fied time after the discovery of a new pool".\(^3\) Natural gas liquids are
not subject to a stipulated levy, but would likely be included under the
"all other natural resources" category, taxed at a rate of 5 percent.\(^4\)
Yield for oil severance taxes was $2.8 millions in fiscal 1965-66, and,
although not specified separately, natural gas and gas liquids probably
accounted for somewhat less than $300 thousand during the same period.\(^5\)

Louisiana taxes oil, natural gas and natural gas liquids under
her General Severance Tax (Art. X, Sec. 1 and 21). Natural gas is taxed

\(^1\)Distribution is authorized among the counties one-half to the
County General School Fund, and one-half to the County Road Fund (Sec.
84-2112). From the Report By the State Comptroller, State of Arkansas,
1965, p. 33.

\(^2\)Sec. 84-2102 (e), from Report by the State Comptroller, 1965
(Arkansas) p. 32.

\(^3\)Ibid.

\(^4\)Ibid. (Sec. 84-2102 (h)).

\(^5\)Biennial Report, Commissioner of Revenues, Arkansas, 1964-65,
1965-66, p. 27.
at 2 3/10 cents per thousand cubic feet at standard pressure (15.025 pounds pressure per square inch at 60°F), with marginal wells, including those in which the gas accompanies oil production taxed at 0.3 cents per thousand. The tax on oil varies according to specific gravity, from 18 cents per barrel for 22 gravity and below to 26 cents for oil over 43 gravity. Wells incapable of producing more than an average of six barrels per day are taxed at half the regular rates. Natural gas liquids are taxed at 2 cents per barrel for distillate, condensate and all other liquids severed with either oil or gas.

Fiscal 1966 yields were as follows: gas -- $82 millions; oil -- $103 millions; distillate -- $14 millions. Thus, about $200 millions of Louisiana's total severance tax collections of $205 millions for 1966 are accounted for by her mineral fuels (about 97.6 percent of the total). This is striking evidence, indeed, of Louisiana's stake in her natural gas and oil industries, both as a source of wealth and as a major contributor of tax revenues. Taxes collected on all the mineral fuels are dedicated one-fifth to the parished from which severed, but not to exceed $200,000 total for any parish in any year, with the balance of collections going to the Severance Tax Fund. This latter fund is

---

7Ibid.
maintained for the purpose of supplying free school books and supplies to Louisiana's public schools, with any "residue" to be transferred to the State Public School Fund.11 As a practical matter, the "residue" after the procurement of textbooks has constituted the overwhelming portion of the total (about 97 percent of the Severance Tax Fund total was transferred to the Public School Fund in fiscal 1963).12

The State of Michigan levies a severance tax on the production of oil and natural gas under an Act (CL 205.301; MSA 7.353; Act 48, P.A. 1929) specifically limited to "each corporation, association or individual engaged in the business of taking these products from Michigan land."13 The rates imposed on natural gas and oil are identically set at 2 percent of the gross cash market value at the point of severance.14 Collections from these sources have varied between $1.1 and $1.2 millions within most recent years, but fell to less than one million dollars in fiscal 1966. Total collections, including oil and gas privilege fees (to be discussed later in this chapter) were just over $1 million.15

Texas levies a set of "occupation" or "privilege" taxes upon her mineral fuels producers, under the general severance-tax type of

__________

11Ibid.
12Ibid.
14Ibid., p. 72.
15Vernon's Annotated Texas Statutes and Repl., 1960, Title 122A, Ch. 3 (to be subsequently cited V.A.S.T., Title 122A, Ch. __).
levy based on value of production, quantity of production, or both. The series of "gross-receipts" taxes were imposed under the auspices of the state in the early and middle 1930's to include oil producers, natural gas producers, sulfur producers, and producers of carbon black. (GS Art. 7047a-7047h). In the 1959 legislature, the title designations were changed, along with a number of others, to be placed under the "General Taxes" category (Title 122A).\textsuperscript{16} The statute taxing natural gas producers (Art. 3.01) establishes a rate of 7 percent of the gross value of the gas produced within the state, with a minimum of 121/1500 of one cent per thousand cubic feet.\textsuperscript{16} The tax is collected monthly from the "first purchaser" of the gas, who is authorized to deduct the tax from the payments made to the producer (Ch. 3, Art. 3.03), although default by the purchaser is deemed not to absolve the producer or subsequent purchasers from their liability. The producer is privileged, however, to sue the purchaser who defaults for recovery of any withheld amounts.\textsuperscript{17}

An Act of the 1959 legislature (Art. 3.11) applies a modification to the rates which are charged, calling for "not less than one cent per thousand cubic feet", with the new rate deemed necessary to "derive a reasonable State revenue" from natural gas production (Art. 3.11(1)I) and to "tax equitably those persons integrally engaged in the occupation" of gas production; that is, to distribute the burdens more equitably. (Art. 3.11 (1)II).\textsuperscript{18} Apart from the reservation of 0.5 percent of the

\textsuperscript{16}Ibid.
\textsuperscript{17}Ibid.
\textsuperscript{18}Ibid.
tax collections to pay for administration and enforcement, the tax is distributed three-fourths to the Omnibus Tax Clearance Fund and one-fourth to the Available School Fund, a practice common to all the severance levies.\textsuperscript{18} Collections of combined natural gas production taxes in fiscal 1966 amounted to \$74 millions.

The Tax on Oil and Gas Produced (Title 122A, Arts. 4.01-4.03) levies the tax on producers ("any person owning, controlling, managing or leasing any oil well and/or any person who produces in any manner any oil..") including royalty owners and other interested parties (Art. 4.01 (1)) at the rate of 4.6 cents per barrel of 42 gallons, without any deductions, on gross production (Art. 4.02).\textsuperscript{20} The tax is payable on the same basis as the gas tax, and is to be paid on any oil, except that which was necessarily removed from gas by means of refrigeration or other costly processes, which oil is subject to a reduced tax. Again, payment is to be made by the first purchaser from the producer, who "collects" the tax by reducing the amount he pays the producer.\textsuperscript{21} The payments are made to the Comptroller of Public Accounts, and their disposition is the same as that of the tax on gas producers.\textsuperscript{22}

A Severance Beneficiary Tax (Art. 22.01) is levied on persons other than the person producing oil or gas, when such person is recipient of oil or natural gas under contract from the producer, and the tax is

\textsuperscript{18}VAST 122A, Ch. 3.
\textsuperscript{20}Ibid., Ch. 4.
\textsuperscript{21}Ibid.
\textsuperscript{22}Ibid.
assessed at basically the same rates as that of the taxes it replaces. Total severance tax collections on oil under these titles (4.01 and 22.01) amounted to $131 millions in fiscal 1966.

A Severance Tax on Coal is levied by the State of Arkansas under the general severance title (Ark. Stat. Anno. 1947 and Replacements; Sec. 84:2102), imposing a rate of 2 cents per ton of 2,000 pounds on coal, lignite and iron ore. Collections of this tax in fiscal 1966 were included in the "miscellaneous" category and not separable, but the collections in a recent year amounted to slightly more than $5,000. The revenues from this tax are classed as general revenues three-fourths and special revenues one-fourth, as in the case of other minerals under the severance tax, with the revenues distributed as are those of oil and gas: three-fourths to the General Fund, one-fourth to the County School Fund. The declining significance of coal mining in Arkansas has been reflected in declining receipts from the coal severance tax.

In summary, severance taxes on mineral fuels produce the bulk of severance-tax revenues for minerals in all the states in the survey, with Texas and Louisiana realizing by far the richest returns; Arkansas is a distant third, and Michigan realizes the smallest return. The tax may be considered a major revenue-producing measure for Texas and Louisiana, comprising, respectively, 16 and 32 percent of total tax revenues for those two states. Arkansas' mineral-fuels tax receipts accounted

23 Ibid., Ch. 22.
24 Report by the State Comptroller, (Arkansas) 1965, p. 32.
25 Totals for tax revenues and severance revenues are in Table 13.
for only about 1.6 percent of her total tax collections in fiscal 1966, and Michigan's mineral-fuels taxes amounted to less than 0.1 percent (see Table 13).

**Other Taxes on Mineral Fuels.** In addition to severance taxes, both Texas and Louisiana at one time levied a "gas-gathering tax" through which all "gatherers" of natural gas and distillate produced in the respective states were taxed after severance from the well.26 "Gathering" was generally defined as "...the first taking or retaining of possession of gas produced for transmission..." after severance, and "...after it had passed through any separator, drip trap, meter or other means designed to separate oil from the gas."27 The intent of both the Texas and Louisiana statutes was apparently to assess a privilege fee against receivers and transporters for export of natural gas from the state, the statutes have both been successfully challenged as violating the "commerce clause" of the U. S. Constitution by seeking to regulate interstate common-carrier (pipeline) movements.28 The Louisiana state legislature in 1958 recognized the probable invalidation of the law in a suspension of collections

---

26TSA (Vernon 1948); Art. 7057f; and Act 153 (1940) and Repl.: RS47:671-673 (1950) La.


28Validity in application of the Texas statute was successfully challenged in Michigan-Wisconsin Pipeline Co. v. Calvert (347 U.S. 157 1954)), which frustrated the State's attempt to tax gas collected for transmission by the pipeline (L. Hill, Op. Cit., p. 863; Suppl. p. 2459). Louisiana's statute was ruled unconstitutional in Bel Oil Corp. v. Fontenot by the State Supreme Court on grounds of violation of the "commerce clause. of the U.S. Constitution (La. State Tax Handbook, 1964, p. 44).
on the gas-gathering tax "...until the question of whether such taxes are valid and constitutional...has been settled."29 Gas-severance rates were increased at the same Extra Session by 2 cents per thousand cubic feet (the amount which the gas-gathering tax had levied) as a replacement.30 After the gas-gathering tax was invalidated, the 2-cent charge was extended to June 30, 1964, after which time it was reenacted as a permanent rate.31

Louisiana's Liquified Petroleum Gas Permits are levied on the basis of a 1942 Act (Act 99; RS 40:1849) to apply to "persons, firms or corporations desiring to store, sell or transport liquified petroleum gases over state highways, or to install storage tanks...for use of liquified petroleum gas."32 The minimum amount applied is $75 and the maximum $3,000, based on 0.25 percent of gross annual sales of the permit holder, and the tax yielded $55,551.25 in fiscal 1965-66, all allocated to the general fund.33

The Royalty Gas Excise Tax is a levy which Louisiana utilizes to assure that the producer returns to the royalty owner an amount equal to the price received by the producer for the royalty owner's interest in gas products sold; the tax is levied as the (total) difference between


30 Ibid.

31 Ibid.

32 Ibid., pp. 60-61.

the price paid to the producer and the price forwarded to the royalty owner.\textsuperscript{34} This is largely a preventive measure designed to assure fair treatment of royalty owners, and the fiscal yield of $631.12 reflects the fact that this tax is not calculated as a revenue-producer.

A relatively-similar intent to assure fair treatment of interested parties to leases appears to manifest itself in Texas' Severance Beneficiary Tax (TSA Title 122A; Art. 22.01), which seeks to levy the severance taxes on the "severance beneficiary", whether he be the producer, or someone who contracts with the producer for all or part of the production of gas or oil for a stipulated period.\textsuperscript{35} The intent of this statute is apparently to lay the tax on the one who actually benefits from the production by receiving the value on the resource commodity, whether he is the actual severer or not. This is not to say that the burden of the tax falls either on the "beneficiary" or on the producer (or operator).\textsuperscript{36} This tax was not detailed as to revenues for 1966, but its application and rates are the same as for the "occupation taxes" (Arts. 3.02 and 4.02, and 3.11) previously noted, and their yield is included in the totals for oil and gas in Table 13.

Michigan, in addition to the regular oil and gas severance tax, levies an Oil Privilege Fee, imposed on oil producers by the Oil and Gas


\textsuperscript{35}VAST 122A, Ch. 22.

\textsuperscript{36}The process of tax shifting, wherein the burden of a tax is transferred to someone other than the one on whom it is levied will be discussed in Ch. V.
Conservation Act of 1939 (Sec. 22, Act 61, P.A. 1939).\textsuperscript{37} The oil privilege fee is payable on the same dates as the oil and gas severance tax, at the rate of one-eighth cent per barrel of oil produced, with its proceeds going to the state General Fund.\textsuperscript{38} The yield on this tax was $18,270 in fiscal 1966, down from its higher yields of about $20 thousand, but apparently continuing a trend beginning in 1964 for smaller yields.\textsuperscript{39} Figures for this tax were included in the consolidated figures for oil and gas severance in Table 13.

B. Taxation of Other Minerals

Leaving the subject of mineral-fuels taxation, the tax picture becomes a bit more spotty, with different minerals being subject to special tax treatment in the several states. As previously noted, Michigan limits her severance taxation to oil and natural gas, and applies no such levies to other minerals. The only other mineral subject to severance taxation in Texas is sulfur, but Arkansas and Louisiana levy several taxes of the severance type on a variety of other minerals. In considering the remaining minerals, it may be convenient to examine their taxation by the individual states which impose them.

Other Minerals Taxes -- Arkansas. Arkansas taxes all the minerals classifications other than minerals fuels under the general severance

\textsuperscript{37}25th Annual Report, Department of Revenue Division, p. 79.
\textsuperscript{38}\textit{Ibid.}
\textsuperscript{39}\textit{Ibid.}, p. 80.
tax previously noted, with the disposition of revenues three-fourths to the state's general fund and one-fourth to the county of origin. Barite, bauxite, titanium ore, manganese and manganiferous ores, zinc ore, cinabar and lead are all taxed at the rate of 15 cents per ton of 2,000 pounds.40 Of this group, the fiscal 1965-66 yields are detailed only for bauxite, which yielded $340,362.68 in taxes.41 Recent figures suggest that barite yields would be about $35-$40 thousands, and the yields of tax on the other listed ores would be very nominal.42

The severance tax applied to gypsum other than that used for manufacturing in the State of Arkansas or sold for that purpose, and for chemical-grade limestone, silica sand and dimension (building) stone is one-and-one-half cents per ton of 2,000 pounds.43 The 1965-66 fiscal-year report details none of these products as to taxes collected, but some observations may be in order regarding probably collections. First, gypsum used in manufacture in Arkansas is exempt from the severance-tax levy, and most or all of that produced in the state is devoted to these purposes, principally the production of cement, wallboard and related products. The other products are included in the "miscellaneous severence

43 Ibid., p. 32.
category, and their individual totals are not available, but it appears relatively certain that their significance, individually and collectively, is very slight.\textsuperscript{44}

Finally, on crushed stone, sand of construction grade, gravel, clay, chalk, shale and marl the rate is one cent per ton of 2,000 pounds.\textsuperscript{45} These items were included in the "miscellaneous severance" category and are not subject to separate determination.

**Other Minerals Taxes -- Louisiana.** Louisiana's severance taxes on minerals are somewhat more detailed and complex than those of Arkansas, in that not only is the general severance tax applied to a variety of minerals, but a special severance tax on sand and gravel is applied by the Wildlife and Fisheries Commission (RS 9:1101). First, the general severance taxes will be considered.

The general severance tax applies the rate of $1.03 per long ton (2,240 lbs.) on sulfur, with the fiscal 1965-66 collections totaling $2,714,645.34.\textsuperscript{46} The rate on salt (common) is 6 cents per ton of 2,000 pounds, with 1965-66 collections of $231,418.07; salt in brine used in manufacture of other products is taxed at one-half cent per ton of 2,000 pounds, and the yield in fiscal 1965-66 was $23,185.75.\textsuperscript{47} Louisiana also levies a tax of 10 cents per ton on coal and ores, and a

\textsuperscript{44}The bulk of the "miscellaneous" yields has been accounted for by gas and barite (see preceding pages).


\textsuperscript{47}Ibid.
tax of 20 cents a ton on marble, but no revenues were reported on these substances for fiscal 1965-66.48 The same distribution of revenues from the severance tax on the above minerals applies as that for general severance-tax receipts from oil and natural gas.

The special severance tax on sand and gravel administered by the Wildlife and Fisheries Commission is imposed on "persons receiving permission from the...Commission to take sand or gravel from the water bottoms of the State."49 The rates applied are: screened sand -- 5 1/2 cents per cubic yard; gravel, screened or washed -- 15 cents per cubic yard; sand and gravel mixed and unscreened -- 10 cents per cubic yard; and fill material -- 2 1/2 cents per cubic yard.50 An exception is provided for materials taken from the Pearl River forming the boundary between Louisiana and Mississippi, where a rate of one-half the above schedule applies,51 apparently a recognition of mixed jurisdictions. Collections from this tax are retained by the Commission and placed in the State Conservation Fund, with collections amounting to about $13^2$ thousand in fiscal 1965-66. The bulk of these collections (est. $100 thousand in fiscal 1965-66) comes from fill material.52

---


50Ibid.

51Ibid., p. 86.

Other Minerals Taxes -- Texas. In the "other minerals" category, Texas levies only one severance tax, an "Occupational Tax on the Production of Sulphur" (Title 122A, Arts. 5.01-5.04). This tax is levied on sulfur producers at the rate of $1.03 per long ton (2,240 lbs.), and is subject to basically the same provisions as the other "occupation taxes" discussed previously. The yield on this tax for fiscal 1965-66 was $3,550,000.

C. Leases and Royalties

Although these collections are not, strictly-construed, taxes on mineral industries, they do represent a sometimes-considerable source of public support from such industries, and thus are deserving of examination in this study. The State of Arkansas collects royalty and leasehold payments under stipulations of the severance tax law, which authorizes the Commissioner of Revenue "...to enter into contracts with producers providing for the severing of resources from the beds or bars of navigable rivers and lakes, and other lands held in the name of the state." The leasehold payment is determined by negotiation, and the royalty payments are provided for under the following rates:

---

53 VAST; Title 122A; Ch. 5.
55 Report by the State Comptroller, 1965, p. 32.
56 Ibid., pp. 32-33.
...on sand, 2 1/2 $ per cubic yard; on gravel, 5¢ per cubic yard; on coal, 6¢ per ton; on oil, gas and casinghead gas, 1/8 of value; and on other natural resources, such amounts as may be agreed to by the contracting parties, with the advice and approval of the Attorney General (Sec. 10-1101).

For fiscal 1965-66, revenues from all oil and gas leases amounted to $8,726.76, and royalties from sand, gravel and oil amounted to $109,080.63.\textsuperscript{57}

All royalties and leasehold payments are classified as general revenues, payable into the state's General Fund.\textsuperscript{58}

The State of Louisiana collects massive sums from leaseholds and royalties, particularly for petroleum and natural gas production in state-owned and controlled lands in the tidelands and coastal areas, along with some inland operations in game refuges, parks and inland waterways. The total from oil and gas leases for fiscal 1965-66, combined with royalty receipts amounted to an estimated $102.9 millions.\textsuperscript{59} These payments for leaseholds and royalties are classified as both general and special revenues, and their disposition is to various agencies; in 1966 the General Fund received an estimated $72.8 millions, the highway fund was allocated $15 millions, and the remainder was allocated to the Conservation Fund.\textsuperscript{60} Some revenues were reserved to the use of agencies associated with the lands from which severance occurred.\textsuperscript{61}


\textsuperscript{58}\textit{Report by the State Comptroller, 1965}, p. 33.

\textsuperscript{59}\textit{State of Louisiana Executive Budget, Fiscal 1965-66}, pp. 4, 6; Sched. 57.

\textsuperscript{60}\textit{State of Louisiana, Executive Budget, 1966,} Loc. Cit.

\textsuperscript{61}Ibid.
Texas also realizes considerable sums of revenues from leases, rentals and royalties on resource lands she owns or controls, though not so much as is true of Louisiana. Identifiable sources of such royalties in fiscal 1965-66 were: oil, gas and mineral royalties, about $36 million; sand, shell and gravel sales, about $1.5 million; mineral leases, rentals, and bonuses, about $15 millions.\textsuperscript{62} All sources of sale, rental and royalty transactions were estimated to yield about $95 millions in 1966, but other public properties than resource lands were apparently involved.\textsuperscript{63} The items which could be identified as resource-connected accounted for nearly $52 millions, in any case.

Thus, about $260 millions of the state's revenue comes directly from the basic-resource-development industries, either in the form of severance levies or other payments. This constitutes about 11 percent of the total state revenues for fiscal 1966 of $2,335 millions.\textsuperscript{64}


\textsuperscript{63}\textit{Ibid.}

\textsuperscript{64}\textit{Ibid.}
CHAPTER V

SOME NOTES ON SHIFTING, INCIDENCE AND EFFECTS
OF NATURAL RESOURCE TAXATION

Taxes levied upon business are seldom willingly retained as a burden of the enterprise. Rather, they are subjected to the process called "tax shifting", in which an attempt is made to transfer the burden of payment to someone other than the enterprise upon which the tax was levied.¹ The final disposition of burdens arising from taxes levied upon resource industries may have substantial implications for policy goals (previously discussed in Chapter I of this study), either furthering or frustrating them. Therefore, some attempts will be made to analyze the most probable disposition of the tax in the light of policy aims, to determine whether existing forms of levy contribute to the proper "mix" of conservation, incentive to production, and reliable yields of revenue within the limitations imposed.

A. Structural Basis for Tax Shifting: Commodity-Tax versus Property-Tax Approaches

Economic Basis for Shifting. A prime requisite for tax shifting is that the tax be levied against, or associated with, a commodity or service which is subject to a price transaction; that is, the capability

¹One helpful distinction in understanding tax shifting is the characterization of the point at which the tax is levied (and collected) as the point of "impact", while the final resting place for the burden (payment) is called the point of "incidence". Sharp, Ansel M., and Bernard F. Sliger, Public Finance, (Homewood, Illinois: The Dorsey Press, 1961, p. 210).
must exist to assign the cost of the tax bill to one or more items pro-
duced and/or exchanged for value by the person or firm taxed. Not all
taxes are assumed to be subject to shifting however, and the above case
contrasts with the case in which shifting is thought to be virtually im-
possible: when the tax is levied on property reserved to personal use, on
pure profits (economic surplus), and generally when a tax is levied on
personal income. Taxation of commercially-exploited natural resources
would, of course, lie within the scope of tax-shifting possibility.

Taxes assessed against resource industries may generally be
classified as comprising two overall categories: those assessed against
resource-producing properties, and those which bear directly upon the
resource commodity in one or more stages of its production and distribu-
tion. The former category would include ordinary ad valorem property-
tax levies, and, to a lesser extent, special yield-tax variations on the
ad valorem convention (the manner in which this tax is assessed and col-
lected renders it very much like a commodity tax, though it is technically
designated a property tax). The latter group would apply, as a practical
matter, to severance levies (although these are nominally "privilege"
taxes levied on the act of severing, the severed commodity becomes, in

\[Ibid., \text{ pp. 211-212.}\]

This last generalization is not universally held, however, when the "person" is a business corporation, and the tax imposed is the
corporate income tax. Many students of tax shifting contend that, as the
tax actually touches elements of capital, rent and other contributions
than "profits" alone, some backward shifts may take place (to workers,
bond-holders and others) or some forward shifts through higher prices to
practice, the object of the taxation). Because of the existence of a price transaction associated with exploitation of resources for commercial purposes, the nominal capacity for shifting exists in either type of levy.

Given the presence of a price transaction, the extent and direction of tax shifts are dictated by market conditions; not only those prevailing at the origin of the basic resource, but throughout the distribution system for the resource and its ultimate products. Perhaps most commonly, the *forward* shifting of a tax is the mode first thought of as a possibility. Attempts to shift taxes forward from the point of impact are largely based on the degree of inelasticity, real or presumed, in the demand for the product of the person or firm taxes; the success of such shifts is dependent upon the actual degree of market elasticity and the long-run supply conditions of the firm or industry attempting the shift.\(^4\)

\(^4\)The consequences of long-run supply conditions to the extent of tax-shifting under competitive conditions may be illustrated by two elementary cases: constant long-run average costs (fig. 1-a) and increasing long-run average costs (fig. 1-b).

**Figure 1 - Tax Shifting: Constant vs. Increasing Costs.**

- **a. Constant costs**
  - \(D\) = imperfectly-elastic demand for product
  - \(S_0\) = Industry Supply curve before tax - (constant-cost)
  - \(S_1\) = Industry Supply curve after tax
  - \(P_0\) = Price before tax
  - \(P_1\) = Price after tax

- **b. Increasing costs**
  - \(D\) = demand curve similar to that in fig. 1-a
  - \(S_0'\) = Industry Supply curve before tax (increasing cost)
  - \(S_1'\) = Industry Supply Curve after tax (increasing cost)
  - \(P_0'\) = Price before tax
  - \(P_1'\) = Price after tax

(continued on following page).
In a purely-competitive market, the individual firm must be largely controlled in his shifting options by the consequences of the tax upon aggregate supply conditions for the industry (see note below). In a case of complete monopoly, the monopoly producer may seek to shift the tax, and would be successful to the extent necessary to re-equate marginal cost and marginal revenue. However, inasmuch as his marginal revenue would rise more rapidly than his average revenue, the resultant price increase would be somewhat less than the sum of the original price plus the (unit) tax. This may be most readily illustrated in the case of a tax assessed on the basis of a given amount per unit of output (a specific levy). In figure 2 below, let AR and MR represent, respectively, the average revenue ("price-line") and marginal revenue functions for a monopoly firm (not necessarily the classic "pure monopoly", but a single seller in a given product market). Functions AC and MC may be taken to represent average cost (total) and marginal cost curves prior to the imposition of the tax, and AC' and MC' the same data after imposition of the tax. The disparities between the vertical heights of AC and AC', and MC and MC' designate the amounts of the tax per unit. The Price before the tax is denoted by \( P \), and the resultant tax after the monopolist attempts to shift the tax by \( P' \).

\(^4\)(cont'd). It will be observed that, in the case of increasing long-run average costs, the price after the tax (\( P_1' \)) is less than that for constant cost (\( P_1 \)), which was equal to the original price (\( P_0 \)) plus the entire amount of the tax. In the case of increasing average costs, a portion of the tax was shifted to price, and a portion absorbed in lower cost data (lower payments to productive factors employed). The greater the slope of the long-run supply curve (i.e., the less elastic), the lesser the shifting of the tax to price. Adapted from Sharp and Sliger, *Op. Cit.*, pp. 214-15, and Due, *Op. Cit.*, pp. 264-66.
As may be observed in figure 2, above, the monopolist reacts to the imposition of the tax by seeking to set a price which will re-equate marginal cost and marginal revenue (his profit-maximizing condition), but, because of the differential rates of change in MR and AR, this equality is reached at a price below the amount which would equal the old price plus the whole amount of the tax. The less elastic the market demand faced by the monopolist, the more of the tax ultimately finds its way to the price. Thus, the pure monopolist, dealing with a necessity item,

\[ \text{MR} = \text{Price of One Additional Unit Sold minus (Reduction in Price for all Previous Products Sold) x (Previous Quantity Sold).} \]
would be expected to transmit a larger part of any tax through price increases than, say, a monopolist producing a luxury good, or a good with many close substitutes.

As a practical matter, it is doubtful that many products are produced or sold under either conditions of pure competition or monopoly of the total degree suggested above. Rather, the more usual case may involve conditions of imperfect competition (characterized by a considerable number of producers, operating more or less independently of one another). This condition (often called "monopolistic competition") gives rise to some degree of price power, either due to special advantages of location or product differentiation, but no firm enjoys more than slight pricing power. A second practical alternative is oligopoly, a market structure characterized by a few powerful sellers who dominate the industry, with each firm keenly aware of the power possessed by his rivals. In this latter type of market structure, the policies and actions of each firm would be largely conditioned by expectations as to the possible reactions of rival firms.

Due suggests that, under conditions of imperfect competition where the firms operate independently of one another, they would attempt to adjust prices upward in an attempt to recoup the cost of the tax increase, but, having little price power individually they would "... trans-
fer little of the burden to the customers, and most would rest temporarily upon the owners of the business firms (through loss of profits given the prevailing demand and supply data). The exodus of some sub-marginal firms would be necessary to re-align average cost and price data for the surviving firms (i.e., to increase the share of market demand enjoyed by each of the survivors -- to shift the Average Revenue curve upward to accommodate the higher average costs). If, as a result of the exodus of some of the firms, the demand curve facing firms surviving becomes less elastic than before, then the final prices will reflect a greater amount of increase than the tax, theoretically; if greater elasticity results (as each producer may expand his scale of operation and enjoy economies of scale, for example), then the final price may reflect less than the full amount of the tax. The implication of the above generalizations is that the monopolistically-competitive producers are producing initially at less-than-optimum scale, both in the long- and short-run senses (i.e., at greater-than average costs), and that any cutback in output is possible only average and marginal costs; similarly, any increase in scale or quantity of output may be expected to

\footnote{Due, \textit{Op. Cit.}, p. 263.}

\footnote{Ibid.}

\footnote{Ibid.}

\footnote{Ibid.}
yield lower average costs (see figure 3 below as a general-case illustration of cost-revenue relationships).13

The oligopoly case is, if anything, even less determinate than the ill-determinate case of monopolistic competition, regarding shifting possibilities. The keen awareness of oligopoly firms for one another's economic significance (mutual interdependence) adds its weight to the self-interest of the firm in making price and output decisions. No firm operating in such an industry would invite destructive retaliatory actions on the part of his rivals by a precipitate action disregarding their presence. Rather, as Due suggests, "Firms, in reacting to changes in costs, will typically not disregard the probably responses of competing firms,... and to the readjustments they make in their own prices."14 To the extent that the tax is generally applied to all the oligopoly producers, and "...each seller knows that competitors are likewise affected."

13The following diagram is suggestive of the theoretical long-run equilibrium for a monopolistically-competitive producer: (AC = AR only at point "T", otherwise AC exceeds AR).

**Figure 3**

Long-Run Equilibrium-
Monopolistic Competi-
tion

the levels which would maximize profits for the firms as a group."¹⁵ Note that it is considered of first importance that it be known that all firms will respond to the price change, a factor which might prevent or curtail shifting of taxes imposed upon only one or a few oligopoly firms operating in one area or state, but not all firms in the industry. In a case such as this, unless one of the taxed firms were dominant (a "price leader"), forward shifting might be forestalled.

The alternative to forward shifting is, of course, backward shifting, in which the attempt is made to transmit the burden back to a supplier, or to an earlier stage of production. As has been noted above, some backward shifting accompanies implementation of forward shifting (i.e., as a consequence of the lesser quantities of product sold, demand for inputs is affected). When forward shifting is prevented, such as in the presence of a highly-elastic demand for the product, highly competitive conditions among producers,¹⁶ etc., then the only shifting alternative is backward shifting. Just as forward shifting depended to a considerable degree upon inelasticities (either in product demand or due to market control, or both) in the demand curve faced by the seller, so backward shifting depends heavily on an inelastic supply schedule for

¹⁵Ibid.

inputs. The logical terminus for any backward shift is with the first supplier of inputs (factor of production), though complete backward shifting would require a perfectly inelastic supply curve for output.\(^{17}\) Hobson\(^{18}\) feared that excises which were shifted backward might result in the destructive taxing of the "social cost" inherent in basic materials, tending to "dry up" these sources until the resultant shortages "raise the prices of the taxed factors and thus readmit them to restore the requisite supply"\(^{19}\) (possibly through higher prices in the product markets, thus transforming an attempted backward shift into an ultimate forward shift). Groves suggests that Hobson's thesis, though "sound enough", still does little to aid in distinguishing "social cost" from "social surplus," citing the case of nonreproducible (natural) resources as having a "...highly inelastic supply..." and "...their services would not disappear if their owners' rent were taxed away."\(^{20}\) This assertion contains considerable

\[17\]Under these circumstances, no matter how demand for the product were affected by taxes, no price above zero would theoretically call forth less (or more) supplies of the product, as below, DD represents the demand curve for the product prior to the tax, and D'D' the demand curve net of the tax (per unit). The perfectly-inelastic supply curve SS remains unresponsive to the change.


\[19\]Groves, *Op. Cit.*, p. 120.

\[20\]Groves, *Op. Cit.*, p. 120.
moment for the policy results of taxes at their final resting place (incidence). Although backward shifting traditionally is not considered to be as widespread as forward shifting, there do appear to be important possibilities for this mode associated with basic natural resource development.

Having considered the mechanics of tax shifting in order to provide a basis for understanding the phenomenon, the following sections will make some generalizations regarding possible patterns of shifting for taxes levied on basic natural resources.

B. Property and Yield Taxes on Natural Resources: Some Probable Patterns of Shifting and Incidence.

Property taxes of various forms, as has previously been asserted, constitute the principal locally-generated levy against natural-resource industries. It has also been noted (Ch. I) that modifications of the ordinary ad valorem property levy have been instituted in a number of states to fit the burden of such tax to the economics of resource-exploiting industries. Still, property taxes are levied and collected from natural resource industries. The question to be pursued in this section is: who pays these taxes, and what are the means by which they are transferred to the point of incidence? The answers may provide some insight into the policy effectiveness of such taxes, and offer some bases for further modifications in the property-tax structure.

Property Taxes on Timber Resources. Seeking to assign general rules-of-thumb to shifting and incidence for timber taxation is to deny both the variety of levies applied, and the differing market structures
associated with timber suppliers and owners of timber tracts. The timber owner may be a farmer, a nonfarm owner of a small private tract, a large tract-owning speculator, a firm engaged in the wood-products industry, or a government owner. The manner in which property taxes (including yield taxes) bear upon these owners differs with each classification. For our purposes, timber owners will be broken into the classes of small private tractholders, large private tractholders, and wood-products industrial holdings (government owners, of course, not being subject to the property taxes, as such).

The small tractholder has probably received a disproportionately-large share of attention of students of property taxation, historically (see Chapter I and Chapter II above). The burden of the property tax on timberlands held in small tracts seems to be a particularly onerous one, especially on those tracts not actively in process of cutting. Thus, the earliest efforts at reform of the property-tax laws were largely directed at seeking relief for this classification of timber owner. Viewed from the standpoint of the possibilities available to the small tractowner, the economics of tax shifting encompass a rather narrow range, at best.

The elasticity of the supply function for timber products of the small tract owner is likely to be very slight; especially so if his property is located in an area unsuited to competitive uses, or the quality of the land is such as to be unsuited to other agricultural application. At the same time, competition for the exploitation of small tracts is

---

21 For the survey states, and for the nation, see the distribution of ownerships noted in Table 5, Chapter II.

22 See the discussion of yield taxes in Chapter I.
likely to be limited, with no more than one or two potential developers for the timber "crop". Under these conditions, and based on the infrequent occasions on which timber may be "harvested", the small timber owner may be forced to absorb a good portion, if not all, of the property taxes levied annually.

The small tract holder may fare somewhat better under the yield-tax exception to the property levy, but only by delaying the assumption of burden of this tax, levied against the timber at time of cutting. Again, his poor economic position relative to buyers is likely to mean the absorption of the bulk of any stumpage levies assessed in connection with the yield tax. The general existence of poor quality in small-tract stands (see Ch. II above), will further prejudice the market power of the small owner.

The large tract owner fares somewhat better in economic power than the small owner, in that his ability to influence the prices of timber in the locality is bolstered somewhat by the scale of his operation. If relatively small sawmills, poleyards, or even pulp mills in the area consider his tract significant enough for their total needs, the large tract owner may be able to shift at least a part of property taxes to them. One difficulty in shifting the ordinary ad valorem levy is the problem of calculation of a per-unit charge applicable to the timber crop. Where the yield tax is assessed in lieu of the regular tax, this calculation may be made considerably easier and the (normally) percentage levy either included in the price or as a separate contract item payable by the buyer.
Whereas the small tract owner had operated either in a highly-competitive or at best monopolistically-competitive market in which he was virtually without power, the large tract owner is likely to have, if not a monopoly in the area, at least the position of an influential oligopolist in this generally-localized industry. The shifting possibilities for taxes levied against the forest property are to be determined accordingly.

The forest-industries owner represents a growing category of timber ownership, and seems destined to continue this growth for the foreseeable future, accounting for 13 percent of timberland ownership nationally, and nearly 20 percent of timberland in Arkansas and Louisiana, 26 percent in Texas, but only 8 percent in Michigan. These lands, owned and managed by forest industries, are generally in medium-sized-to-large tracts, often comprising the bulk of timberlands in the locality. Taxes assessed against this property classification would be subject to attempts at forward shifting. Vertically-integrated, diversified corporations (such as the Georgia-Pacific and Dierks Forests operations in Arkansas, Louisiana, Texas and other states), possess sufficient market power to exert considerable price power in markets extending to the final sales of lumber, paper products, poles and posts, etc. Giant firms, though numerically a minority in the wood-products industry (with the possible exception of the paper industry, which requires such capital outlays for plant and equipment as to exclude very small operations), exert considerable influence in wide markets, and this influence should continue to grow. Both

---

23 See Chapter II, Table 5b.
the conventional ad valorem tax and, where applicable, yield taxes are quite likely to be shifted forward under either near-monopoly or oligopoly conditions.

The existence of policies established by various trade associations and "rating" boards (such as the Southern Pine Inspection Board) may help in standardizing prices at the final product market, and thus aid in forward shifting of the tax. This is a potential aid to large tract owners as well as to wood-industries owners. It is unlikely that such organizations provide a similar service to many small-tract owners or to the mills using their products to produce "unrated" lumber.

Finally, in comparing the ad valorem property tax with the yield-type levy, Professor James Yoho suggests that, when not unreasonably high, the ad valorem (annual) tax tends to mitigate in favor of the "all-age" type of timber operation, in which the products are more-or-less continuously harvested. The yield-type levy, which may be deferrable until harvest, tends to favor the "even-age" stand or at least to make it feasible, in his opinion. In any event, excessive ad valorem levies may be expected to work to discourage increasing the density and/or quality of stands, as the taxes (if assessment is kept up to date) would be increased with each stand improvement.

---


25Ibid., pp. 56-7.

26Ibid.

27Ibid., p. 53.
In the harvesting of a mature stand, also, the annual levy would constitute a valid reason for withdrawing timber as rapidly as possible, thus reducing the exposure of the stand to tax assessment, and producing a cost saving. The yield-type levy produces no such urgency, and it is precisely this quality which prompted its initial adoption as a conservation expedient.

Which type of measure, then, is best suited to modern forestry objectives? This is a difficult question to answer in absolute terms, as the considerations center on whether it is preferable that the forest yield an annual product, or that it be allowed to mature as a single unit ("even-age" forest). Much of modern forestry leans toward the former application, though Professor Yoho associates high quality with the latter.28 It may be necessary to provide an option between the election of an annual tax or a deferred, yield-type levy for different tracts and for different purposes (e.g., sawtimber is somewhat more amenable to the extended, "even-age" tract method; pulpwood might readily come from the "all-age" stand). In any event, rates applied through the ad valorem tax should be reasonable. Professor Yoho suggests that "frozen" rates might be utilized; that is, a ceiling may be set on the assessment and/or rate for property taxes collected against timber tracts.29 In this way, the owner would not be penalized for stand improvement, and, as long as the rates were sufficiently high to prevent pure speculations, they would occasion no great advantage.

---

28Ibid., p. 57.
or disadvantage for either approach to timber management over the
other.30

Property Taxes on Mineral Properties. The exploitation of
mineral properties entails a complex and mixed set of ownerships and
industrial structures even more varied than that for timber. In order
to encompass the entire range of market structures, one must include
small, localized operations for the excavation of sand and gravel, or
clay for local brickyards, along with the gigantic and powerful complex
of exploration, drilling, pipeline transport and refining of the oil in­
dustry. For purposes of this analysis, taxation of mineral lands will be
considered on the basis of localized versus interregional production; and
ownerships on the basis of small, large and industrial categories.

Small ownerships of such common minerals as sand and gravel,
stone and clay, and other minerals of no particularly unique qualities
would likely be operating in markets in which price is largely determined
by the level of demand for the product. That is, local or regional activ­
ity in such areas as residential and commercial construction, roadbuild­
ing, brickmaking and related activities would set standards for prices
received. To the extent that development of these materials does not
compete with such other activities as farming, residential use or other
economic applications (e.g., the case of excavation of sand and gravel
from creek and river beds), supply would tend to be highly inelastic. For
the small-tract owner, there is a general likelihood that he will be unable
to shift the property tax forward in any significant or predictable degree.

30Ibid.
An exception would arise in the case of a particularly-rich, or particularly-well-located deposit which might command a premium price, compared to other sources of supply. In the case of inferior deposits, it is possible that no development offers may be made to the owner, or offers made may not be considered worthwhile, even given the more-or-less "surplus" value in such deposits.

Even when the small tract owner commands deposits of minerals with an interregional or national market, such as petroleum or natural gas, he may enjoy few opportunities for shifting the property tax forward. Having insufficient capital and/or technical knowledge to develop such deposits, and given the high fixed costs associated with oil and gas production, the small-tract owner is generally forced to deal with professional developers ("wildcat" speculators or pipeline or petroleum companies). These developers, in turn, seek to execute leasehold agreements with several tractowners in a given locality, in order to achieve economic scale of operations (a leasehold agreement with any individual small tractowner may even include an "escape" clause, to be exercised in the event that sufficient numbers of leases, or sufficient area for development, are not secured by the developer to make production worthwhile). Thus, in the case of the small minerals tractholder, as in the case of the small timber owner, the possibilities for shifting the burden of property taxes are very limited.

Owners of large tracts (or even medium-sized tracts of unique advantages of richness or favorable location) would be likely to fare better, to the extent that they have the capacity to affect supply appreciably in local markets. Even in interregional or national markets, the
size of their holdings alone may give these owners some advantage among regional developers. Because large leaseholds negotiated with a single owner tend to insulate the owner from "whipsawing" (setting one owner against another in negotiating the lease), and may be attractive to several developers bidding against one another, the owner may be able to shift a portion of the property taxes forward to the developer eventually awarded the lease. This presumes, of course, that the owner has some basis for estimating the cost of such taxes for purposes of incorporating them into the leasehold and royalty agreements.\(^{31}\) A minimum of records-keeping, however, should make this feasible.

Large tractowners should find agreements on resources traded in the less-competitive markets (e.g., petroleum, natural gas, metals, etc.) less subject to wide variations in both numbers of prospective developers and terms which such developers are willing to accept than for the more competitive or localized markets (such as for sand and gravel, stone and other materials generally used in the locally-oriented construction industries). This may be due to the fact that the former group possess a greater capacity to shift the taxes through monopoly price power to a later production stage.\(^{32}\)

---

\(^{31}\)If, for example, a tax on a given tract amounts to, say, $500 per year, the owner would adjudge the rate of earnings on a lease **net** of this amount, as follows:

\[
\text{rate} = \frac{[(\text{leasehold amt/term of lease}) + \text{avg. royalty}]}{\text{Market Value of Leased Lands (est.)}} - 500
\]

\(^{32}\)As long as the industry may be able easily to include the shifted tax in an administered price structure, resistance to the shift would tend to be considered unimportant; a "markup" on this part of cost may even be possible (see Groves, *Op. Cit.*, pp. 285-6: "pyramiding" of taxes).
Industrial tractowners will view shifting possibilities largely on the basis of their price power in the markets, which may be extensive in the case of large, vertically integrated concerns in industries producing and selling in oligopoly or virtual monopoly markets (e.g., the petroleum, metals, salt, and sulfur industries nationally; the cement, glass, brick and other industries locally or regionally). In these industries the property tax is viewed as a cost of production, and the attempt to recoup this cost through the price of products is a foregone conclusion.

As in the case of other industries, excessive property taxes on natural resource holdings of industries may exert a repressive effect. This would be especially true of a firm operating interstate or inter-regionally in a market characterized by highly-competitive conditions. In the bulk of resource industries operating on a national scale (oil production and distribution, metals, sulfur, salt, gypsum, etc.), however, the rule is oligopoly organization virtually throughout the production, distribution and marketing processes. In oligopoly the practice of "bulk-line cost" pricing, in which market price is administered either covertly or more-or-less overtly to accommodate the least efficient (highest-cost) member of the oligopoly in a position of at least minimum profits.33

Under such an arrangement, the highest state or local tax rate paid by one of the oligopoly producers may actually become a substantial element in price-fixing for the entire industry, in addition to allowing the

---

producer in question to shift the entire amount of the property tax from the point of impact to the point of ultimate sale. Conceivably, then, the final effect to the private sector of the economy is a shift of much, much more than the very highest property tax assessed by any state or locality, with the more-favored firms enjoying a substantial monopoly profit as a consequence.

A study of property taxation would be incomplete without a consideration of the subject of tax capitalization. This is a special case of tax shifting in which the perpetual burden of any newly-imposed property tax is theoretically permanently shifted backward to the owner of the property at the time the tax is imposed.\(^{34}\) This phenomenon, of course, would be most applicable to property devoted to commercial purposes, but, in a sense, it may be applicable even to residential property to the extent that real property taxes are a consideration in the decision of a householder to buy. The requirement of a price transaction to enable shifting is met by what Sharp and Sliger\(^ {35}\) describe as "a simulated one between the current property owner and the future buyer of the property".\(^ {36}\) For the owner of natural resource lands, especially for the small-tract owner, this is likely to mean a capitalization of not only the bare-land tax on his property, but the capitalization of yield-tax charges in the case of timber or other materials whose realization for production is subject to taxation at time of conversion. If a corollary may be appended to

\(^{34}\)For an excellent discussion of tax capitalization, see Groves, *Op. Cit.*, Ch. 6, pp. 142-45.


\(^{36}\)**Op. Cit.**, Supra note no. 3, p. 212.
the concept of tax capitalization, it would be that an area characterized by very low tax rates applied to real property may find the sellers attaching a "negative capitalization" to this virtue. That is, inflated property values may be the result of property taxation which is significantly lower than that for otherwise-competitive properties. Thus, the property owners at time of the enactment of special property-tax deferrals or exemptions may actually enjoy a speculative economic surplus associated with the capitalized value of such tax relief.37

37The extent of this "negative capitalization" is by no means certain, but it may be described by the following formula:

\[ P = \frac{A + S^t}{r} \]

where

- \( P \) = Market price,
- \( A \) = Net Annual return in an adjacent (or similar) competitive area with a higher tax rate (net rent),
- \( S^t \) = difference in ad valorem (or other) property taxes favoring the region in question, and,
- \( r \) = average return for similar properties deemed sufficient to induce purchase and development.

Thus, if the average net rental return on a parcel of property in a higher-tax area, sufficient to induce development at a rate of, say 5 percent were \$300; then the value of such a property would be (capitalized):

\[ P = \frac{A}{r} = \frac{\$300}{.05} = \$6,000; \]

while for the favored (negative capitalization) region, the value would be:

\[ *P = \frac{\$300 + \$100}{.05} = \$8,000, \]

when the tax advantage \((S^t)\) for the favored region is \$100 (less) compared to the tax in the less-favored region.
C. Severance Taxes on Natural Resources: Patterns of Shifting and Incidence

The unique application of the severance tax to the equally-unique natural resources industries contains the elements necessary for shifting of the tax (price transaction, component of cost structure of commodity, differing elasticities of demand and supply in the markets, etc.), and constitutes, in operation, a commodity tax. Though the tax is variously applied as a "privilege" tax (Arkansas, Louisiana, Michigan, et. al.), or as an "occupation" tax (Texas), or on some other basis of nominal designation, the fact that the tax involves the extraction, production and distribution of commodities in trade would lead those involved to regard the severance tax as applying to the commodity. As in the case of property taxes, the analysis will be made on the basis of the ability to shift the tax by various classes of resource owners and developers, and for various types of resource industries. Special attention will again be given to the timber and wood-producing resources as distinguished from minerals industries, representing, respectively, renewable and nonrenewable resource classifications.

Timber Severance Tax Shifting and Incidence. As should be apparent by now, little reliance is placed by the survey states upon timber severance taxes for public revenue; rather the bulk of such taxes is devoted to the interests of conservation and forest management (See Chs. I, III). The presence of the tax, however, has the same immediate implications for shifting and incidence as if it were disposed in the conventional manner of distribution for revenues, and the incidental benefits received by forest owners and developers from forest improvements financed by the
tax have little, if any, bearing upon the desires of owners and developers alike to shift the burden of the tax.

Timber severance taxes are levied upon the "severer" or developer of the resource property, whether he be the owner of the lands, or someone with assigned leasehold rights conferred by the owner. The final resting place of the tax, however, may or may not lie with the severer; his capacity to shift the burden of the levy to others will determine the final resting place for the tax.

Severers dealing with small tract owners are likely to have the option of the direction of shifting which they will choose -- backward shifting to the tract owner (capitalization, as it were, of the diminished net value of timber after the tax), or forward shifting to the processor (this would be of more practicality if the severer had several alternative customers for his product; the likelihood of success would be reduced in proportion to the economic power of the processor, increased with larger numbers of processors). As in the case of the property tax, the small tract owner would have little price power (due to his insignificant contribution to supply) to influence the price received from severers, and thus would be in no position to protect himself from a backward shift of the burden of the severance tax, save for diverting his lands to alternative uses. The option would largely lie with the severer.

The developer (either owner or lessee) of timber resources on small tracts would face forward-shifting possibilities largely based on the numbers and economic power of would-be processors or manufacturers of wood products in the locality or region. Thus, if the severer were fortunate enough to deal with a number of small competing sawmills in an
area, elasticities of supply faced by any one of these sawmills might cause the acceptance of at least a partial forward shift of the tax. Similarly, a choice between sawmills, pulpmills, postyards and other wood-users competing with one another might ease forward shifting, especially if there were a limited number of suppliers. However, if the severer were only one of a large number of suppliers to, say, a monopsonistic paper mill, dominating the area, then it is quite unlikely that the severance tax would be accepted as a part of the supply contract unless the mill were able to transmit the cost to the ultimate market. A further disadvantage for severer and/or owner prevails when the timber crop is limited in its market applications (e.g., smaller, poletimber-sized trees on second-growth stands would be suited only to either pulpwood or post production). In these latter cases, the small tract owner and/or severer may expect, between them to bear a large part of, if not all, the burden of payment for the severance tax.

When timber is developed in large tracts, the timber owner may be accorded some protection against backward-shifting of the severance tax due to the likelihood that his tract will be more attractive to a larger number of development possibilities and developers. He may now command more price power in dealing with developers, and, perhaps, even with subsequent processors. If, as is frequently the case, the timber on the large tract is well situated and of higher quality for development, then the inelasticity of his demand function is further enhanced, and the shifting possibilities expand.

The severer other than the owner, seeking to develop a large tract, may be placed in a "squeeze" between the influential owner and the
dominant processor of wood products, in which case, he may have to absorb all or a large part of the severance levy burden. To the extent that his rights to large tracts comprise a substantial part of the local supply, the severer may be at least partially successful in shifting a portion of the tax to processors in the negotiated price. This latter possibility is made more tenable if the processor has some confidence that he, in turn, may shift the tax to subsequent buyers.

The industrial owner/developer of timber tracts, as in the case of the property tax, tends to regard the severance tax as a part of the cost structure, and is ill-inclined to absorb its burden. Again, to the extent that the commercial owner is economically-influential in the wood-products industry, regionally or nationally, his power to incorporate severance taxes in price is substantial. Should competitive or other conditions (such as product substitutes like plastics, masonry materials or others) deprive the wood-industries owner-producer of price power in the final market, his alternative are to transmit the burden of the tax to his labor force, capital-equipment suppliers or others, or, finally, to absorb the cost of the tax from profits. The possibilities for a backward shift of severance levies, though difficult to ascertain empirically, would be especially favorable if the wood-products producer is an oligopsonistic or monopsonistic buyer of labor in the area, or is a similarly-dominant customer for timber and wood-processing equipment and materials.

The forward shift of the severance tax still appears to be the more likely course of action for the vertically-integrated forest-owner-processor, and this possible course of action may be aided materially by the trade associations and boards previously mentioned, with their atten-
dant power to fix prices and marketing policies. If the elements for conscious oligopoly market structure were lacking before, such associations lend decisive support.

One development by the wood-products industry which, in recent years, may have eased the dilemma faced by the small-tract owner relative to the severance tax burden is the so called "American Tree Farm System", sponsored by the American Forest Products Industries organization.38 This program enlists private forest owners, often small-tract farm or family operations in providing sources of supply to the local wood-using industry, in return for which the industry offers advice, services and other considerations to the tract owner in order to produce conditions of scientific, sustained-yield management.39 By 1961, acreage under the System amounted to about 54.8 million acres, with 3.8 million acres in Texas, 3.75 million in Louisiana, 3.6 million in Arkansas, and 1.2 million in Michigan.40 Aside from the obvious conservation benefits to be derived for forestry, the participation by the forest industries may also enable the small tract owner to enjoy, by association, the price-power of the industry, and cause the forward shifting of severance-tax burdens otherwise likely to have been shifted back to the owner, or absorbed by the developer. The extent of forward-shifting might be deduced by comparing the prices received on such "Tree Farm" contracts with the valuations placed on timber cut on its own tracts by the forest industry itself.

39 Ibid.
40 Ibid.
Severance Taxes and Shifting in Minerals Industries. Unlike the severance tax on forest products, the minerals severance tax may be considered to produce respectable (if not spectacular) revenues, and to be largely treated as a revenue source. As in the case of the severance tax on timber, however, the severance tax on minerals may be regarded by the severers as a commodity tax on the minerals realized. Again, market structures facing severers, owners, and producers are decisive in patterns of shifting which may emerge. The analysis which follows will be based on a consideration of these factors.

Again, as in the case of property taxes, where the minerals are quite common, and held in small deposits, the tax on severance may be expected to hold few possibilities for forward shifting, and to include the possibilities for backward shifts from the severer to the owner. This stipulation may not apply in the case of some minerals of unique or very limited supply, for which the demand by developers and producers is great (e.g., certain gem stones, platinum and other precious metals, etc.).

Severers and/or developers operating in industries of relatively common and highly competitive products will seek to shift the tax, but forward shifting may be largely unprofitable due to the market competition, and/or existence of numbers of substitute products. The alternative, then, is a backward shift to the owner, who is similarly disadvantaged in market price power. The success of such attempted shifts will depend, then, on the relative powers of the owner and severer; it is quite probably that both will ultimately shoulder some of the burden of the tax.

For certain industries whose production is localized (such as the salt and sulfur industries), and who operate in oligopoly-oriented
production and distribution markets (such as the above, plus oil, natural
gas and metals), forward shifts are sufficiently easy that they may be-
come a matter of policy, without regard to the possibility of backward
shifts. Thus, the severer of petroleum products, even if not a verti-
cally-integrated concern, such as a pipeline company or producer-refiner,
may be successful in gaining a forward shift of severance taxes. Price-
fixing by the oligopoly firms in the area may offer an incidental benefit
to the independent developer who deals in the same market.\textsuperscript{41}

Vertically-integrated owner-severer-producer firms, or simply
severer-producers, in industries organized in oligopoly-market forms will
be strongly disposed to transmit the tax as a cost of production to the
final price of products. Here, again, trade associations and boards may
aid in maintaining parallel price policies for the oligopoly firms. In
the case of petroleum, the state and federal governments have been of
substantial (even if unintended) help in market control, through the osten-
sible pro-conservation practice of prorationing and the economic "assist-
ance to orderly marketing" of Bureau of Mines estimates of monthly crude
production.\textsuperscript{42} Industry-sponsored guideline practices are available to
other oligopoly-oriented minerals industries.

\textsuperscript{41}\textsuperscript{41For a survey of landmark proportions regarding market organi-
ization of the domestic crude petroleum industry, see Rostow, Eugene V.,
A National Policy for the Oil Industry, Part II, Chs. 4-6.}

\textsuperscript{42}\textsuperscript{Rostow, Op. Cit., pp. 27-9.}
D. Effects of Resource Taxation: Some Observations

The incidence of the tax is the end result of shifting; the effects of a tax are far more widespread in nature, and pertain to the social as well as the economic costs inherent in the tax. Some general effects of taxes on resources will be suggested in this discussion, and, in the concluding chapter (Ch. VI), specific observations regarding resource-tax effects will be made.

Effects on Timber Industries. Tax policies, and the mechanisms for shifting of taxes on timber industries have been studied very carefully by public policymakers as they affect conservation, incentives and production in the modern period (since the 1930's). Modification of the ad valorem property tax has been accomplished through the yield-tax concept in many states in an attempt to encourage (or at least, to avoid discouraging) sound forest management. Substantial amounts (in some cases virtually all) of the yields from both severance and yield taxes on timber have been "ploughed back" into the agencies and programs promoting sound forestry.

The results of forest-tax policies thus far do not provide evidence that conservation has been either helped or hindered by the modern approaches to forest taxation, though the industry has certainly benefited from the tax-supported public education, information and research programs. The ad valorem tax may have taken some toll in the ruthless cutting practices of the 1930's and previously (though the economic conditions of the great depression may have contributed to much of this waste), but participation in yield-tax programs has not, thus far, indicated that there is an
overwhelming desire to escape the burden of the conventional levy. Conservation and scientific methods of good forestry practice have been in evidence most on the publicly-held lands, followed in order by those owned by the forest industry and large, privately-held tracts (see Ch. II). These are the areas in which improvements would have been expected in any case, and the areas controlled by the latter two types of owner have grown, and will probably continue growing, at the most rapid rate. While the small woodlot may not disappear completely, such holdings will assume a lesser and lesser significance to the forest industry. Perhaps those remaining will frequently be connected directly with the wood-using industries as suggested by the "tree farm" approach, said to be growing at the rate of about 3 million acres per year.43

Minerals taxation appears to have been largely accommodated into the cost structures of those resource producers operating in markets characterized by lack of strong competition. The ultimate resting-place for many of these property and severance taxes, or large parts thereof, is the ultimate marketplace for the finished product. Thus, the taxes involved become consumption taxes, paid through prices for goods produced by the taxed industries. The tax may have few ill effects, and, indeed may be something of a tax on "benefits received" for the consumer who enjoys the end product of society's common largess.

Again, many of the minerals industries are characterized by large, often vertically-integrated, concerns; but this need not be an effect of the tax structure, so much as of the industries' requirements

for large capital outlays, or, for some industries, the fact that the subsequent stages of production and distribution are populated with large, powerful firms. Mining, like manufacturing, is often most efficiently conducted on large-scale operations, and this may better serve conservation and output goals than the attempt to limit the size of enterprises arbitrarily.

If it appears that the success in shifting taxes on resource industries subverts the intent of such levies, perhaps the real intent of production taxes should be viewed in the light of the following statement:

...it is commonly believed that a cigarette tax paid directly by a manufacturer in North Carolina ends as a burden on the smoker.... In fact, we are so confident of the shifting in this case that we label the tax a consumption tax.

Thus, the purposes of public policy may be served, even if, as is very frequently the case, business taxes become, at length, personal taxes. In this aspect, taxes on businesses (or persons) engaged in the resource industries are not materially-different from taxes on any industry.

E. Summary

In the foregoing discussion, attention has been given to the probable patterns of shifting and incidence for resource taxes; that is, the manner in which the initial levy is ultimately disposed of, and the probable final resting-place for the burden of payment. The mechanics of shifting suggest that, in order for a tax to be shifted, it must involve

---

a commodity or process which is subject to exchange for value ("price transaction"), and, in this particular, taxes levied against natural resources qualify.

Taxes levied against resource industries constitute two general effective applications: those which may be considered as attaching to the resource lands and wealth (property taxes), and those which may be associated with the production or processing of the resource commodity (severance taxes). The yield-tax variation on ad valorem property taxes constitutes something of a "hybrid" levy in effect, containing as many (or more) attributes of the commodity tax as of the property tax. This is due to the timing of its collection with the harvesting or mining of the resource.

Property taxes constitute the most difficult type for shifting in the conventional sense when they are applied on an annual basis to resource lands which yield a product only periodically, sometimes over substantial periods of time, as, for example, those pertaining to standing-timber tracts. When shifting is possible, the capacity to shift the ad valorem tax is probably greater among large-tract owners than small-tract owners, due to the greater price power of the former, and easier for industrial owners than for other private owners, due to the greater degree of vertical integration with the processing and final markets for this class of owners. This is generally true for both timber and minerals properties. The presence of yield-type, "in lieu" taxes on the resource commodity only, or on both the lands and commodity, simplifies the process of tax shifting, providing a timing of the tax with the actual trading in the resource commodity. Under these circumstances, the computation of
the tax on the basis of the resource commodity is virtually automatic, and the possibilities for shifting will be virtually all based on the differential market influences of owners, severers and processors, proceeding in the direction and degree dictated by the dominant member of this group.

Severance taxes, constituting commodity taxes in effect, are subject to shifting according to the degree of price-power possessed by owners, developers and processors, with the small-scale owners being least able to avoid a backward shift by severers, and smaller-scale severer-developers being least able to transmit the burden forward to processors, other factors equal. The composition of the industry utilizing the resources will have a substantial bearing upon the degree and direction of tax shifts, with those who operate in oligopoly or near-monopoly product markets being more disposed and able to shift taxes forward toward the ultimate consumer. The more competitive the product market, the fewer the forward-shifting possibilities. Industrial owners in vertically-integrated resource industries would be most likely to seek forward-shifting possibilities, given sufficient price power in product markets.

The final disposition of the burden of resource taxes, where forward shifts have been successful, lodges largely with the ultimate customer for the resource product. Despite the basic designations of both property and severance levies, there is an implicit acceptance (even intent) of the consumer's shouldering the burden of resource taxes, as in the case of all production-oriented taxes, in the drafting of such taxes. These taxes are often popularly called "consumption" taxes when more overtly transferred to the consumer, as in the case of tobacco taxes levied originally upon
the manufacturer. Thus, forward shifting of the taxes on natural re-
sources provides both a rationing function for their use, and a basis 
for collection, in various stages of their development, of society's 
demand for compensation for the loss of these resources.

From the standpoint of final effects, the pattern of shifting 
assumed by commodity taxes has a very real bearing upon the consequences 
of a tax to the state or region in which it is levied. That is, if a 
commodity-type tax such as that described in the preceding paragraph is 
successfully shifted forward to consumers markets diffused throughout 
several regions, then the state or area in question will actually have 
relieved itself of substantial portions of the burden of the tax. There-
fore, if a petroleum severance tax in, say, Texas or Louisiana, is trans-
mitted to the final sale of products by a national corporation, purchasers 
in Iowa or Florida may actually be made to shoulder some of the burden of 
taxes levied on removals of resources from the former states. In effect, 
the states of Texas and Louisiana have levied taxes to be paid, in part 
at least, by persons in other states. This is much in keeping with the 
concept that persons benefiting from the enjoyment of resource products 
should be assessed the social (as well as market) cost of such enjoyment.
CHAPTER VI

SUMMARY, EVALUATION AND CONCLUSIONS

In the preceding chapters, the reader has pursued an examination of the roles of resource industries at the basic-production level in the economies of the survey states, and the manner in which they are subjected to special forms of taxation by those states. In the course of the study, the similarities and differences among the four states, both as to resource wealth and the approach to its taxation, have been portrayed to afford the reader insight into the question, and to provide a basis for comparison and evaluation.

The present chapter will have three fundamental objectives: first, an analysis of the fiscal significance of natural-resource taxation for the four states; secondly, an examination of the policy effectiveness of resource taxes, in line with the policy objectives suggested in Chapter I; and, finally, some suggestions will be offered for modification of tax structure for more effective results from both the policy and revenue standpoints.

A. Fiscal Significance of Natural Resource Taxes Compared for the Four States

Probably the most obvious characteristic observed from the study thus far is the vastly-differing fiscal significance of resource taxes for the survey states. Two of these states, Texas and Louisiana, collect massive revenues from resource taxes, principally those on mineral resources, and most of the latter from petroleum products. Arkansas and Michigan stand in an entirely different class, realizing only modest revenues from
taxation of resource industries, though the petroleum industry is the mainstay for resource-tax collections in these states, also.

As a basis for analyzing the differential fiscal significance of resource taxes to the several states, it may be appropriate to examine each state in the survey separately, giving attention to each classification of resource industry separately, also. The contrasts provided are quite striking, and may aid in understanding both the degree of importance associated with resource industries for each state and the comparative yields of various resource industries to the revenue base.

Texas. The treasury of natural-resource wealth for Texas is vast, and places the state at the very top of this category, both in terms of the value of resources products, and public revenues obtained from taxes levied upon them. Texas' minerals production is, of course, the principal basis for her preeminent position in natural resources. The value of her minerals production accounts for about 22 percent of the total minerals value produced in the entire nation, a figure which is well ahead of that for any other state (Louisiana was second in production in 1965 with 14 percent, California third with about 7.5 percent).\(^1\) The values obtained from her forest and fisheries industries also contributes significant, if not such spectacular, amounts.

As might be expected, in the light of the above observations, Texas led the nation in resource-severance tax collections in fiscal 1965-66, with almost $211 millions, the bulk of this figure ($205 millions) coming from her severance taxes on petroleum products (See Table 13, Ch. IV).

---

As a percent of her total tax collections, the combined severance tax receipts accounted for about 16.5 percent, second only to sales and gross receipts at $786 millions and 62 percent of the total $1,267 millions.² A portion of the gross receipts revenue arose from processing industries dealing with natural-resource products, and this, it should be pointed out, would add to the fiscal significance of resources at stages of their development above the basic level.

In addition to tax revenues gained from natural-resource industries, the State also collected substantial amounts of money from leases, sales and royalties on products severed from public lands, or lands under public jurisdiction.

Louisiana. Louisiana, like Texas, possesses vast natural-resource wealth. Her second-ranking position among resource producers (14 percent of 1965 value in minerals industries) makes her, in many characteristics, very similar to Texas in the role which resource taxes play in her public-revenue picture. Unlike Texas, Louisiana levies specially-designed taxes against her forest and fisheries industries, along with the minerals-resource industry. Louisiana, then, has the most comprehensive structure of resource-tax application among the survey states.

Consistent with the great significance of her natural-resource industries, Louisiana derives a major proportion of her tax and nontax revenues from this area of tax application. The severance-tax, in its various applications, is the leading tax for the state, with the $205 millions in fiscal 1966 accounting for almost one-third of total tax

The overwhelming bulk of severance-tax collections come from minerals ($204 millions in fiscal 1966), and of minerals taxes, oil and gas products account for the virtual total sum ($200 millions and 98 percent in fiscal 1966).\(^4\) Timber severance taxes during the same period accounted for about $630 thousands, or only about 0.3 percent of the total severance-tax revenues, and fisheries severance taxes have characteristically accounted for a very small part of the total severance revenue (less than $400 thousand in fiscal 1965, the latest year for which data were available in detail).\(^5\)

The impact of Louisiana's natural resources upon her fiscal revenues is not limited to the yields from severance taxes. She also realizes large sums from mineral leases and royalties on resource products taken from state lands, territorial waters and streams of the state, as evidenced by the estimate for fiscal 1965-66 of $103 millions from such leases and royalties.\(^6\) Combined with severance tax revenues, the total estimated returns of about $306 millions approaches one-third of total budgeted state revenues of about $1 billion for the fiscal year 1965-66.\(^7\) Thus, viewed from the context of either taxes or total state revenues, natural resources possess a critical significance to the state's fiscal well-being.

\(^4\)Ibid., p. 10.
\(^7\)Ibid.
The disposition of severance-tax revenues is of considerable interest, also, as these revenues constitute a vital base of support for several necessary public functions. As previously noted (Ch. IV), with the exception of timber severance tax revenues, (limited in returns to any parish of $200,000, or three-fourths of the total, whichever is smaller), the majority of severance revenues are retained by the State for the benefit of the free school textbook program and for the Public School Fund. This latter fund has been the principal beneficiary of the revenues, as the textbook program has required only a small part of the total. Fisheries severance taxes have primarily nourished the Conservation Fund, though the amounts have hardly been adequate to any substantial support in themselves.

The returns on mineral leases and royalties for 1965-66 fiscal year were budgeted for the General Fund (about 70 percent) and to the Highway Fund (about 14 percent), and the balance was allocated among a number of special-fund accounts.

Arkansas. The significance of severance taxes to the support of fiscal budgets in the State of Arkansas is in striking contrast to the leading roles such taxes occupy in Texas and Louisiana. Severance tax revenues are a minor part of the total collected by the Revenue Department, with the 1965-66 fiscal-year collections of $4.8 millions accounting for

---

9Executive Budget, p. 6.
only about 2 percent of the tax receipts handled by that agency ($253 millions).\(^\text{10}\) The $253 millions in collections by the Revenue Department accounted for about 95 percent of total tax and other collections of $267 millions in fiscal 1965-66.

When the $8,726,766 derived from oil and gas leases and the $109 thousand from royalty payments (principally sand and gravel) are added to the total from severance taxes, the relative importance of resource-based yields is not changed materially, still falling somewhat short of 2 percent of the total tax collections from all sources.\(^\text{11}\) In terms of a total state budget of about $400 millions, the total support from natural resource taxes and other collections from the industry accounts for about 1.2 percent.\(^\text{12}\)

Of the total from severance taxes, the largest contributor is, and has been, the petroleum industry. Oil severance taxes have recently averaged about $3 millions annually ($2,85 millions in fiscal 1965-66 is somewhat below figures obtained in preceding years), or about 62.5 percent of total severance taxes.\(^\text{13}\) Next in value were timber severance collections, with $885 thousands collected in fiscal 1965-66, and reflecting a sustained rise in recent years.\(^\text{14}\)

\(^{10}\)Biennial Report, 1964-65, Wild Life and Fisheries Commission, pp. 6, 8.


\(^{12}\)Report by the State Comptroller (Arkansas), 1966, pp. 242-3.


\(^{14}\)Ibid.
Thus, the State of Arkansas presents a more orthodox picture of state revenue system, with the "customary" state taxes -- sales, gasoline, income, etc., -- being the leaders in revenue production. Severance taxes and other collections from natural resource industries must be considered as having minor significance in the scheme of state finances, and represent only a limited source of "turnback" to the county and local units. In fiscal 1965-66, the one-fourth share of general severance tax revenues returned to the counties totaled $970 thousand. Shares of this sum would be likely to assume significance only for the poorer counties.\(^\text{15}\)

**Michigan.** For the State of Michigan, resource taxes have the least fiscal significance among the survey states. Her collections of the oil and gas severance tax for fiscal 1965-66 totaled about $983 thousands, off slightly from the previous several years, when the average of collections had averaged just over $1 million.\(^\text{16}\) The 1965-66 total accounted for less than 0.7 percent of the total tax collections of $1,424 millions.\(^\text{17}\) Addition of the Oil Privilege Fee collections ($18 thousands) barely brings the total to 0.7 percent, and the state-collected portion of the forest-severance taxes on timber in fiscal 1965-66 of $19 thousands raises the total only slightly.\(^\text{18}\) The severance taxes on timber in private forest

\(^{15}\text{Ibid.}\)

\(^{16}\text{\textit{25th Annual Report}, Department of Revenue Division (Michigan)}, p. 80.}\)

\(^{17}\text{Ibid., pp. 10-11, p. 28.}\)

\(^{18}\text{\textit{23rd Biennial Report}, Michigan Dept. of Conservation, Lands Division, 1966, p. 36.}\)
reserves (woodlots) are locally-collected, and not readily available, but the indication is for a very nominal sum.

In 1965-66 there were only 37 oil and gas severance taxpayers recorded on the rolls of the Department of Revenue Division, and this small number of taxpayers seems to suggest a limited potential for the severance tax as it is presently constituted.19

Added to the resource-based support from the severance tax and privilege fee is a comparatively-large income from oil and gas royalties, rentals, bonuses and fees, which totaled over $472 thousands for fiscal 1965-66.20 Total state-collected revenues from natural resources thus approach $1.5 millions, or about 0.8 percent of the total state revenue from all sources, estimated at $1,871 millions for fiscal 1965-66.21

Summary. In the matter of natural resources taxation from the standpoint of fiscal significance, Texas is the apparent leader in dollar terms, but Louisiana places a much greater relative reliance upon these taxes as a means of public revenue. Texas' natural-resource taxes on basic levels constitute almost 17 percent of total tax collections, and are second only to her sales tax in productivity of revenues. Louisiana's severance-tax collections approach one-third of her total tax collections, and comprise the largest single category of tax levied in terms of yield. Question may be raised as to the soundness of such substantial dependency by these states upon a tax source which, by its nature, is subject to ex-

20(Lands Div.), p. 37.
21(Revenue), p. 15.
haustion in production. However, the vast reserves of the principal revenue-producing resources, petroleum products, suggest no crisis will develop in the immediate or foreseeable future.\textsuperscript{22} Certainly, it may be argued that tying one's tax structure so closely to a single, or limited number of activities subject to business fluctuation not necessarily coordinated with fiscal requirements of the states is unwise; but, by the same token, many other levies are subject to the same condition. The income tax, for example, is prone to wide fluctuation, especially if progressive rates are applied.

For Arkansas and Michigan, resource taxes are a minor base of support. The tax is not inconsequential for Arkansas, at least, constituting about 2 percent of total tax collections. In absolute terms, the Arkansas taxes produce a valuable addition to her total receipts. For Michigan, revenues from resource taxation represent only a "token" amount when considered with her diverse, richer other sources of support.

B. Policy Effectiveness of Resource Taxation in the Survey States

At the outset of the study, in Chapter I, three major policy considerations in formulating resource-tax policies were suggested: conservation, incentives to economical production and optimum fiscal yield. In postulating these policy goals, it was suggested that priorities might be assigned which would often emphasize one or another of these objectives over others. For example, conservation might be considered paramount to

\textsuperscript{22}See Tables 7, 8 and 9, Chapter II.
fiscal yields in the case of a scarce or critically-valuable resource threatened with depletion. This section will be devoted to a consideration of the degree of success in the ostensible policy emphases for the various resource-tax applications. The manner of approach will be to consider each type of resource in turn, and to examine the results in each state apparent in each industry. Especial stress will be placed upon timber, as this area appears to have been subject to the earliest and most intensive policy-directed tax programs.

**Timber and Forest Products.** Both Louisiana and Michigan have erected timber-tax structures embodying the yield-tax principle, with attendant concessions to the special tax status of standing-timber tracts. Michigan, with her private and commercial forest reserves laws providing relief from annual property-tax collections, has sought to stimulate reforestation and renewed productivity for lands previously cut over, and to reduce the rate of abandonment of tax-delinquent former forest land. Louisiana, with her reforestation contracts and mandatory forest classification law, has sought to encourage managed reforestation and to provide for only minimal burdens from the property tax, respectively. At the same time, Arkansas and Texas have provided no similar yield-tax benefits for timber, though forestry services are supported in other ways, with research and assistance programs for forest owners and development. Arkansas, for example, returns all forest-severance revenues to the agencies dealing with forest research and assistance.

How well have the special, incentive-based tax programs worked? The evidence is, at most, inconclusive. Total acreage listed under Michigan's commercial forest reserve classification, as has been noted, consti-
tutes only a very small fraction of the total forest land held by private owners. Michigan's is a "voluntary" program of classification, and apparently timber owners have not rushed to avail themselves of its benefits. During the time in which Louisiana's forest classification program was voluntary, a similarly-disappointing experience was noted, and it was not until classification was made mandatory in 1954 that classification comprised a significant fraction of total forest lands. As to Louisiana's reforestation contracts providing restricted "in-lieu" tax treatment for timber, these are presently said to account for about 500 thousand acres.

But what of the physical gains made in forest acreage in the past several years? The total forest area has, indeed, been expanded within each of the four survey states. Qualitatively, however, the additions to the forest land in many cases are simply abandoned farmlands which have reverted to timber by natural reseeding, often without producing stands of sufficient density, or having less desirable species mixed with the more desirable ones. Cull trees present a continuing problem, retarding the production of marketable ones. A report in 1955 showed that Louisiana's forest lands were only about 50 percent well-stocked, mainly in the Southeastern region, and by 1960, Michigan's forest lands were 70 percent well-stocked, while in 1961, Arkansas' forest lands were estimated at about two-thirds well-stocked.

---

24Ibid.
25See Ch. II.
With reference to forest management and active maintenance of good forestry practices, the most abundantly-clear feature is the spotty record of farm owners and individuals not connected with the wood-using industries. The Michigan study\(^{27}\) noted that Michigan led the nation in replanting of forest acreage in 1957, with over 1.2 million acres replanted between 1935 and 1957, but of this total 70 percent of the plantings occurred on publicly-owned lands, although this classification accounted for only about 28 percent of the total ownership acreage.\(^{28}\) In Arkansas, the 1961 report noted that the recent gains in desirable species, especially softwoods, were "largely on public and industrially-owned tracts."\(^{29}\) In East Texas forests, the chronic problem area for forest management and quality of stands has been the Northeastern region, which is largely populated by farm woodlots and small tracts held by non-industrial owners.\(^{30}\) Perhaps the most general defection is among the absentee owners and other individuals not connected with the wood-using industries, with practices of farm owners varying from good silviculture to none at all.

The record of policy success, with special reference to conservation and promotion of forest management, appears to have been something less than complete, with the most encouraging results from industrially-

---


\(^{28}\) Ibid., p. 8.


\(^{30}\) "Forests of East Texas", p. 6.
owned tracts, and the most dismal from the private, nonassociated owners.

A hopeful sign of some policy success may be deduced from the condition in Michigan, an area which had been victimized by shortsighted cutting practices until the mid-1930's. Michigan shows a substantial involvement in new plantings entailing a high percentage in seedlings and saplings among the growing stock. This suggests that Michigan, in the 1950's, had commenced to lay the basis for poletimber and sawtimber volume consistent with a balanced-yield potential, something which she did not have at that time.

The property-tax situation in the states of Arkansas and Texas is due some very prompt attention. The increasing population, and the expansion of competing uses for land which it entails, may threaten forest areas in those states, and the existence of no "shelter" from the regular ad valorem property tax may contribute materially to the threat. It cannot be assumed that historically-low assessments for forest lands will be continued indefinitely in the face of the expansion of urban populations into these areas, accompanied by factories, residential-land expansions, and other improvements which may tend to raise assessment ratios. The long market period for forest products, particularly from those tracts characterized by substantial immature stands, mitigates against the owner's ability to sustain the burden of high assessments and annual collection. It would appear then, that Texas' and Arkansas' timber

---


32 Ibid.
industries are headed for trouble unless some yield-tax or other modification of the property tax is executed within the near future.

**Minerals and Other Resources.** For the most part, the policy applications to minerals taxation appear to have been designed to meet requirements for orderly production with minimum repressive effects, and in some cases to produce substantial public revenues, as well. Perhaps it is not so much the taxes themselves, but the absence of taxes which describes policy applications in many cases. For example, the application of petroleum and natural gas severance tax rates differs substantially for the states of Texas, Louisiana and Arkansas compared to that levied by Michigan on the same industry. The rates for Michigan's oil and gas industry are substantially lower, effectively, than those applied in the other three states.\(^{33}\) This may be partly explained by the minor role played by the petroleum industry in Michigan, as compared to the other three states, however, and may be a public-policy consequence of a desire for continued well-being and expansion. Reference has previously been made to the fact that Michigan does not levy a severance tax on its metallic-minerals industry (Ch. IV), and to the concessions that she makes relative to the property tax on metallic-minerals values (Ch. I, pp. 10, 11). These concessions appear to reflect the concern of public policy for the industry's ability to compete with adjacent states' metallic industries, and with Canadian competition in this area.\(^{34}\)

---

\(^{33}\)Given a price of crude oil of, say, $3.00 per barrel, a tax of 18 cents amounts to 6 percent; a 26-cent tax would amount to 8.6 percent (Louisiana's rates); Texas taxes oil at 4.6 percent of value; Arkansas at 5 percent; and Michigan at 2 percent.

\(^{34}\)See Gronouski, *Op. Cit.*, pp. 353-57, in which competitive pressures are detailed.
In similar fashion, Texas does not levy severance taxes over the entire group of her minerals industries, nor on forest industries. Instead, she concentrates her efforts upon the petroleum products and sulfur (see Ch. IV). Whether this limited application of taxes is productive, from a policy standpoint, of more efficient production and larger total economic benefits, is unclear. It may be that Texas simply considers the application of severance taxation to presently-untaxed areas productive of insufficient potential revenues to make it worthwhile, considering the administrative burdens.

The taxation of fisheries by Louisiana appears to reflect a means of internally-generated finances for services to this industry, and seems to work no extreme hardship on the taxpayers, while aiding in assuring the perpetuation of the industry. Texas apparently has utilized fees, licenses and other assessments rather than severance taxes to accomplish her public-policy goals in this resource area, as do Arkansas and Michigan. The small scale of the fisheries industry in Arkansas does not appear likely to yield revenues of any consequence, and special taxes may operate to discourage marginal operations to the extent as to erode the tax base. For Texas and Michigan, it appears a matter of choice as to which application, taxes or fees and licenses, is most productive of desired results, and both have apparently chosen the latter course.

**Summary.** As indicated previously, the critical policy application of resource taxation appears to have been historically devoted to timber and forest products, conservation having been among the earliest concerns associated with tax measures in this area. Policy for other resources appears to have been a pragmatic balance between revenue poten-
tial and orderly conduct of the enterprises, without wasteful exploitation. More than taxation policies, it still appears that the principal problem of conservation is the finding of the most economically-sound methods for exploitation of the mineral resources: in the case of petroleum and natural gas, the dilemma of the "rule of capture" (see Ch. I) and the apparently-wasteful and contradictory practice of "prorationing", wherein neither the geologically-optimum nor economically-optimum rate of recoveries seems to be served. This problem should be subjected to disinterested and dispassionate study toward a satisfactory solution, perhaps along the lines suggested by Davidson.

C. Suggestions for Modifying Resource Taxation

The discussions just concluded have examined the fiscal significance and policy result of resource taxation in the survey states. Now, some attention will be given to suggestions for changes in the taxes which will be directed at improving one or both of the above results. No attempt will be made to overhaul the entire structure of resource taxes in any of the states, but rather suggestions will be made for improving the coverage and policy effectiveness within the present framework of the existing structure in each case.

Timber Taxes. Apart from the rather obvious suggestion that the states of Arkansas and Texas should give high priority to the development of a system of yield-tax levies for their forest industries, in advance of

---

36 Ibid.
hardships which are likely to accrue to timber owners as assessments are raised, a number of general observations of possible improvements in both severance and yield tax systems present themselves. As suggested in the previous discussion, the degree of success in conservation and management improvements in those states levying special taxes for forest owners has been somewhat limited. In all the states, the private, non-industry-associated owners comprise the problem group. Louisiana's success in gaining private participation in forestry programs seems to date from her imposition of mandatory classification requirements for forest lands, as previously suggested. Based on this development, perhaps it is fair to say that the "voluntary" character of Michigan's private and commercial forest reserve laws has contributed to the low incidence of participation, and the restrictive aspects of the language in the acts\textsuperscript{37} may have discouraged numbers of owners who might have otherwise participated.

To improve the effectiveness of Michigan's timber-tax laws, a first suggestion would be to liberalize the requirement for maintaining forest lands in the reserve, to permit other uses of the land not incompatible with forestry (hunting is already permitted), such as for recreational and camping use, along with limited grazing. The recognition of mixed-forestry activity, already partially recognized for "selectively-logged" tracts, and the allowance of either tax-free or reduced-rate taxing of necessary cutting for optimum stand density would also be helpful.\textsuperscript{38} Perhaps as much as anything else, Michigan needs a general timber-

\textsuperscript{37}See Ch. I for examples of restrictions which have been, or are currently applied.

\textsuperscript{38}See Ch. III.
severance tax, applied to those lands outside the commercial and private reserves, and approaching the rates of the present stumpage levies for reserved lands, to remove any tax advantage in cutting on such lands. These measures would work toward increasing the listings under both private and commercial reserves.

A general incentive to participation in forest-improvement programs in all the states might embody rewards for new plantings and for active silviculture programs by private owners. Such a program might include, in addition to reduced prices for seedlings for replanting (already available in Michigan), a partial remission of severance taxes otherwise due, on proof of replanting, or in cases of removal of trees adjudged consistent with a stand-improvement program (such as the thinning of trees for maximum growth, or removal of less-desirable species from a managed tract). This remission might be as little as ten percent of taxes otherwise due, or perhaps as much as fifty percent or more. A sliding scale, based on the extent of forestry improvement, might be most productive if its administration is feasible.\footnote{Some of the burden of verification might be eased by utilizing county agricultural agents, local sheriffs or other officials as inspectors, within the limitations imposed by lack of technical knowledge.} Although such a program is almost certain to reduce tax revenues initially, the improvements arising as a result may very possibly cause more abundant revenues within a decade or two, and would aid in assuring the continuation of yields. Coincidentally, the volume and value of forest products would improve, and this might bring substantially more benefits than any taxes foregone in the short run.
The fact that Texas and Arkansas have no present basis for differentiating between timberland and other properties for property-tax purposes may become a real problem soon, as suggested above. With this factor in mind, it may be considered wise to adopt some measure of modification of the property tax to recognize the special character of forest lands. Possibly a fixed valuation such as that applicable to Louisiana's classified forest land (see Ch. III) would be sufficient, or "freezing" the assessments at their present relatively-low levels in most areas may be desirable. If this is not adequate or feasible, then some application of the "in-lieu", yield-tax principle may be necessary. With her traditionally rural character, Arkansas's property taxes have been generally lower in farm and forest areas than in urban or mixed areas, but the days of this practice are definitely numbered, with the case of Northern Lower Michigan providing an indication of what may be in store for her as population density increases. Similar results may be forecast for East Texas.

If it appears that the modifications suggested for timber taxation tend to be dilutive of the tax base and yield, as indeed they may be, it may be well to remember that forestry will be, and to a considerable extent already is, an industry which has a minimal application of the "free gift of nature" argument for taxation.40 Most forest holdings now are not virgin stands, but the result of second-growth and even third-growth regeneration. To a considerable degree, replacement growth has been the result of the forest-owner's initiative. This is especially true

40 Marquis ("Severance Taxes on Forest Products") suggests a "..loss of force..to ....this (free-gift) argument" when the development effort is considered (p. 317).
when a balanced forest results from careful management and good forestry methods. To this extent, the forest owner is a partner of nature, and should not be taxed as if he received only a windfall gain from her bounty. Especially the incentive-based reductions of severance taxes suggested above would offer recognition and reward for good forestry.

Other Resource Taxes. In the changes recommended for other resource taxes, the emphasis is primarily on means of either improving fiscal yields, or in providing more equitable tax treatment for the resource owners. Some recommendations also will be made for enlarging the coverage, especially that of the severance tax.

Petroleum and natural gas products taxation occupies the dominant position in the severance-tax structures of all the survey states, and represents Michigan's only "pure" severance tax. Rates on severance taxes are varied as to basis and rates of application; Louisiana uses a specific (measure) basis for the taxation of petroleum products, while the other states use ad valorem bases. This writer tends to lean toward the ad valorem rate application as more immune to compromise through price inflation or, alternatively, imposing hardships on producers during deflation of prices received. For example, the present rates applied to petroleum products in Louisiana were enacted in 1948, and since that time, the price of, especially crude petroleum, has increased substantially, in effect reducing the rates of taxation paid by Louisiana's petroleum producers. Further, a percentage-rate scale would maintain yields on a par with other features of the general price level, with dollar amounts tied to prices received by the industry. Of course, the argument might be made that declining prices would cut tax yields with falling prices, but it
should be apparent that recession conditions would have reduced production-tied revenues in this case, anyway. Similar percentage rates might readily be applied to other mineral categories for all states without increasing (in fact, in many cases reducing) the administrative burden.

As previously indicated Michigan's 2 percent levy against oil and natural gas products is the lowest effective rate against resource products in the mineral-fuels category among the survey states. Considering the very potent capacity of the petroleum industry for forward-shifting of tax burdens, (see Ch. V), it would appear that the levy is based on needlessly-low rates. However, without data on the comparative costs of production and technical problems, arbitrarily suggesting new, higher rates would be presumptive. Still, the matter would appear deserving of study.

Another observation is quite evident in Michigan's taxation of resources through severance-tax measures: the fact that most of her natural-resources industries "ride free"; that is, they are not subject to severance taxes. This, it would seem, is inequitable and unfairly discriminately against the oil and natural-gas producers, as well as constituting omission of potential tax sources whose taxation has been successfully undertaken in other states. Therefore, it is suggested that a generalizing of severance taxes might well be studied, with possible application either of the taxes currently applied to oil and gas, or a separate schedule of rates, to such industries as the metallic minerals, cement, sand and gravel, peat and such other areas as appears appropriate. Similarly, the levies of the State of Texas might also be generalized to include more of her minerals industries.
If the "free gift of nature" argument has any credibility at all, it is certainly applicable to the case of minerals-resource industries, wherein a portion of the value received is due in no measure to the effort expended in developing the properties, but rather to the accident of nature which caused the owner to command the wealth buried in the soil or waters under his control. Society has a stake in these resources, and their taxation is consistent with the public interest, and perhaps even incumbent upon government, if the social value of this natural wealth is to have the general benefits which it should yield. The issue, then, would appear to be not whether the resource-exploitation should be taxed, but the degree of taxation needed to assure society's claim, without the confiscation of that part of value attaching to the enterprise of the developer.

D. General Summary

As a climax to the study of resource taxation in the states of Arkansas, Louisiana, Michigan and Texas, this chapter has sought to produce some keener insight into the importance of natural-resources industries to the fiscal support of their respective states; the policy applications in resource taxation, and their apparent success or failure; and, finally, to offer some general recommendations for the improved operation of resource taxation. Efforts have been made to describe the successful aspects of operation, and to point out some apparent shortcomings. Forestry taxation historically has been, and continues to be, a real problem area in taxation, as is apparent from the volume of study devoted to means of coping with the taxation of forest properties. The ideal tax for
forest lands and products has not been found, and still defies solution. If some light has been shed on this problem by this study, then that alone may serve to justify it.

Other resource taxes and the problems surrounding them appear to be less subject to general classification, rather being unique in each case to the state or region (or industry) in which they are situated. Some resources are common to all the survey states; others are unique in their own areas (e.g., sulfur in Louisiana and Texas; bauxite in Arkansas; peat, copper and iron ore of commercial quality in Michigan). Whether common or unique, the taxation of these resources is subject to very definite conditions of markets, abundance of reserves, political makeup of the state, nature of competition, and other considerations which have a bearing upon the manner in which resource taxation is applied. For these reasons, it should come as no great surprise that tax structures have developed quite differently among the states.

The discussion just ended, it is hoped, has placed some of these differences in perspective, and has concentrated on problem-solving following the policy benchmarks of conservation, incentives to efficient production, and optimum fiscal yield in the public interest. With the seeking of answers to some problems, others are made more apparent, and the cycle may be expected to go on indefinitely. In the pursuit of knowledge, our appreciation of problems is heightened and expanded, so that more questions are raised than answered. That is the price of inquiry, and a price which the seeker of knowledge must be willing, even eager to pay. Others who wish to pursue this fascinating area of resource taxation will find abundant rewards for their pains.
SELECTED BIBLIOGRAPHY

A. Books


B. Periodicals


B. Periodicals -- continued


C. State and Federal Government Publications


C. Government Publications -- continued.


C. Government Publications -- continued.


D. Industry Publications


E. Miscellaneous


170
E. Miscellaneous -- continued.


James Frederick Butler was born in Conway, Arkansas on March 19, 1934, the son of Mrs. G. S. Butler, Sr., and the late Mr. Butler. He is married to the former Sally Bonsell. They have no children.

Mr. Butler was educated in the public schools of Arkansas, and was graduated from Conway High School in May, 1952. He received the Bachelor of Arts degree from the Arkansas State Teachers College (now State College of Arkansas) in August, 1955. His undergraduate major was economics and sociology, and his minor was history. Mr. Butler was awarded the degree of Master of Business Administration by the University of Arkansas in January, 1958, with a major in business administration and a minor in economics.

Prior to commencing his studies toward the Ph.D. degree, Mr. Butler held the positions of Assistant Professor of Economics at Harding College, Searcy, Arkansas (1956-57) and Instructor of Economics at Central State College, Edmond, Oklahoma (1957-59).

Mr. Butler enrolled in the Graduate School of Louisiana State University, Baton Rouge, in June, 1959, and completed coursework for the Ph.D. degree in January, 1961. Language requirements were completed in March, 1961, and general examinations for admission to candidacy were completed in May, 1961.

After leaving residency at Louisiana State University in January, 1961, Mr. Butler accepted the position of Assistant Professor of Economics at Louisiana Polytechnic Institute, Ruston, Louisiana, a position he held until August, 1963. In September, 1963, Mr. Butler
accepted the position of Assistant Professor of Economics at Little Rock University, Little Rock, Arkansas, which post he still occupies. He is presently serving as Chairman of the Department of Economics and Finance at Little Rock University.
EXAMINATION AND THESIS REPORT

Candidate: James Frederick Butler

Major Field: Economics

Title of Thesis: A Survey and Analysis of the Taxation of Basic Natural Resources in the States of Arkansas, Louisiana, Michigan and Texas

Approved:

Major Professor and Chairman

Dean of the Graduate School

EXAMINING COMMITTEE:

Date of Examination:

July 9, 1968