Maldevelopment in West Virginia

Owen Cox

The University of Montana

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MALDEVELOPMENT IN WEST VIRGINIA

by

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B.S. The University of Kentucky, 1967

presented in partial fulfillment of the requirements

for the degree of

Master of Science

The University of Montana

1995

Approved by:

Chairperson

Dean, Graduate School

Date

December 8, 1995
West Virginia's landscape is dominated by forests which cover 80 percent of its surface. At the beginning of this century the forests were in a native state relatively undisturbed by humans. By 1920, however, West Virginia had been essentially clear-cut to supply wood to the industrial boom in the surrounding area. The forests are recovering, but are again being subjected to a rapidly increasing demand for wood, first sawlogs, and now pulpwood. The pulpwood demand is for paper pulp and non-traditional products such as strand board and laminated beams. An examination of the character of the demand for this low-value wood and its interaction with the available supply suggests the possibility for undesirable ecological consequences from the increased harvests.

The history of natural resource development in West Virginia is characterized by exploitation. While some have benefited, the landscape and many of its residents have been left with devastation and poverty. The new pulpwood demand is from developers with minimal exposure to the costs of overuse or ecological decline of the forests. Will this again lead to a cycle of exploitation and forest destruction? The largest of the related economic development projects, a pulp and paper mill in Apple Grove, West Virginia, is examined for guidance in answering this question.
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Acknowledgments

This paper was undertaken to provide West Virginians dedicated to halting the exploitation of their state with assistance in evaluating the effect of increasing demand on their forests. Without their willingness to spend time infusing me with the texture and dynamics of their very special corner of the world my path to understanding would have been formidable. If I have failed to convey it, the fault lies totally with me. Norm Steenstra, Bill Ragetté and Kim Baker, thanks and good luck. To Janet Fout, of the Ohio Valley Environmental Coalition, I am especially indebted. She kept me informed of the progress on issues and supplied with news clippings. The latch string was always out regardless of the demands on her life. Of particular importance has been the inspiration provided by her indefatigable dedication to making the world a better place.

I am also grateful to the public and private forestry and industry professionals who shared their views and experiences with me. The West Virginia Division of Forestry Director, Bill Maxey and his assistant, Ed Murriner were especially helpful, and unfailingly courteous in spite of my audacious questions.
In deference to the ecosystems imperiled by conventional paper making, this document is printed on paper made from kenaf fiber instead of tree fiber. Kenaf is an annual field crop that can be grown with no chemical inputs or irrigation. The paper is acid-free and chlorine-free.
Introduction

West Virginia is 80 percent forested and 90 percent of the forests are privately owned. The state’s wood products industry and timber harvests have grown significantly in recent years. Further dramatic growth and development is anticipated and the wood is all expected to be supplied from private lands.

There have been periods of intense natural resource development in West Virginia that may be described as ‘rational exploitation.’ These development eras have been characterized by "Baconian Programs" seeking to maximize nature’s potential for human benefit and facilitated by the exploitive power of “Political Capitalism.” Industrialists have mined timber, coal, gas and oil from the state without regard for the environment or the people living on the land. It seems likely that analysts of the American social, political and economic landscape such as Howard Zinn, Grant

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McConnell and Gabriel Kolko\(^5\) would describe development of this sort, characterized by inequity, exploitation and injustice, as maldevelopment. Maldevelopment is said to occur when the concentration of power in a society facilitates an inequitable distribution of the rewards and penalties associated with economic activity.\(^6\)

One fears that the deprivation resulting from maldevelopment fosters a psychology of dependency which leads to repeated episodes of exploitation. The theory of dependency, expressed predominately in connection with critiques of North American development programs in Latin America,\(^7\) appears to have achieved some relevancy in West Virginia as well. The state's economic well-being has been viewed as dependent upon exporting their wealth of natural resources. Consequently, proposals to locate major industrial facilities in the state, 'adding value' to resources before exporting them, are generally welcomed.

This paper examines the current development pressures on West Virginia's forests. Stewards of the forest suggest an ecosystem-based, multi-generational approach to forest use and protection; while those focused only on the trees invite repetition of a cycle of exploitation and crash. Are the conditions for maldevelopment still

\(^5\) ibid.


embedded in the state's political and economic psyche? The issues raised by the largest forest products development project, a pulp mill in Apple Grove, West Virginia, are examined for clues to West Virginia's progress toward seeing the forest for the trees.8

At the beginning of the twentieth century much of West Virginia's forest was 'primary,' relatively undisturbed by humans.9 That changed. Wood was needed to support the industrial boom in the surrounding states, and by the 1920's the state had essentially been clear-cut.10 Trees have now grown back. Chapter One includes a brief history of this cycle of exploitation. The recovery of the forests has been accompanied by the re-emergence of industry utilizing wood as its primary raw material, principally sawmills and value-added manufacturing operations such as furniture, millwork, flooring and containers utilizing high-value sawlogs. Pulpwood, roundwood and residual wood chips from sawmills, has been produced for pulp mills in surrounding states.

Once again, there is rapid change in the forests of the Mountain State. Saw timber harvest consumption, which had been essentially static since the mid-1960's, has increased by almost 80 percent since 1987. This growth is generally viewed favorably since it has been

8 Maser, Chris. *Sustainable Forestry: Philosophy, Science, and Economics.* Delray Beach, FL: St. Lucie Press, 1994, pp. 11-15. Maser enriches the 'seeing the forest for the trees' metaphor with his admonition that we ignore the "invisible present" at our peril.
accompanied by a corresponding increase in employment and represents a tree harvest believed to be sustainable.  

Now an unprecedented demand for pulpwood is developing. This includes the traditional use for paper-making plus new products such as oriented strand board (a plywood substitute) and laminated structural beams. Four large mills using pulpwood are in various stages of development in West Virginia. Their combined demand is more than two times the state’s current pulpwood production and represents an 80 percent increase in the total combined harvest of saw timber and pulpwood. West Virginia’s present and projected wood demand is outlined in Chapter One. The mills' promoters and many forestry professionals in the state contend that silviculturally beneficial ‘timber stand improvement’ (culls and thinnings) tree cutting and the harvest of tree tops and limbs currently being left in the woods will be sufficient to supply the new facilities. Opponents envision extensive, ecologically destructive clear-cutting of immature forests and monoculture plantations to assure a continuous cheap supply of pulpwood. Various perspectives on supply and the critical relationship of ownership patterns to supply are also analyzed in Chapter One.

Chapter Two explores the interaction of factors that affect prices. Pulpwood in the central Appalachian region is traditionally of little value to a land owner due to the supply far exceeding

\[\text{11 ibid.}\]
Pulpwood buyers are primarily concerned with minimizing the costs to harvest and deliver wood to their mills, therefore, their critical variables are the wood's accessibility and its proximity to their mills. The hypothesis of short-rotation clear-cuts for pulpwood is tested in Chapter Two. The results suggest there is cause for concern.

The preservation and restoration of biological diversity is firmly established in the lexicon of forest management. As with sustainability, biodiversity's definitions vary depending on one's management goals. Consequently, the compatibility of ecosystem based protection of biodiversity with increased, or even the present, timber harvests is controversial. Chapter Three explores this critical benchmark of ecosystem health and the major stresses on forests in West Virginia.

Efforts to maintain or restore forest ecosystem health while providing an appropriate level of commodities and amenities for humans are complicated by the inherent tension between private property and the 'public interest.' A regulatory structure that

12 Maxey, Bill. Director, West Virginia Division of Forestry interview with the author, September 15, 1995, Chris Janney, Manager of Wood Procurement, Mead Corporation, Chillicothe, OH and Mike Grist, Procurement Forester, Westvaco, Covington, VA telephone interviews with the author, October 10, 1995.

13 Ibid.

14 Kalisz, Paul, Associate Professor of Soils & Silviculture at the University of Kentucky. This is an adaptation of his definition of 'Sustainable Silviculture' from a presentation at "The Forest Commons" conference, sponsored by Appalachia-Science in the Public Interest. Eastern Kentucky University, March 31, 1995.
reflects the mutual inclusiveness of protection and production can provide a framework for diffusing this tension. The public is probably ahead of the state in this regard, but West Virginia has taken some tentative steps toward regulatory protection. Its progress and outlook for improvement are analyzed in Chapter Four.

The largest and most controversial of the proposed mills is a bleached pulp and paper mill to be located in the town of Apple Grove on the Ohio River forty miles upstream from Huntington, West Virginia. It is to be a huge industrial facility, with its first phase costing $1.1 billion. The mill will employ 600 workers and it accounts for more than half the projected increase in wood demand in the state. There are a number of questions regarding the distribution of benefits and costs associated with the mill. Those unrelated to the forests, jobs and economic impact, state financial subsidies, and pollution are examined in Chapter Five.

Chapter Six revisits timber supply and demand with respect to the Apple Grove pulp mill. The benefits of clear-cutting to a pulp mill and its support by commercial silviculturists are discussed.

Is there potential for inequity in the distribution of benefits and risks from the Apple Grove project? Chapter Seven examines this question together with the general outlook for forest health in West Virginia. Hopefully, the risk that maldevelopment poses for everyone with an interest in forest health will provide the catalyst for a unified effort to prevent it. The forest landscape envisioned by
professional silviculturists, forest agency bureaucrats, landowners and environmental activists has much in common. Their differences about how to achieve it are real and substantial, but irrelevant if history repeats itself.
Chapter One: Timber Demand and Supply

History of Exploitation

Throughout the industrial era in the United States, West Virginia has supplied its abundant natural resources (timber, coal, oil and natural gas) to the manufacturing centers in the surrounding states. These areas prospered but West Virginia's legacy is environmental devastation, pollution, diminished health, poor education and high unemployment. The state's resources have largely been controlled by out-of-state individuals and corporations whose interests were advanced and protected by the state government, universities and a few business elites who profited as intermediaries. What successful efforts there have been to protect the environment have been due primarily to private citizens, who frequently have had to fight the state's regulatory agencies as hard as the corporate polluters.

Events of the late 1800's set the stage for the seemingly intractable nature of many of the later environmental problems. Nearly every rural family in the state can point to some ancestor who exchanged his land or its resources to outsiders for a pittance. During the late 1800s the back country swarmed with land speculators and lawyers who acquired titles and options to land

that they would then try to sell to local or out-of-state industrialists. For example, Philadelphia investor Stuart Wood sent his agents into the hills to trade sewing machines for land.

The vague surveys and overlapping land claims of earlier days meant that arguable claims could be raised against much of the state's land. Industrialists from other states exploited this situation by initiating lawsuits in federal district court, where the only federal judge in the state was noted for his helpful attitude towards the out-of-state speculators.

The legal system was mysterious and frightening to the backwoods landowners. Typically, they lacked the resources to contest the claims. When courts did uphold the landowner's title, there were lawyers to pay and years of complicated litigation. In desperation, some mountaineers tried to scare off the surveyors who came to the state in the late 1800s. Warning rifle shots created incidents that metropolitan newspapers portrayed as examples of backwoods feuding.17

In 1870, it is estimated that two thirds of West Virginia was still covered with native forests (ten million acres).18 By 1920, it was all gone except for a few isolated remnants.19 The jobs and prosperity associated with over 1500 lumber operations were gone with it, leaving only "bitterness and chagrin" at the devastation caused by unregulated timbering.20 In the peak year, 1909, over 1.5

18 Williams, 1984, p. 105.
19 Clarkson, Roy. Tumult on the Mountains. Parsons, WV: McLain Printing Co., 1964, p. 31
billion board feet of timber was harvested in the state.\textsuperscript{21} Harves
ts from the residual stands reached a low point of 185 million board feet in 1933. Demand recovered during World War II and averaged about 425 million board feet until the late 1980's.\textsuperscript{22} The forest's regeneration has exceeded the harvests, reaching a peak 'growth to drain' ratio of 3.7 to 1.0 in 1989.\textsuperscript{23} Until the late 1980's West Virginia's forest products industry was characterized by small, locally owned sawmills and secondary, 'value-added' plants. The favorable timber supply outlook is now attracting the attention of large, multi-national forest products companies. The people of West Virginia are mindful of the consequences of past exploitation of their state but eager to embrace opportunities that promise to improve their economic condition. It is a schizophrenia fostered by painful experience but a sense that their well-being is dependent on economic factors beyond their control. The following sections of this chapter examine the new demand and the forests' capacity for supplying it.

Character and Demand of the Forest Products Industry

Demand for wood from the central Appalachian forests is increasing rapidly. In 1987, the last year formal statistics were accumulated, 563 million board feet of saw timber were harvested in

\textsuperscript{22} Widmann, 1990, p. 2.
\textsuperscript{23} DiGiovanni, July, 1990, p. 1 and table 22.
West Virginia.\textsuperscript{24} The West Virginia Division of Forestry estimates the harvest in 1994 at over 1 billion board feet.\textsuperscript{25} This 78 percent growth in harvest, 9 percent per year, prompted Bill Maxey, State Forestry Director, formerly of Westvaco and Georgia-Pacific, and an unabashed supporter of maximizing timber harvests, to suggest a moratorium on recruiting new primary wood consuming mills.\textsuperscript{26}

About 80 percent of the timber harvested in West Virginia has been for hardwood saw timber or other high-value uses such as house logs and rustic fencing. The state's forests "provide some of the finest high-quality hardwood timber produced anywhere. [F]urniture, gun stocks, and other high-quality specialty items produced from...this timber are known throughout the world."\textsuperscript{27} Hardwood pulpwood is a saw timber byproduct comprising about 15 percent of the wood harvested with few trees being cut specifically for pulpwood. It is estimated that 95 percent of the hardwood pulpwood harvest is from tops and limbs of saw timber trees.\textsuperscript{28} The remaining 5 percent of the annual harvest is softwood, predominately pine, used for woodpulp.\textsuperscript{29}

\begin{itemize}
\item[28] Maxey and Murriner, September 15, 1995.
\item[29] Widmann and Murriner, 1990, p. 5.
\end{itemize}
There are eight pulp mills located near West Virginia’s borders. The mills, in Ohio, Pennsylvania, Maryland, Virginia and Tennessee presently obtain some wood from West Virginia. The map in Figure 2 locates these mills. The 1987 harvest survey reported all of West Virginia’s pulpwood and chip production going out of the state (558,000 cords) and a net export of sawlogs (54 million board feet). The 1989 Ohio report discloses that its wood products industry was importing 20 percent of its saw timber and pulpwood from West Virginia. The USDA Forest Service pulpwood survey for 1991-1993 indicates that Ohio is now importing 28 percent of its pulpwood, and West Virginia's pulpwood and chip production has increased to almost 700,000 cords.

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30 Widmann and Murriner, 1990, p. 5.
31 Widmann and Long, 1992, p. 3.
Figure 2 Existing Pulp and Paper mills encircle West Virginia.

Map prepared by the West Virginia Division of Forestry
New Demand on West Virginia’s Forests

Data from a 1994 harvest study is presently being accumulated and is to be published in November, 1995. It is expected to confirm the estimated harvest of one billion board feet of saw timber. Pulpwood production is expected to total about 700,000 cords unchanged from reported production of 696,000 cords in 1992 and 1993.33 Included in the totals for each of the years is approximately 100,000 cords of softwood pulpwood.34 The Division of Forestry believes the 1994 saw timber harvest (demand) is approaching its peak given current industry capacity within the state’s demand area which includes portions of Kentucky, Ohio, Pennsylvania, Maryland and Virginia.35 One billion board feet is two-thirds of the peak demand in the turn of the century clear-cutting era which has been described as “the highest degree of forest utilization that the world has ever seen.” 36 West Virginia’s next phase of demand growth is in pulpwood. The mills comprising the new demand are listed in Table 1. Figure 3 charts the estimated 1994 and projected ‘New Mills’ relative demand for saw timber and pulpwood compared the last survey in 1987. Figure 4 maps the location of the new mills.

33 Widmann, August 21, 1995.
34 Widmann, August 21, 1995.
35 Maxey, William R., Administrative Forester (Director) and Edward Murriner, Assistant Administrative Forester, West Virginia Division of Forestry interview with the author, September 15, 1995.
Heretofore there have been no pulpwood consuming mills in West Virginia.

Table 1  New West Virginia Primary Wood Products Mills

<table>
<thead>
<tr>
<th>Company</th>
<th>Products</th>
<th>Location</th>
<th>Status</th>
<th>Demand in Cords</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parsons &amp; Whittemore</td>
<td>Pulp and paper</td>
<td>Apple Grove</td>
<td>Permitting</td>
<td>900,000</td>
</tr>
<tr>
<td>Georgia Pacific</td>
<td>Strand board</td>
<td>Mount Hope</td>
<td>Operating</td>
<td>250,000</td>
</tr>
<tr>
<td>Weyerhaeuser</td>
<td>Strand board</td>
<td>Summersville</td>
<td>Und. Const.</td>
<td>400,000</td>
</tr>
<tr>
<td>Trus-Joist MacMillan</td>
<td>Laminated beams</td>
<td>Buckhannon</td>
<td>Operating</td>
<td>65,000</td>
</tr>
<tr>
<td>Total for New Mills</td>
<td></td>
<td></td>
<td></td>
<td>1,615,000</td>
</tr>
<tr>
<td>Present Pulpwood Production</td>
<td></td>
<td></td>
<td></td>
<td>700,000</td>
</tr>
<tr>
<td>Total Potential Demand</td>
<td></td>
<td></td>
<td></td>
<td>2,315,000</td>
</tr>
</tbody>
</table>

Figure 3  Projected Change in Relative Demand for Saw Timber and Pulpwood in West Virginia.

The present estimated pulpwood demand of 700,000 cords (all exported to neighboring states) will increase to as much as 2.3 million cords, including 300,000 cords of softwood, if all four of the

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37 Murriner, Edward, Assistant Administrative Forester, West Virginia Division of Forestry interview with the author, February 15, 1995.
new mills are built. However, the Apple Grove mill is expected to obtain as much as 400,000 cords from Kentucky and Ohio. If that occurs, the total demand for West Virginia will be reduced accordingly. Regardless, the demand increase is dramatic and prompts two questions. First, what will be the ecological effects on the forests of the increase in wood harvested? Secondly, what are the implications to logging and forest management practices of the change in mix from domination by highly sought after saw timber to low-value pulpwood?
Figure 4 Location of New and Proposed Pulpwood Consuming Mills in West Virginia.
Timber "Supply"

The last survey of West Virginia’s forests was conducted in 1989 when it was estimated that the state was 79 percent forested and contained 224 million cords of commercial species of growing trees. Annual growth is about 5.8 million cords, or about one-half cord per acre of timberland.39

Tom Birch is a Senior Resource Analyst with the USDA Forest Service who has studied and published several articles on the condition and potential of West Virginia's woodlands. He estimates the practical annual wood supply in a given area to be approximately the annual net growth on timberlands identified by their owners as available for harvest in the next ten years.40 In 1989, approximately one third of West Virginia forest owners controlling 53 percent of the private forests in the state (5.7 million acres) reported plans to harvest within ten years.41 At the state's growth rate of one half cord per acre per year, 2.85 million cords would be available. A full accounting of what is actually being cut reveals that this level may have already been exceeded.

40 Birch, Thomas, US Forest Service, Northeastern Forest Experiment Station, Radnor, PA, interview, August 21, 1995.
Saw Timber-Pulpwood Relationship

The unit of measure quoted for timber harvests from hardwood forests is consistently board feet (the measure of saw timber production). Over 40 percent of the 'pulpwood' supplied from the hardwood forests of Ohio, Kentucky, Maryland and West Virginia is in the form of chips from saw timber residuals. The highest and best use for hardwood timber is saw timber; pulpwood in all forms is a residual product of the forests. Recall that 95 percent of the current harvest of hardwood pulpwood is from tops and limbs of saw timber trees. There is considerably more pulpwood available from this source, however. According to Ed Murriner, a study done in the late 1960's documented seven to eight cords of pulpwood left in the woods per acre of saw timber harvest. A recent "logged area analysis" of one hundred harvest sites is being evaluated to update the potential of this source of pulpwood. Preliminary results indicate about five cords left in the woods on sites where no pulpwood was removed. Approximately 200,000 acres per year are undergoing some level of timber harvest in West Virginia, selective cut, diameter limit or clear-cut. At five cords per acre, 200,000 acres would produce 1.0 million cords of hardwood pulpwood. It is estimated

43 Maxey and Murriner, September 15, 1995.
44 Fajvan, Mary Ann, Professor of Forestry, West Virginia University. Interview with the author, October 10, 1995.
45 Maxey and Murriner, September 15, 1995.
that 300,000 cords were harvested,\textsuperscript{46} therefore 700,000 cords may have been cut and left in the woods.

The other underdeveloped source of pulpwood is manufacturing residuals. According to Murriner, a sawmill employing the best technology can produce about 0.8 cords of hardwood chips for every thousand board feet (Mbf) of logs processed.\textsuperscript{47} Accordingly, a billion board foot harvest could yield 800,000 cords of chips. An estimated 300,000 cords were produced in 1994,\textsuperscript{48} which suggests the potential for an additional 500,000 cords. Figure 5 illustrates the relationship between the actual and potential pulpwood supply from the present hardwood saw timber harvest.

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{figure5.png}
\caption{Actual and Potential Hardwood Pulpwood Supply}
\end{figure}

\textsuperscript{46} Murriner, September 15, 1995.
\textsuperscript{47} Murriner, September 15, 1995.
\textsuperscript{48} Murriner, September 15, 1995.
One can only speculate as to the amount of this 'cut' (tops and limbs, 700,000 cords, and manufacturing residuals, 500,000 cords), totaling as much as 1.2 million cords, that can practically be converted into pulpwood 'harvest.' Pulpwood consumers in the central Appalachians have never experienced the discipline of a tight supply.\(^{49}\) In theory, West Virginia, with 600,000 cords of current hardwood pulpwood production and 1.2 million cords of potential additional production, could meet its projected new, 'in state,' demand of 1.4 million cords of hardwood pulpwood without cutting any additional trees. Surrounding states presently importing West Virginia pulpwood, Ohio, Maryland, Pennsylvania and Virginia, would have to increase their local pulpwood production.

West Virginia’s estimated 1994 pulpwood production of 700,000 cords includes 300,000 cords of hardwood roundwood and 300,000 cords of chips plus an additional 100,000 cords of softwood pulpwood. The Apple Grove pulp mill demand of 900,000 cords includes 200,000 cords of softwood. This total potential demand for softwood of 300,000 cords is equivalent to the net annual growth of softwood in West Virginia.\(^{50}\)

\(^{49}\) There was universal agreement on this point in my conversations with the two senior foresters, William Maxey and Edward Murriner, in the West Virginia Division of Forestry; Rich Widmann, USDA Forest Service Forester, who has been doing pulpwood surveys in the area since 1985; Tom Birch, Senior Resource Analyst with the Forest Service; Chris Janney, Manager of Wood Procurement for Mead Paper’s mill in Chillicothe, OH; and Mike Grist, Procurement Forester for Westvaco, who is involved with pulpwood procurement for their Luke, Maryland and Covington, Virginia pulp mills.

\(^{50}\) DiGiovanni, July, 1990, Table 41.
Compare the composition of the timber harvest in Figure 1 with Figure 6 which reflects 100 percent recovery of tops and limbs for pulpwood and the new softwood demand of 300,000 cords. Pulpwood harvesting activity more than doubles from the historical 20 percent to 44 percent of the total wood removed from the forests.

**Figure 6 Harvest Composition Assuming 100 percent Recovery of Hardwood ‘Tops and Limbs’**

![Pie chart showing harvest composition](chart)

**Silviculture Potential**

The saw timber harvest of one billion board feet is the equivalent of 1.6 to 2.0 million cords. Tops and limbs comprising the pulpwood cut may be another million cords, plus the softwood pulpwood harvest of 100,000 cords, for a total volume of wood being cut of 2.7 to 3.1 million cords. Recall the ‘practical’ harvest based on

---

51 The straight numerical conversion is 1.6 cords per Mbf, however, Ed Murriner, West Virginia assistant administrative forester, reports his experience being closer to two cords per Mbf. Conversation with the author, October 11, 1995
USFS surveys and experience is 2.85 million cords. The annual growth in West Virginia's forests is 5.8 million cords. Commercial foresters, unconstrained by landowner's plans and preferences or the ecological implications of increased harvests, suggest West Virginia is vastly under utilizing its timber resource.

The US Forest Service, to estimate the potential supply from West Virginia's predominant forest type, "threw the silviculture book" at the state's oak-hickory forest. Based on the 1989 forest inventory, without regard to prices, ownership patterns, accessibility or any other factors that affect supply, the Service calculated the harvest opportunities on the 9.2 million acres of oak-hickory forests in the state.\textsuperscript{52} Oak-hickory forest comprise 77 percent of West Virginia's timberland.\textsuperscript{53} Four general categories of forest were identified: mature stands that should be harvested (clear-cut), 2.1 million acres; stands that could benefit from thinning, 3.2 million acres; areas in need of regeneration (would never be commercially valuable, also to be clear-cut), 2.0 million acres and stands that needed ten years to reach optimum commercial value (let grow), 1.9 million acres.\textsuperscript{54} According to these estimates, almost 100 million

\textsuperscript{53} DiGiovanni, 1990, p. 1.
\textsuperscript{54} Arner, 1991.
cords including 25.6 billion board feet of saw timber could be harvested.\textsuperscript{55}

What are the implications of using this as the basis for decision-making? Table 2 summarizes data from the study and presents a theoretical harvest that equals the present one billion board foot saw timber harvest and assumes the same number of acres being logged (200,000). 130,000 acres of the total logged would be clear-cut. This is 1.1 percent, i.e., 90 year rotation, of the state's timberland. In 1994, however, only 2000 acres were clear-cut in West Virginia.\textsuperscript{56} The striking factor in this hypothetical exercise is the increase in pulpwood production gained from clear-cutting. Manufacturing residuals are assumed to increase from the present 0.3 cords per Mbf of saw timber processed to 0.6 cords (75 percent of the potential yield of 0.8 cords per Mbf), but this only accounts for 300,000 cords of the increase. Currently, the billion board foot saw timber harvest is yielding approximately 600,000 cords of hardwood pulpwood compared to the potential of this scenario of 2.8 million cords. The 475 percent increase helps explain why the boosters of the pulpwood consuming plants are so optimistic about wood supply.

\textsuperscript{56} Maxey and Murriner, September 15, 1995.
Table 2 Potential Harvest in oak-hickory forests of West Virginia

<table>
<thead>
<tr>
<th>Harvest Opportunity</th>
<th>Acres</th>
<th>Cords</th>
<th>Board Feet</th>
<th>Per Acre</th>
<th>Pulpwood</th>
<th>Cds/Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fully Stocked</td>
<td>2143</td>
<td>62.1</td>
<td>18031</td>
<td>29.0</td>
<td>8.4</td>
<td>20.5</td>
</tr>
<tr>
<td>Regenerate</td>
<td>2010</td>
<td>21.3</td>
<td>4779</td>
<td>10.6</td>
<td>2.4</td>
<td>8.2</td>
</tr>
<tr>
<td>Thin &gt;5 cds</td>
<td>1356</td>
<td>11.8</td>
<td>2072</td>
<td>8.7</td>
<td>1.5</td>
<td>7.2</td>
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<tr>
<td>Thin &lt;5 cds</td>
<td>1831</td>
<td>4.2</td>
<td>735</td>
<td>2.3</td>
<td>0.4</td>
<td>1.9</td>
</tr>
<tr>
<td><strong>Totals:</strong></td>
<td><strong>7340</strong></td>
<td><strong>99.4</strong></td>
<td><strong>25617</strong></td>
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</table>

Proforma Harvest to yield one billion board feet:

<table>
<thead>
<tr>
<th>Harvest</th>
<th>Acres</th>
<th>P'wd Cds</th>
<th>Board Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fully Stocked</td>
<td>100.0</td>
<td>2.0</td>
<td>841.4</td>
</tr>
<tr>
<td>Regenerate</td>
<td>30.0</td>
<td>0.2</td>
<td>71.3</td>
</tr>
<tr>
<td>Thin &gt;5 cds</td>
<td>70.0</td>
<td>0.5</td>
<td>107.0</td>
</tr>
<tr>
<td><strong>Totals:</strong></td>
<td><strong>200.0</strong></td>
<td><strong>2.8</strong></td>
<td><strong>1019.7</strong></td>
</tr>
</tbody>
</table>

This example demonstrates the basis for the fear of many of the opponents of the pulpwood consuming mills that clear-cutting will become the prevalent logging method. Without entering any more acreage than the present harvest (200,000 acres), the pulpwood harvest could be almost five times higher. The 130,000 acres of clear-cuts would constitute a desirable commercial silviculture program.

While this harvest is theoretically sustainable over time (90 year rotation), the alternative preferred by silviculturists is to accelerate the harvest of fully stocked stands to preclude decline or loss of productivity. They also favor aggressive clear-cutting of stands requiring regeneration and extensive thinning harvests in order to raise the overall productivity (growth per acre per year) of
the forests.\textsuperscript{57} The fact that the harvest resulting from this approach would not be sustainable is not an issue. The intent is to intensively manage as many acres as possible assuming there will always be substantial unimproved timberland to compensate for supply fluctuations from the managed acreage. For example, there are 100 West Virginia timberland owners of tracts 5000 acres or larger who expect to harvest timber in the next ten years. They control over 2.5 million acres of timberland, which is 23 percent of the state’s privately owned forests.\textsuperscript{58} Applying the ‘silviculture prescription’ to these 2.5 million acres would result in 1.1 million acres being clear-cut. The harvest would yield approximately 16 million cords of pulpwood and 6 billion board feet of sawlogs. It is important to keep this in mind because these large owners control enough supply to substantially augment what is available from the rest of the state.

\textbf{West Virginia’s Private Forests}

There is no conclusive data supporting the notion of a monolithic base of private timber owners prepared to begin clear-cutting to satisfy a demand for pulpwood or to achieve a state of maximum silvicultural productivity. A small number of forest owners could, however, have a dramatic impact on timber harvests and overall forest condition. The state's "Managed Timberland" program provides for a 58 percent property tax reduction to all timberland owners who ask for it and only requires that "you

\textsuperscript{57} Arner, 1991.
\textsuperscript{58} Birch, 1989 unpublished survey, Table 26.
promise to keep your timber growing and control the quality of trees by eliminating damaged and inferior trees." The program, designed to benefit the 260,000 individual forest owners in the state, has attracted only 525 participants (in mid-1994) who own 2.2 million acres. 200 of these are corporations and land trusts that own over 2.0 million acres of the land in the program. For the owners of small tracts, the program's paperwork may not justify the two dollars an acre tax savings, but those electing to participate enjoyed a tax savings of $1.4 million in 1993. The beneficiaries of the program are separate from those bearing the costs of inadequate, tax supported public services in the state. This is especially true for public schools, where West Virginia ranks 50th in terms of high-school educational attainment.

These large corporate holdings, many of which are contiguous and relatively undeveloped, are convenient targets for high volume mills. That, coupled with corporate managers motivated to sell by uncharacteristically high prices, could lead to a prompt liquidation of these large stands. Parsons & Whittemore's forester, Wilder Jackson, responsible for evaluating wood supply for Apple Grove, reportedly has indications from property owners that the company can obtain commitments for timber on 1.5 million acres of West Virginia's private timberland. This acreage represents over 25 percent of the

60 ibid.
61 ibid.
West Virginia forests within the 75 mile procurement range of the mill. Another 500,000 acres in Kentucky and Ohio may be available. Reportedly half the West Virginia acreage is from large company tracts (greater than 2000 acres). Based on the harvesting plans of the 100 owners of tracts of 5000 acres or more and the expressions of interest to Apple Grove, it is reasonable to assume that these forest owners will be receptive to stepping up the commercial harvests on their lands. Many, if not most, corporate managers are compelled to demonstrate 'acceptable' returns on their assets. The rapid escalation of demand for pulpwood may be perceived as an anomalous opportunity for above average returns.

The Division of Forestry, according to Ed Murriner, Assistant Administrative Forester, subscribes to the notion that perhaps the state's entire 10.7 million acres of private timberland is available to supply growth in wood products demand. It is assumed that, over time, virtually 100 percent of the private, non-industrial landowners will choose to harvest their forests. Statistically, timber tract ownership turns over on average every seven years and the assumption is that it becomes available for commercial harvesting in the transition. The expressed intentions and past practices of forest owners does not give a great deal of credence to this assumption: An unpublished 1989 survey by the US Forest Service

of forest owners in West Virginia indicates that owners of 5.7 million acres (53 percent of all timberland) intend to harvest trees for some purpose in the next ten years. However, the owners of only 1.6 million acres (15 percent of all timberland) report that their primary purpose for owning timberland is for timber production, and for those owning another 1.0 million acres (9 percent of all timberland), it is the secondary reason. Of all owners who have harvested timber at some time in the past, only 28 percent have cut saw logs whereas 79 percent have cut fuelwood for their personal use. The data also show that less than 10 percent of present West Virginia forest owners have ever harvested trees for saw timber. This statistic is somewhat ambiguous, however, since if it is the 10 percent who own the largest tracts, they control over 65 percent of the state's private forests.  

It appears West Virginia's forests can supply the pulpwood to meet the increased demand. From the present saw timber cut, there is a substantial quantity of pulpwood left in the woods, plus increased recovery of manufacturing residual chips. Commercial silviculture orthodoxy prescribes increased clear-cutting on West Virginia's predominant oak-hickory forests resulting in as much as a 475 percent increase in pulpwood production. Lastly, owner surveys

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suggest a small number of large tracts comprising at least 25 percent of the state's private forests may be available for increased harvests.

The preceding supply scenarios for hardwood pulpwood are not a comprehensive set of possibilities. They are instead intended to suggest approaches commensurate with the prevailing wood products industry ideologies about pulpwood supply and timber harvests in general, namely, that there is a significant unharvested quantity of pulpwood and the forests could benefit from more aggressive harvests. Figure 7 summarizes the suggested approaches. The first column illustrates the current hardwood pulpwood supply. The second column includes the supply potential from harvesting all the 'tops and limbs' that are currently left in the woods plus maximizing the chip production from manufacturing residuals. The third column depicts the supply of pulpwood generated from the 'silviculture potential' harvest prescription which includes 130,000 acres of clear-cuts. The last column represents the potential aggregate demand of the present production of 600,000 cords of hardwood pulpwood plus the new mills' requirements of 1.4 million additional cords. The Chapter Two examines the factors related to pulpwood prices in an attempt to determine the new market's ability to successfully bid for the wood it needs.
Figure 7 Comparison of Hardwood Pulpwood Supply Scenarios

With Projected Demand.
Chapter Two: The Pulpwood Market

Time-Honored Approach to Pulpwood

There seems to be little doubt that commercial foresters believe there is an adequate supply of pulpwood to satisfy the demand from the new and proposed mills. It is equally likely that none of the new mills' wood buyers anticipate using price competition to satisfy their demand. There is no history to support the notion of fungibility between hardwood saw timber and pulpwood. If pulpwood is harvested at all, it is incidental to cutting saw timber trees. For example, representatives of the Weyerhaeuser strand board mill, in a meeting with West Virginia state foresters, reiterated that they are interested in the tops, limbs and 'junk' trees available from tulip-poplar saw timber harvests.67 Loggers supplying the Georgia-Pacific strand board mill, which is in operation, report hauling material they had previously left in the woods to the mill. The value of these loads was enough to cover the fuel costs of the entire harvest.68 They didn't report whether the land-owner received anything for the additional wood removed from his or her forest. The Apple Grove Pulp Company woodlands manager described their wood requirements as "portions of trees, or damaged trees, left behind and following saw log logging operations, and....small, crooked, diseased and low grade species trees which

68 Murriner, October 10, 1995.
many times need to be removed in stand improvement work.”69

Pulp mills, utilizing their financial resources, will often buy standing timber. In reselling the sawlogs, veneer material, and posts, they may yield a profit on the transaction in addition to the pulpwood harvested. Landowners rarely know what they have on a tract of timber in total and even less about the saw timber/pulpwood mix. A long-time observer of timber buying activity described the relationship between the buyer and the seller in most transactions as analogous to “hawks circling mice in an open field.”70

As further evidence of the disjunction between supply and demand for pulpwood, in 1993 pulpwood harvests in West Virginia increased by 13 percent over 1992,71 but the average price declined from $5.89 per cord to $5.82. The per cord price in 1994 fell precipitously to $4.44 even though the harvest is estimated to be at least equal to 1993’s. These pulpwood prices include fuelwood, which generally commands a higher price than mill wood. During this two year time span the average price of saw timber increased by 64 percent to the equivalent of $115 per cord in 1994.72

As demand increases, mills will increase their supply base by drawing from a wider area or promoting thinning or other ‘stand

70 Loucks, Orie L., forest ecologist, Miami University. Interview with the author, October 18, 1995.
71 Widmann, August 21, 1995.
72 Murriner, Ed. assistant administrative forester. Average prices were calculated from the “West Virginia Timber Price Report” for 1992-94 prepared by the West Virginia Division of Forestry.
improvement cuts' of pulpwood material. Sawmills will also be encouraged to increase their chip production capabilities. The price factors effected by such supply expansion strategies are transportation and/or harvesting costs, not the price of wood 'on the stump.' Current prices for wood delivered at pulp mills and strand board plants in the region vary from $36 to $45 per cord.73 The variation in price is due primarily to species, with higher prices paid for dense wood, such as hickory, preferred for pulp making. Recall that the average prices paid to timberland owners, including firewood sales, ranged from $5.87 to $4.44 per cord during 1992-1994. This discussion describes the pulpwood market as it has existed for over 100 years in the central Appalachians.74

Outlook For Price Competition

One is prompted, however, in contemplating the potential for overlapping demand by existing and proposed mills, to develop a scenario for a wood market with pulpwood occupying a more dominant position. Discussing that possibility, Rich Widmann, the USFS analyst who has analyzed pulpwood trends for some years commented, "these states, [West Virginia, Ohio and Kentucky], are saw mill country. If all these plants using pulpwood go in, the

73 Price information from Mike Grist, Westvaco wood procurement forester; Chris Janney, Mead Paper wood procurement manager; and Ed Murriner, West Virginia assistant administrative forester. Interviews with the author during September and October, 1995.
74 Both Grist of Westvaco and Janney of Mead Paper reminded me that their mills are over 100 years old and it has always been a "buyers market" for pulpwood.

change will be dramatic." His colleague, Tom Birch added, historic relationships (of pulpwood to saw timber) will be meaningless, "all bets are off." 75

The current ratio between pulpwood and saw timber prices is about 1:20 ($5 per cord versus $100 per cord). This is based on averages, there may be some instances of low grade, low demand sawlogs priced five or ten times current pulpwood prices, but essentially, pulpwood and saw timber are two different products. Saw timber must meet standards for diameter and length of the log. Curves (sweep), crooks, knots and other defects all affect its value. For pulpwood, only the species matters. Tulip-poplar is the desired species for strand board. Paper mills are concerned with a wood's density and the character of its 'fibers.' They buy based on weight, hence the variation in the prices for a cord, which is a measure of volume.

For pulpwood to compete with saw timber it will have to be harvested before reaching a commercial saw timber grade. For example, a thirty year old stand of timber will be primarily pulpwood, and on a good site contain about twenty cords of wood. 76 At ninety years, a fully stocked saw timber stand contains approximately eleven thousand board feet of saw timber and fourteen cords of pulpwood. 77

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75 Interviews with the author, August 21, 1995
76 Chris Janney, Mead Paper procurement manager, estimated 18 to 27 cords, October 10, 1995.
77 Arner, et. al., 1991
percent, a landowner could harvest the thirty year old stand now for $15 per cord and again thirty and sixty years hence and receive a present value equal to the saw timber harvest in sixty years. See Table 3, following. It is not necessary, however, for pulpwood prices to rise to $15 to carry out such a harvest program. Tulip-poplars may grow three feet per year for number of years, easily reaching pole diameter in thirty years. At present, there is a market at $7 each for 7.5 inch diameter, 5.5 foot long tulip-poplar posts for use as mine timbers. Forty five of these equals a cord which would have a value of $315. Thus, exceeding the $300 pulpwood value of an entire acre of this thirty year old timber (20 cords @ $15).

It seems reasonable to assume there will be a quantity of 'products' more valuable than pulpwood in any thirty-year old forest. If not, pulpwood consumers will be faced with a $10 per cord price increase. This equals about 25 percent of the average delivered wood cost of $40 per cord, which is a significant increase. With respect to one of the principal finished products of pulpwood, market pulp for paper making, the implications of such an increase are relatively minor, however. In the last cyclical market downturn the price for bleached hardwood pulp fell to $400 per ton in late 1993. The price in mid-1995 recovered to $900, and is expected to exceed $1,000 in the current market cycle.

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79 Murriner, Ed, West Virginia Division of Forestry, assistant administrative forester, interview with the author, September 18, 1995.
1.1 cords to make a ton of pulp. The wood cost increase would then be $11 or from 1 percent to 4 percent of the selling price per ton of pulp. It is still a factor, but less significant in this context.

There are considerations other than supply shortages that would prompt the industry to encourage these thirty year 'pulpwood rotations.' The primary ones are high transportation costs from remote sources and high logging costs on difficult terrain. Essentially, a mill needs to obtain wood from only one third as many acres if they can harvest twenty cords every thirty years versus fourteen cords, plus manufacturing residuals from the saw timber for a total, also, of twenty cords, every ninety years. This is an important factor as one considers supplying pulpwood to a mill from the mountainous areas of West Virginia. Chris Janney of Mead's view is that "the roads and bridges are not there to support a big increase in production." The Westvaco forester, Mike Grist, added, "there is a lot of wood and sawmills from Charleston [West Virginia] to the Kentucky border but we don't go too far into that area because of problems with transportation."

Landowners, even those unappreciative of the time value of money, may be prompted to adopt such a harvest program by the frequency and/or immediacy of receiving some cash for their wood. A loss due to fire, insects or disease would be less catastrophic as well. In fact, if a landowner's sensitivity to risk raises the discount

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81 Janney, October 10, 1995.
82 Grist, October 10, 1995
factor to 5 percent, then three thirty-year rotation $5 per cord pulpwood harvests return the same value as one ninety-year saw timber cut.

Table 3 Present Value Comparison of Harvest Alternatives.

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<tr>
<td></td>
<td>Value</td>
<td>Now</td>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td>Pulpwood/cord</td>
<td>$475</td>
<td>$300</td>
<td>$300</td>
<td>$300</td>
</tr>
<tr>
<td>Saw Timber/cord</td>
<td>$446</td>
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<tr>
<td>Pulpwood/cord</td>
<td>$128</td>
<td>$100</td>
<td>$100</td>
<td>$100</td>
</tr>
<tr>
<td>Saw Timber/cord</td>
<td>$133</td>
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Chris Janney would "like to see more clear-cuts" to satisfy the increased pulpwood demand. He acknowledged, however, that "public pressure is for fewer clear-cuts rather than more." Mary Ann Fajvan, a forestry professor at West Virginia University, and a proponent of thinnings and periodic clear-cuts to ‘improve stands,’ repeated the common theme of area silviculturists that “the forests would benefit from some pulpwood demand.” She has never seen

83 Janney, October 10, 1995.
“harvesting driven by pulpwood demand” except in television documentaries of tree farms in the US south. In her opinion, that extreme situation is not what West Virginians want to see in their forests. She confirmed, however, that thirty to forty year rotations, less for tulip-poplar, were quite possible. She also reported that Trus-Joist, the developer of the laminated beam mill, has expressed an interest in tulip-poplar plantations and Westvaco was planting some conifer plantations in the state. Pressure for plantation ‘forestry’ may come from the Apple Grove mill as well. The mill’s demand for 200,000 cords of softwood will reportedly be met from south western West Virginia where there are underutilized stands of conifers especially on reclaimed strip-mine sites. This supply is not apparent from the data, however. In 1989, this area of the state contained about 4 million cords of softwood and its growth over harvest amounted to only 100,000 cords per year.

These are all developments, potential or real, that confirm the worst fears of those opposing major increases in demand for pulpwood: that immature forests will be clear-cut for pulpwood and monoculture plantations will replace native forest ecosystems. Present value analysis suggests that, if pulpwood demand exceeds the readily available supply, pulpwood can compete efficiently with saw timber due to the temporal disparity between the two products. What are the ecological implications of increased harvests, short

84 Fajvan, September 21, 1995.
85 Fajvan, September 21, 1995.
86 DiGiovanni, July, 1990, Tables 115 and 118.
rotations and plantation forestry with respect to the goal of preservation and restoration of the biological diversity of the unique forest type of the region?
Chapter Three: Ecological Implications of Increased Harvests

The Biodiversity of West Virginia’s Forest Landscape

The widely accepted measurement of the ecological health of an ecosystem is the degree of its biological diversity. What is it, and why is it important? Biodiversity is far more than a measurement. There is something for everyone, the ecologist, the romantic, the scientist, and even the philosopher. Definitions abound, but it seems appropriate here to consider the meaning of biodiversity to George Constantz, a biologist, naturalist and parent who lives and works in a hollow off the Cacapon River in West Virginia.

Why should we care about biological diversity? Biological diversity, defined as the number of different kinds of living things and their genetic variability, counts for several reasons. First, the number of species in a particular place indicates that ecosystem’s health. Polluted streams have bullhead catfish, carp, and a few other hardy species; an untainted Appalachian run will support dozens of fishes. Second, we feel greater delight in a landscape hosting many kinds of organisms than in one that is species-poor. How do you feel at dusk surrounded by fireflies, listening to the whippoorwill, and smelling trailing arbutus? Third, we don’t have the slightest idea which species will serve our future needs. Scientists have explored the drug potential on only about 2 percent of the world’s plant species. Who would have ever predicted that the horseshoe crab would become crucial to hematology? Would the passenger pigeon’s liver have been the ideal system for studying human liver cancer? Finally, human-caused extinctions betray the attitude that other species were put
here on earth for our benefit, to exploit as we see fit. We will not transcend this selfish heritage—and therefore will not be able to take credit for the next act in the evolutionary play—until we vow to maintain biological diversity.87

The forests of the Central Appalachians are complex and diverse. The parent forest community, the mixed mesophytic (plants thriving under conditions of medium moisture), is still in the early stages of recovery from the early 1900’s clear-cutting. The mesophyte forest is found along the moist western aspect of the Appalachian Plateau in both the Cumberland Mountains of Kentucky and Tennessee and in the Alleghenies of West Virginia below 2500 feet. Forest ecologist, Robert Mueller, describes the mixed mesophyte forest as

diverse with a number of species each of magnolias, oaks, hickories, walnuts, elms, birches, ashes, maples, basswoods, locusts and pines. There is also Tulip tree, Black and Sweet Gum, Black Cherry, American Beech and Canadian Hemlock. The most characteristic type indicators are White Basswood and Yellow Buckeye. ... American Chestnut, once a major component, now survives only as stunted, disease-ridden sprouts.

These major canopy species are accompanied by even more diverse understory tree, shrub and herbaceous layers as well as many fungi and mosses. Typical components of the understory are the small trees Musclewood and Sourwood, shrubs such as Spice Bush and Paw Paw, and the herbs Ginseng and Goldenseal. Mesophytic plants, including the trees, tend to have soft, juicy

leaves that on death rapidly decompose and, as distinguished from those of xeric oak forests, form only light litter but contribute to building rich soils.

To the east, in the Valley and Ridge Province, conditions become xeric. This region is characterized by at least five species of oaks, and on the driest sites, conifers, Virginia, Pitch, Shortleaf, Table Mountain and White Pines.88

Because of the diversity of aspect, elevation, geologic and climatic conditions, the central Appalachian forest contains many smaller biologic communities that contribute to its biodiversity. The most prevalent are glades or natural openings resulting from water deprivation (interrupted drainage or bedrock). The greatest area of natural openings, however, consists of moisture rich glades, high-elevation bogs, fens, swamps and other wetlands. Small forested wetlands are also common; found in conjunction with flood plain topography, artesian springs, perched water tables or sinkholes. These communities are often home to rare, frequently disjunct species. A notable example is the 750 acre Cranberry Glade complex located at 3400 feet elevation on West Virginia's Allegheny plateau. It consists of boreal type bogs, fens, marshes, and swamps rich in acid soil disjuncts such as Bog Rosemary and Small Cranberry.89

89 ibid., p. 41.
The trees of this 80 to 90 year-old recovering forest community are reaching the end of their maximum growth years according to Bill Maxey.\textsuperscript{90} Life is far from over when growth slows, however. Some common life spans for trees of the central Appalachians are: white oak, 600 years; northern red oak, 200-300 years; black oak, 200 years; sugar maple, 400 years; American beech, more than 360 years; white pine, 450 years and Canadian hemlock, 900 years.\textsuperscript{91} In reaching maturity, more than 99 percent of the trees in a forest die, providing the snags, abundant large woody debris, stream debris dams, and canopy gaps necessary for the diverse plant and animal communities of mature forests.\textsuperscript{92} To this day few examples of the complex herbaceous understory of mixed mesophytic forests remain. Re-colonization requires hundreds of years.\textsuperscript{93} The stress to fauna from timbering operations is no less severe. Work by Jim Petranka, a biologist at the University of North Carolina at Asheville, in similar forests of North Carolina indicate post clear-cut recovery times of 50-70 years for communities of sensitive animals such as salamanders.\textsuperscript{94}

\textsuperscript{90} Interview with the author, September 15, 1995.
\textsuperscript{92} Mueller, 1994, p. 45.
Bill Maxey, on the other hand, is not concerned. "As far as biodiversity is concerned, if the cutting and burning of everything during the first of the century with no management at all didn't get rid of the threatened and endangered species, I don't think our very conservative today's management's going to be a problem." Disturbance, within limits, does contribute to diversity. George Constantz describes the result of disturbance as a "patchwork quilt in which each section has a different disturbance history." At this point the quilt has lost its symmetry, less than one percent of its patches are climax, "virgin" forest. The vast majority have been disturbed within the last 100 to 200 years and are of an intermediate stage. The biological diversity of Appalachia is, indeed, still rich. A patch of climax forest may contain three dozen tree species. West Virginia is home to at least twenty-one species of lungless salamanders. A square yard of forest may contain more than a dozen species of non woody plants or herbs. And Appalachia is home to approximately 400 species of fish. The effect of the loss of abundance and the diversity lost with the missing climax patches will forever be a mystery. Without restoration of some balance to

95 Maxey, Bill. Director, West Virginia Division of Forestry interview with Doug Hawes-Davis in connection with the filming of Green Rolling Hills. 1994.
97 Constantz., p. 189.
98 Constantz., p. 35.
99 Constantz., Pp. 23, 28, 32 and 35.
the age of the landscape, the remaining biological diversity is also endangered.

**Stress on the Forests**

The timber “growth-to-drain” ratio is cited by most advocates of increasing the wood harvest in West Virginia. Still widely quoted is the 3.7:1 ratio published in 1989. Recall that the current estimate is 2:1. Logging, however, is only one of the ecological stresses on the forest ecosystem of West Virginia. Acid deposition, fragmentation, unplanned development, and exotic species of plants and animals all play a major role.

West Virginia’s high-sulfur coal is mined with dramatic effects on the landscape. To add insult to injury, the emissions from burning it in the midwest blow back over the state. There is evidence that the life-spans of some tree species have been reduced by 50 percent due to the stress of acidification. The accelerated mortality is serving as ironic justification for increased logging.

Fragmentation dominates the landscape. The forests of Appalachia are described by Constantz as “an archipelago of second-growth woodlots in an ocean of pasture.” The characteristics of fragmentation, insulation and size of stands, total habitat area, habitat diversity and ratio of forest edge to forest interior have well documented effects on biodiversity. Populations may be “outright

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100 Loucks, Orie. Interview with the author, October 19, 1995
101 Constantz, p. 189.
destroyed, severely reduced, or subdivided." Fragmentation may impede normal immigration among habitat patches. In addition, sources of immigrants to reestablish species where they have become extinct may be lost.

Other deleterious effects of haphazard 'development' accompany forest fragmentation, erosion, siltation of waterways and inadequate sewage treatment being the most common. The remedy, land-use planning and zoning, is anathema to the resident 'highlanders.' Independent and skeptical of authority, they cling to the idea that God created the hills for them to use as they see fit. Absentee landowners, who own 72 percent of West Virginia, rely on crass, secular political influence to frustrate attempts at planning.

The last major stress on the ecosystem, exotic species, includes plants, such as kudzu; animals, including pigs and cats; and pathological organisms, such as the chestnut blight and Dutch elm disease. A US Forest Service researcher estimates that the loss of species diversity from exotics exceeds that from pollution, fragmentation, loss and alteration of habitat and plantation forestry.

102 Constantz., p. 190.
103 Constantz., Pp. 190-191.
104 Constantz., p. 198.
105 Constantz., p. 203.
The current virulent exotic in the Appalachian forests is the gypsy moth. These pests, inadvertently introduced into the wild during an attempt to establish a domestic silk industry, have been eating their way through the forests of the eastern US for over 125 years. They have been attributed with altering species composition in heavily impacted areas, though not yet with threatening any species with extinction.\textsuperscript{107} The moths feed in the caterpillar stage. They have a strong preference for white oak which constitutes 60 percent of the forest in many parts of West Virginia. If the moth reduces the proportion of oaks to 15 to 25 percent, the food base may be too low to sustain subsequent moth outbreaks. Consequently, the pest will decline and forest diversity will increase.\textsuperscript{108} Meanwhile, a large percentage of the forest canopy trees are weakened from moth defoliation thereby becoming susceptible to mortality from drought, fungi, insects and the stresses of winter.\textsuperscript{109} The moth has been exploited by proponents of 'salvage sales' on both public and private land.\textsuperscript{110} In 1993, three-fourths of the USDA $19 million budget for fighting exotic pests was expended on gypsy moth eradication.\textsuperscript{111} Chemical pesticides and the biological agent of choice, \textit{Bacillus thuringiensis} ("Bt") attack other lepidoptera (moths and

\begin{flushleft}
\textsuperscript{108} Constantz, p. 205.
\textsuperscript{109} Constantz, p. 204 and FS/APHIS, \textit{Pest Risk Assessment}, Mueller, p. 44.
\textsuperscript{111} FS/APHIS, \textit{Pest Risk Assessment},
\end{flushleft}
butterflies), many of which are beneficial, as well. The ambiguity of the ultimate effects of the moth and of the suppression tactics argues for attempting to get along with the pest. An observer with the viewpoint of the perpetuity of the forest ecosystem suggests “that insects and diseases are a part of normal forest evolution and that they can be accommodated as long as forest tracts are large, healthy, and diverse enough to harbor the seeds of resistance and re-colonization.”

Acid deposition, fragmentation, development abuses and exotic pests are all threats to the biological diversity of West Virginia’s forests. Individually, but more often due to unpredictable synergy, their cumulative effects are a severe test of the resilience and stability of the forest ecosystem. Timber harvests are the perpetrator of fragmentation and often an accomplice of development. There are suggestions that present timber demand and harvesting practices are causing a decline in the biological diversity of West Virginia’s forests. Without changes to protect the forests, increased timber demand can only be expected to accelerate the rate of change.

112 Campbell, p. 32.
113 Mueller, 1994, p. 44.
Forest practices regulations give the public a mechanism to affect the conflict between preservation of biological diversity and short-term economic returns. West Virginia has taken some tentative steps toward regulatory protection. Chapter Four examines the support for regulation and its status in West Virginia.
Chapter Four: Forest Practices Regulation

Public Attitudes and Support for Regulation

As the forests of the region begin to recover from the turn of the century devastation, the citizenry shows signs of rejecting another cycle of exploitation. Sixty five percent of the respondents to a 1994 survey in Kentucky did not "think private forest owners have a right to do as they please with their forests regardless of what it does to the environment." Government regulation of tree cutting on private land to protect streams and wetlands was favored by 63 percent of the respondents, and to protect threatened or endangered species by 71 percent of those responding to the survey.115

Similar results were reported in a 1992 survey in Alabama. The forest products industry is the second largest employer in the state with the highest total payroll. Fifteen pulp and paper mills are located in Alabama including Parsons & Whittemore's 4000 ton per day bleached pulp and newsprint complex. Despite, or maybe because of, the dependency of the state's economy on timber, 42 percent of forest owners agreed that forestry practices on private land should be regulated to protect the environment. 57 percent were in favor of regulated harvesting in wetlands, and 64 percent

support regulation to protect habitat for endangered species.\textsuperscript{116} These are stronger expressions of support for environmental protection than one would expect given the synergy of economic interests and property rights sentiment endemic to conservative Alabama. Reportedly, a similar Penn State study found that more than 80 percent of private landowners in Pennsylvania were in favor of regulations to protect the ecology of private land and indicated a clear bias toward protection instead of exploitation.\textsuperscript{117} Raising landowners' awareness of their intrinsic connections with their forests, streams and all the life they support is crucial to counteracting the pressure to maldevelop them.

With logging again on the rise in West Virginia after 75-100 years of re growth there are still no specific state laws dealing comprehensively with timber operations. Bills introduced in the legislature to regulate the timber industry are routinely defeated and Governor Caperton adamantly opposes mandatory state timbering laws and regulations.\textsuperscript{118}

West Virginia's newspaper of record, \textit{The Charleston Gazette}, called for protection in an August 11, 1994 editorial:

\textsuperscript{117} Haldeman, Denny, Director, The Land Ethics Alliance: Chattanooga, TN. Personal communication, April 2, 1995
West Virginia needs jobs, But West Virginia doesn't need another industry to come in, scar the landscape, strip the state's natural resources and then leave once the damage is done.

How much forest will have to be cut down every year to feed the oriented strand-board plant in Braxton County? The $85 million lumber plant being built in Buckhannon? The proposed pulp and paper mill in Mason County?

While these new projects are good news for the hundreds of workers who will be hired, they could be an environmental disaster in the making if the logging to feed them isn't done in a responsible manner.

Timbering can provide many jobs: loggers, pulp mill workers, truck drivers. A real coup would be a furniture maker or some other finished goods manufacturer that would actually produce something in West Virginia rather than simply extract natural resources.119

Even the director of the state Division of Environmental Protection, David Callaghan, who ignored citizen's rights in approving two draft permits for Parsons and Whittemore, is worried: "The timber industry is loosely regulated in this state. I think there are significant opportunities for environmental damage out there. We are deficient in the total regulatory approach, and have been for a number of years."120

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120 ibid.
In 1992, the Logging Sediment Control Act was passed which provides some regulation of the logging industry and protection from some of its more egregious practices.

**Logging Sediment Control Act**

The 1992 Logging Sediment Control Act is the only regulatory protection afforded the ninety percent of West Virginia's forests that are on private land. The Act provides for logger certification in first aid, safety and best management practices. Logging contractors are required to be licensed and notify the Division of Forestry of the 'best management practice' they expect to employ to control erosion on each site they cut. The Act is unequivocal in its proscription of sedimentation of waterways. Best management practices notwithstanding, a logging operation may be shut down for increasing, or potentially increasing, the turbidity of a stream. The Act, however, allows harvesting of "any or all" trees in stream-side zones.\(^{121}\) It appears that riparian areas are being sacrificed for a visual water quality standard. Nutrient levels, temperature, water chemistry and habitat, for example, are not addressed by the Act.

The majority of on-site inspections by the Division of Forestry are in response to complaints by citizens. The notification provisions of the Act have been in effect for two years during which time there have been 6000 cuts reported, 400-500 complaints, and 600 total

\(^{121}\) Maxey, September 15, 1995 interview and Division of Forestry 'handouts' for logging contractors: "1992 Logging Sediment Control Act" and "Forestry Best Management Practices and Definitions."
inspections by the Division. The complaints revealed approximately 300 'problems,' 175 of which resulted in cessation of logging activity at least until corrective action was taken.122

The regulatory deficiency is institutionalized in that the state Division of Forestry is responsible for administering the Act and promoting the logging of the state's forest land.123 Bill Maxey, Chief Administrative Forester, is not troubled by his department's conflict of interest, except to the extent that regulatory functions preempt the Division of Forestry's marketing efforts.124 Norm Steenstra, a founder and lead lobbyist for the West Virginia Environmental Council describes the Division of Forestry as a "welfare program for the timber industry" and asserts that no new commodity product plants should be built since current logging levels are not sustainable.125

Parsons & Whittemore's spokesperson for the Apple Grove pulp mill, Ken Goddard, while never missing an opportunity to recite the 'good corporate citizen' mantra, nevertheless maintains that logging practices are not their responsibility. They rely on state regulators to make sure their wood suppliers do not damage the environment and "would expect that all logging and reforestation operations be conducted in a responsible manner and in compliance with all State ...
regulations and guidelines."  

This sort of soothing rhetoric and avoidance of responsibility may be aided and abetted by laws and regulations. Regulations don't change attitudes or necessarily even behavior. Without commitment to the goals of the regulations, one finds procedures taking precedence over what actually takes place on the ground.

The Charleston Gazette's editorial notes that without regulations there is little to keep history from repeating itself in West Virginia. The non-residents who own almost three quarters of the state's private forest land are undoubtedly a powerful lobby for maintaining an anti-regulation sentiment in the state government. If the residents do mobilize in reaction to destructive logging practices, a system of laws, regulations and supportive agencies to administer them will be a primary defense against the forces of maldevelopment.

A strong forest practices act should provide the legal foundation for an ethic of restoration and preservation of forest ecosystem health and esthetics. It should also include a mechanism for the production of forest products and amenities desired by

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127 Sharon Duggan, an attorney in San Francisco, related California's experience. The state passed a forest practices act in 1971 with stringent environmental protection provisions. Only in recent years has she perceived an attitude among the regulators and the industry that coincided with the goals of the law. The public is a 'party' under the California law. Duggan and others have been active since the law's enactment advocating the public's interest in the biological integrity of the state's privately owned forests. Presentation at "The Forest Commons Conference." Appalachia-Science in the Public Interest, Eastern Kentucky University, March 31, 1995.
humans. Kentucky’s Natural Resources Commissioner, Bill Martin, mindful of the support for regulation expressed by the Kentucky citizens’ survey and the growth in logging underway in the state, supports regulations guided by the principles that the use of natural resources must not “steal...from future generations.” And, that forests must be viewed as more than just timber and be managed in an “ecologically sound, economically viable and socially responsible” manner. The connections between environmental protection and prosperity are indisputable (see “Environmental Protection and Economic Health” in the following chapter). The potential for damage from unregulated logging will increase as the demand for timber increases, particularly with the pressure to hold down logging costs on low-value pulpwood. More than one half of West Virginia’s projected increase in pulpwood demand is from one mill. Chapter Five examines that project.

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Chapter Five: Apple Grove—The Lightning Rod for Protest

Outline of the Project

Of all the projects and proposals for expansion of the forest products industry in West Virginia, the pulp mill at Apple Grove has been the most controversial. Its developers, Parsons & Whittemore, a family owned, international pulp and paper industry conglomerate, invited controversy from the outset by being secretive and unapproachable. They have dealt almost exclusively with the state governor, who, in turn, has been equally close-mouthed. Understandably, as various aspects of the project have been exposed to scrutiny, the examination of them has been intense. The facts that have come to light have done little to dispel citizens' concerns that having the mill in their community may not be in their best interests.

The mill is planned in three phases. The first, expected to cost $1.1 billion, will produce about 850 tons/day of bleached market pulp (for sale to other paper mills) and 1050 tons/day of printing and writing paper. The second and third phases will increase production to 950 tons/day of market pulp and 3100/tons of paper.\textsuperscript{129} When completed it will be almost twice the size of the largest existing mills in the area and one of the largest in North America.

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Estimates for the mill's wood consumption for the first 2000 tons/day phase vary from about 800,000 to 900,000 cords per year. The company does not intend to own woodlands and will obtain its pulpwood from logging contractors and residuals from wood products plants. It expects its wood procurement zone to have a radius of 75 miles from the mill. At the peak of construction, 2,200 people are expected to be employed at the site. The first phase of the mill will employ approximately 600 people. The company projects that 600 to 800 additional logging related jobs and 2500 other 'secondary service sector' related jobs will be created. The estimated direct 'impact' of the mill on the West Virginia economy is $150 million per year with an overall economic effect of $600 million. The mill will produce pulp by the chemical 'kraft' process and bleach it with chlorine dioxide.130

Jobs and Economic Impact of the Mill

The conflict inherent in the individualism of neo-classical economic theory and the collective good of the community is sharply drawn in the Apple Grove mill issue. There is a workforce in the surrounding eight counties of West Virginia, Ohio and Kentucky of more than 150,000131 people. They will have an opportunity to compete for 600 new high-paying jobs at the mill. Despite the odds of one directly benefiting from the mill's employment opportunities, it is a beacon of hope to those with unfulfilled expectations. There

130 Parsons & Whittemore. 1994.
are at least two questions related to the benefits and associated risks of these jobs that have not been answered. First, how many of the high paying jobs at the mill will go to skilled workers transferred by Parsons & Whittemore from their other mills or to experienced mill workers emigrating from other areas instead of to inexperienced locals? Secondly, to what extent the community benefit from the additional jobs?

The basis of support for the mill from the local business, banking and political community is apparent. The local economy will benefit from its share of the $1.1 billion construction project and the mill's estimated annual expenditures in West Virginia of $150 million.\(^{132}\) The prospect of improved job opportunities that holds local working-people in the coalition supporting the mill is much less assured. There has been no commitment from the company that they will give hiring preference to West Virginians. Considering the extent of the support the company is requesting from the state, the lack of a quid pro quo for jobs is mystifying. Instead, the company's posture is combative: "We don't plan to helicopter people in here from Louisiana behind barbed wires [but, we] think the union management will have a problem with [our interest in hiring] the individual or sub-contractor the best qualified for the job."\(^{133}\) The company on numerous occasions has expressed its hostility toward unions. The suggestion is, that once a worker is a member of the

\(^{132}\) Parsons & Whittemore, 1994.

Parsons & Whittemore 'family,' there is no need for a union to represent them. The company’s ingrained antipathy toward organized labor is, no doubt, heightened by the opposition of the West Virginia Construction Trades Foundation to the use of chlorine by the proposed mill.

Related to the locals versus immigrants question, there is ample evidence from rural development case studies demonstrating employment opportunity favoring trained and experienced migrants over the local unemployed. As an example, Monroe County, Alabama, the home of a Parsons & Whittemore mill of similar size, has gone from a 4 percent unemployment rate in 1970 (before the mill was built) versus a statewide rate of 4.4 percent to near 10 percent in 1992 compared to a 6.8 percent rate for the state.134 The mobility exhibited by workers flooding to remote places like the north slope of Alaska, the inter-mountain west and the Ozarks has been dramatic.135 Far fewer barriers exist from the population centers that ring the confluences of the Ohio, Big Sandy and Kanawa Rivers in West Virginia.

Accepting Parsons & Whittemore’s projection that the 600 jobs in the mill will translate into almost 4000 new positions community-wide,136 the increase in total employment would be 2.5 percent and

the unemployment rate would be between 8-9.5 percent instead of the historic 10.5-12 percent.¹³⁷ The economic model (WVIOM) of the Center for Economic Research at West Virginia University estimates the economic multiplier for integrated pulp and paper mills to be three and the model used by the state bureau of economic statistics estimates a two times multiplier.¹³⁸ The total number of jobs created would be 1800 and 1200 under these models, or about a 1 percent addition to the regional 150,000 person work force. David Greenstreet, the director of the Center for Economic Research, speculates there was some 'double counting' of logging jobs when Parsons & Whittemore applied the multiplier. Loggers are part of the spin-off employment, not primary jobs. He cautions that estimates of direct jobs from new employers are consistently higher than the actual employment.¹³⁹

The company estimates that 75 percent of its $200 million per year of expenditures will be made in West Virginia.¹⁴⁰ Applying the 2X and 3X multipliers to this $150 million indicates a total economic impact of $300 to $450 million. Since 1989, when the Apple Grove proposal first surfaced, West Virginia's travel and tourism industry has grown 21 percent, adding 12,000 jobs and $630 million in annual

¹³⁷ US Census, 1980 and 1990
¹³⁹ Greenstreet, October 26, 1995.
economic benefit.\textsuperscript{141} Jobs in the tourist industry are often maligned as less than 'real jobs,' but the industry provided jobs for 71,500 West Virginians and $3.67 billion in economic activity in 1994. The growth in tourism has been led by outdoor activities such as hiking and river rafting, which are dependent on clean water and forests unspoiled by excessive logging.\textsuperscript{142}

In return for the economic effects of the mill, the community will annually receive millions of pounds of additional air pollutants and tens of thousands of pounds of toxins added to the Ohio River.\textsuperscript{143} There will be pressure to clear-cut thousands of acres of ecologically, esthetically as well as commercially valuable forests to produce throwaway paper.\textsuperscript{144} Additionally, there will be effects on local services (schools, hospitals, public safety, and infrastructure) and amenities (traffic, peace and quiet and esthetics) that have, so far, not been quantified. It is clear that the company intends to avoid the economic costs for the local effects of the mill through tax waivers and abatements.\textsuperscript{145}

\textsuperscript{142} Associated Press, September 16, 1995.
\textsuperscript{143} Ward, Ken Jr. \textit{The Charleston Gazette}. Charleston, WV, September 6. 1994. Ward reported the emissions of P&W's Alabama mill which I adjusted for differences in production levels. The technology employed at the two mills is to be the same.
Economic Development Support

West Virginia's governor, Gaston Caperton, described the $1.1 billion Apple Grove mill as the "Super Bowl" of economic development and casts himself, without a hint of irony, as an environmentalist who wants heavy industry in West Virginia. He and the state development authority have refused to discuss potential financial subsidies to the developers, Parsons & Whittemore, Inc. Documents obtained by the Charleston *Sunday Gazette-Mail* under the Freedom of Information Act show requests by the developer for over $60 million in infrastructure improvements, $180 to $200 million in direct state financing, tax abatements and training incentives and inducements to third parties to develop logging roads and acquire logging equipment. Absent from the Freedom of Information Act documents were any responses from the state officials indicating the level of support the company could expect. The fact that there was a series of requests from Parsons & Whittemore culminating in the support requests outlined above is viewed by observers as the support the Caperton administration is prepared to offer the company and defend to the people of West Virginia.

147 Ward, Ken., September 14, 1994
If competition for industrial plants via state and local tax incentives were not de rigueur,\textsuperscript{149} common sense suggests that no incentives should be necessary to encourage Parsons & Whittemore to locate a mill in West Virginia. The abundant wood supply is the justification for the mill. The company, however, has a well developed penchant for subsidies. Their Monroe County, Alabama complex is the beneficiary of $1.1 billion in tax-free bond financing, $245 million in favorable loans from the state employees retirement system, exemption from over $5 million per year in property taxes, plus the usual array of infrastructure support, training programs and so on.\textsuperscript{150}

The often repeated threat by the company, the governor and his minions is that the company will take their mill elsewhere if West Virginia fails to deliver satisfactory financial, community and regulatory support:

You may well succeed in vilifying a one billion dollar pulp and paper project and driving it elsewhere, where it will be most welcome. It will be a sad day for West Virginia.

Ken Goddard
Vice President, Parsons & Whittemore, 1995\textsuperscript{151}

\textsuperscript{150} Nyden, September 4, 1994.
\textsuperscript{151} Ward, March 11, 1995
Please assure [Parsons & Whittemore] that we will continue the economic programs of the state that have made West Virginia very competitive.

Governor-elect Caperton, 1989

There's a real possibility that because of these kinds of protests [against the mill], [Parsons & Whittemore Chief Executive Officer George] Landegger may decide West Virginia is not the kind of place he would want to put his pulp mill.

Governor Caperton, 1994

If West Virginia proves to be intractable, the obvious location for the mill will be across the river from Apple Grove in Ohio. The revolt against incentives to attract business has found a 'beachhead' there, however.

Handouts to individual corporations have become a zero sum game with no wealth creation. They are drying up money for education. I believe Ohio can show economic gains by unilaterally disarming in this war among the states.

Ohio State Senator Charles F. Horn
Chairman, Economic Development Committee, September, 1995

The logic of the scope of support suggested for Parsons & Whittemore is questioned by some examples: Employment in the forest products industry in West Virginia increased by 60 percent to a total of 20,000 in the seven or eight year period ending in 1994. The increase appears to be dispersed over a large number of small

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152 Ward, March 5, 1995.
153 Ward, September 14, 1995
154 Johnston, September 21, 1995
155 Nyden, September 4, 1995
firms. In 1992, the West Virginia Center for Economic Research compiled a list of planned expansions and new plants. Fourteen hundred new jobs were expected to be created from this group of thirty plants.\textsuperscript{156}

The Trus Joist MacMillan laminated beam plant is expected to cost \$85 million\textsuperscript{157} (8 percent of the cost of Apple Grove), consume about 65,000 cords of wood\textsuperscript{158} (again, about 8 percent of Apple Grove's wood demand), and employ 250 people\textsuperscript{159} (40 percent of Apple Grove employment). A Bruce Hardwood flooring plant in Randolph county, after several expansions, now employs 600 workers.\textsuperscript{160} The Georgia-Pacific and Weyerhaeuser oriented strand board plants are both expected to have workforces of at least 125.\textsuperscript{161} Absent from any of the sources discussing the 'siting' of these facilities are any references to financial incentives. Undoubtedly there have been some, but they have been too small to evoke comment. The number of jobs created far exceeds what is expected from the Apple Grove mill and there have been no major conflicts about environmental effects.

\textsuperscript{157} Ward, August 16, 1995
\textsuperscript{158} Murriner, March 15, 1995
\textsuperscript{159} Greenstreet, March 1994, Table 9.
\textsuperscript{160} Greenstreet, October 26, 1995.
\textsuperscript{161} Greenstreet, March 1994, Table 9, and Murriner, March 15, 1995.
West Virginia's 'smokestack' chasing agenda is in lockstep with many other state and local governments. Senator Horn of Ohio's "unilateral disarming" is going against the tide of increasing incentives to lure industry. The same article where he was quoted reported that 40 percent of large businesses "were more likely to be offered incentives today than they were a year ago and 73 percent said such incentives were more likely now than five years ago."\footnote{Johnston, September 21, 1995}

In the case of Apple Grove, however, the reason for siting the mill in West Virginia is the plentiful supply of wood. Its access and availability should be incentive enough for the mill. Subsidizing the company to enhance their profitability is of no apparent benefit to the public providing the subsidy. To the contrary, the public is at risk from increased logging of their forests, an unknown outlook for new jobs, the effects of growth and the pollution from the mill.

**Pulp Mill Pollution Issues**

The pollution effects of the mill have been well publicized. The principal controversy surrounds the dioxin that will be created as a result of bleaching the mill's pulp with chlorine. Chlorine combines with organic compounds (phenols in the case of pulp) to form dioxin. Chlorine is used to brighten pulp's cellulose fibers and remove lignin, the resinous substance that binds cellulose together (and contains the phenols) in all types of woody growth. Lignin also imparts a brown cast to paper and reduces its strength.
To reduce the formation of dioxin, Parsons & Whittemore proposes to utilize elemental chlorine free (ECF) technology in the bleaching of their pulp at Apple Grove. This will allow the mill to be in compliance with the federal EPA's "Cluster Rules" for the pulp and paper industry.\(^{163}\) The ECF process includes up to 100 percent substitution of chlorine dioxide for chlorine gas in the bleaching process. The oxygen in chlorine dioxide catalyzes chlorine's reaction with lignin in pulp resulting in a five to ten-fold reduction in the amount of chlorine needed.\(^{164}\) Dioxin and other organochlorines, however, are persistent substances that accumulate in the environment. The ECF process will merely result in slower accumulation and thus only delay the biotic effects.\(^{165}\)

The Cluster Rules are the EPA's first attempt to eliminate or reduce the formation of pollutants at the source instead of controlling their emissions at the end of the pipe or by add-on controls.\(^{166}\) As this innovative approach neared approval, the EPA completed a three-year study on dioxin. The study, instigated by industrial users and producers of chlorine, was expected to demonstrate that it was a weaker carcinogen than originally suspected. The draft report,

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\(^{165}\) Floegel, 1994. This is the essence of remarks attributed to a chlorine dioxide trade group publication referenced on p. 17. Essentially, who cares if it is good science if we can sell sodium chlorate (the feedstock for chlorine dioxide)?

issued in July, 1994, instead of lowering concerns about dioxin, concludes that it provokes severe health problems in humans, even at very low doses. In addition to increasing the risk of cancer, it can damage reproductive functions, stunt fetal growth and weaken immune systems.\textsuperscript{167} The report is receiving concurring peer reviews. Consequently, approval of the Cluster Rules, which would have legitimized Apple Grove's proposed bleaching technology, has been delayed until at least the spring of 1996.\textsuperscript{168}

The pulp and paper industry meanwhile has been moving toward technology that is not only chlorine free, but essentially effluent free. In June of 1994 there were sixty mills around the world producing chlorine free pulp. The technical director of a leading engineering firm is of the opinion that chlorine free closed-cycle bleached kraft pulp mills are now "technically feasible in the development time frame envisioned" for a new mill. There seems to be no question that chlorine will be replaced as the dominant pulp bleaching technology—the only unknown is when and what will be the rate of change.\textsuperscript{169} The importance of the US industry in the timing and pace of change was the theme of recent remarks by Helge Eklund, the president of Europe's largest pulp producer, challenging

\begin{itemize}
  \item \textsuperscript{168} \textit{Pulp and Paper}, reported in "From the Editor." Vol. 68, #12, November, 1994, p. 9.
\end{itemize}
his US counterparts to abandon the use of chlorine-based bleaches. "You are the most important people when it comes to changing this situation," he declared.\textsuperscript{170}

There is scant evidence of leadership within the US pulp and paper industry. The pattern has been to assume that the cost of litigation and delaying tactics is less than investment in technologies to overcome the developing evidence of the environmental risks inherent in current pulping and bleaching processes. Eklund went on to address such short-sighted cost/benefit analysis: "[i]nvesting in environmental protection does not give a quick buck, but must be seen as a long-term investment for the company and for society."\textsuperscript{171}

In this instance, at least, the call for leadership goes unheeded. Despite the questionable rationale behind chlorine dioxide substitution and the worsening evidence of the pathogenesis of dioxin, Parsons & Whittemore is planning to build a mill using chlorine and the state of West Virginia intends to issue them permits to discharge dioxin and other organochlorines. The risks of dioxin, to workers in the mill, those drinking water and eating fish from the Ohio River, or breathing the air within range of the mill's boilers are far removed from the system of rewards that motivate a Parsons & Whittemore vice president, who declared: "we consider chlorine an


emotional issue" and efforts to remove all chlorine from the environment "counterproductive and ill advised.\textsuperscript{172}

West Virginians have taken a strong stand against dioxin especially in air emissions and ash from hazardous waste incinerators. In 1977 and 1978, there were plans to build a total of twenty-five toxic waste incinerators in Mason County (the site of the proposed pulp mill). Despite strong business community support and initially a compliant county commission, the opposition, Mason Association for a Clean Environment (MACE), prevailed, and the county commissioners passed a resolution banning incinerators. Subsequently, the state passed a moratorium on hazardous waste incinerators.\textsuperscript{173}

Permits and Appeals

Following a preliminary "fast track" approval of two draft state water permits (one for discharge of effluent to the Ohio River and the other to site the mill's landfill in a wetland) by the West Virginia Division of Environmental Protection, appeals were filed derailing the fast track approach. The Region III Federal EPA administrator, Peter Kostmayer (the former US Representative from Pennsylvania) became involved. He exerted pressure on the DEP to accept


\textsuperscript{173} Bady, 1993; Fout, Janet. Project Coordinator, Ohio Valley Environmental Coalition. Personal communication, November, 1994; and Holzer, Roberta Personal communication. Gallipolis, OH, October 10, 1994.
additional public comments on the proposed permits and objected to the state's ten-fold increase in the allowed dioxin emissions included without public comment in the final draft permit. Kostmayer also expressed his intention to meet with Parsons & Whittemore officials to urge them to build a mill that does not use dioxin producing chlorine bleaching processes.\textsuperscript{174} Governor Caperton intervened, expressing his displeasure with the EPA in a meeting with President Clinton. In a December 2, 1994 letter to Carol Browner, the EPA Administrator, he complained of "arbitrary, discriminatory, outside the law" and "unprofessional handling," by the EPA. Two months later the EPA dropped its objections to the permit and Kostmayer was fired.\textsuperscript{175} As yet, however, the appeals have not been denied.

The first results from a multi-year test of fish tissue samples from above and below the Apple Grove mill site reveal dioxin concentrations up to four times greater than acceptable limits.\textsuperscript{176} The tests, conducted by the federal EPA, are part of a long-term evaluation of the Ohio River basin but are not required by the permitting regulations. The essence of this situation is that existing permitting standards do not incorporate the most recent (July, 1994) study of the effects of dioxin or validate fish tissue studies, therefore,

\textsuperscript{176} \textit{The Herald-Dispatch}. "Fish in Ohio River not meal of choice." Huntington, WV, August 2, 1995.
permits can be issued without regard to the results of either of the studies.

Issuance of the draft air permit has been delayed pending the company's estimates of dioxin and other toxins to be emitted from sludge incineration. The West Virginia DEP is also waiting for the federal EPA to issue standards for dioxin emissions from incineration of pulp mill sludge. Local activists with a long history of involvement in hazardous waste incineration expect this to be another controversial issue.\textsuperscript{177} Organochlorines have been found to account for as much as four percent of the weight of pulp mill sludge.\textsuperscript{178}

The Toxic Soup of Pulpmaking

Pulp mills are nothing more than chemical plants. The cellulose (carbon) of the wood is rendered into pulp. To accomplish this transformation a mill uses methanol, caustic soda (sodium hydroxide), salt (for chlorine and caustic soda), sodium chlorate (for chlorine dioxide), hydrogen peroxide and sulfuric acid together with a lot of water, heat and pressure.\textsuperscript{179} The plants discharge into the air and water tons of toxic methanol, hydrochloric acid, sulfuric acid, chloroform, chlorine dioxide, ammonia, and acetone along with the smaller but deadly quantities of organochlorines.\textsuperscript{180} There are

\textsuperscript{177} Fout, Janet, Ohio Valley Environmental Coalition, discussion with the author, September 16, 1995.
\textsuperscript{178} Floegel, 1994
\textsuperscript{179} Floegel, 1994 and Parsons and Whittemore, 1994.
\textsuperscript{180} Ward, September 6, 1994.
regulatory criteria that will allow a certain amount of all of these toxins to be emitted by the Apple Grove mill. There is also effluent-free technology “feasible in the development time-frame required for a new mill” that uses no chlorine and has virtually no toxic emissions.\textsuperscript{181} There are undoubtedly risks associated with designing and building a chlorine and effluent-free mill. A developer assuming those risks should not be denied the rewards of a successful project. There are minimal risks, however, to the developer of a conventional chlorine-based mill. Such a mill’s substantial risks accrue instead to the community where it is located. The extent and distribution of benefits to the community are not as evident. Community members who understand the risks, can, based on a perceived opportunity for a share of the rewards, make an informed choice about accepting them. Those who are ignorant of the risks or motivated by economic necessity and rest of the biotic community are at the mercy of the forces of maldevelopment.

Much more is at stake than the siting of one mill or the assimilative capacity of the region for additional pollution. West Virginia, despite an abundance of natural resources and proximity to prosperity, has experienced generation after generation of exploitation and poverty. Is there anything in the state’s approach to Apple Grove signifying a reversal of the cycle of exploitation?

\textsuperscript{181} Hershmiller, 1994
Environmental Protection and Economic Health

The evidence that economic prosperity follows environmental protection is compelling. Stephen Meyer of the Massachusetts Institute of Technology analyzed twenty years of economic performance and concluded: "States with stronger environmental standards tended to have the higher growth in their gross state products, total employment, construction employment, and labor productivity than states that ranked lower environmentally." 182

Expanding on Meyer's work, Bob Hall at the Institute for Southern Studies compiled the comprehensive *Green Index* 183 which includes detailed measures of each state's environmental health and the recently published "Gold and Green" 184 study which ranks each state based on twenty indicators of economic and environmental health. West Virginia, in the 1991 study, ranked no better than 45th in measures of air and water pollution, hazardous toxins released, public health and educational achievement. In the 1994 composite report, West Virginia ranked 48th in measures of economic health, ahead of only Louisiana and Mississippi, and 45th in the environmental health indicators. Alabama, cited as the benchmark for economic development driven by the engine of the forest products industry, was 46th in both measures.

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182 Hall, Bob. Meyer was quoted in the press release for the "Gold & Green" Report, October 12, 1994, p. 2.
West Virginia is the lone state east of the Mississippi River with an economy ‘highly dependent’ (13 percent to 36 percent) on natural resources. The measure is based on the percent of the state’s gross product derived from agriculture, mining, timber and energy industries. A state with that level of dependency would be expected to pursue policies to protect its natural resources. The Green Index identified fifty relevant policy initiatives. West Virginia has adopted only eleven of the fifty. Only four other states have adopted fewer. West Virginia ranks 45th in the percent (0.79 percent) of its state budget spent on the environment. In forestry for example, there is one forester for each of West Virginia’s 55 counties and only half of their time is spent training loggers and enforcing the Sediment Control Act. Before the Act was passed in 1992, the foresters’ primary function was to encourage commercial timber harvests by private landowners. With the potential increase in demand, the encouragement to harvest will come from the wood users themselves. The crucial question is, how will that increased harvest effect the ecology of the forest landscape?

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188 Maxey, September 15, 1995
Chapter Six: Apple Grove's Wood Demand

Supply and Competition

The relative scale of the Apple Grove mill intensifies concerns about its potential impact on the forests. There are three pulp mills presently obtaining pulpwood from the 75 mile area around Apple Grove; Westvaco at Luke, Maryland (production, 900 tpd); Mead Corp. at Chillicothe, Ohio (1000 tpd); and Stone Container at Coshocton, Ohio (600 tpd). See Figure 2. These existing pulpwood users combined production of 2500 tons per day will be increased by 80 percent by the first, 2000 tons per day, phase of Apple Grove. This 'over night' major increase of a demand that took 100 years to reach its present level, spawned hyperbolic Apple Grove related warnings of "a 140 percent increase in timber harvest" and "36 square miles of clear-cuts."\(^{190}\)

The company has promoted an image of a dispersed pulpwood procurement impact extending out 75 miles from the mill with 40 percent\(^{191}\) coming from Ohio and Kentucky. The credibility of this scenario is strained by the Ohio wood products industry's dependence on imported wood. In 1989, Ohio imported 109 million

\(^{189}\) Maxey and Murriner interview, September 15, 1995. Mill pulp capacities were obtained from Lockwood's Directory of the Paper and Allied Trades, New York: Vance Publishing Corp., 1986 and from Chris Janney, Mead's procurement manager in an October 10, 1995 interview.


\(^{191}\) Maxey interview, September 15, 1995.
board feet of saw timber from West Virginia, 20 percent of its consumption and 3.3 times more than two years before. In 1993, it imported 227,000 cords of pulpwood from all sources (28 percent of consumption). The forests of Kentucky could produce more pulpwood, but a paucity of demand for saw timber and the inadequacy of the state's roads and bridges are not conducive to a significant increase.

Without question, a portion of West Virginia's presently exported production of 700,000 cords of pulpwood will be diverted to Apple Grove. The economics of transportation costs will see to it. To some extent the diversion may result in an increased harvest in Ohio and Kentucky thereby validating the projection of a dispersed, three-state supply base for Apple Grove. This is not a forgone conclusion. The Ohio mills have well established supply relationships in West Virginia including a network of wood yards. Chris Janney, of Mead, when asked about increasing the harvest in Ohio, acknowledged that "the wood is there, we would like to cut more, especially clear-cuts. It is not practical though, due to changing public attitudes about esthetics. Don't forget, our backs are up against cornfields. We have to get our wood in the Ohio Valley." Adding to the appeal of West Virginia forests is their productivity.

Their average growth is about one half cord per acre per year, fully 25 percent more than the nearby forests in Ohio and Kentucky.\textsuperscript{195}

Clear-Cutting with a Silvicultural Face

Speculation about the potential for increased clear-cutting is warranted. It is the preferred harvest method for pulp mills.\textsuperscript{196} At this time, with pulpwood a relatively modest portion of West Virginia's wood demand, clear-cutting is almost non-existent (1 percent of the acres cut). In Alabama, the site of fifteen pulp mills, 45 percent of the acres harvested each year are clear-cut.\textsuperscript{197} Recall that 80 to 90 percent of the cost of pulpwood at the mill is harvest and delivery cost. A logger's initial cost for traveling to a site, setting up, preparing roads, skidding trails and landings is essentially fixed. If that initial cost is justified based on the value of a planned selective cut of saw timber, an incremental cut of pulpwood need only be justified based on its direct harvest costs. If the site is clear-cut, unit costs of all the wood removed will usually be reduced due to


\textsuperscript{196} This point was emphasized by Chris Janney, Mead Corp. procurement manager, in my interview with him on October 10, 1995. In twelve years of observing timber harvests for a bleached pulp mill on the coastal plain of the Carolinas, I do not recall ever seeing anything but a clear-cut.

lower initial costs per unit harvested and less time spent working around the trees left standing.

A review of the various harvest scenarios illustrates the pulpwood benefit from clear-cutting.

**Table 4. Pulpwood harvest opportunities.**

<table>
<thead>
<tr>
<th>Harvest</th>
<th>SawTimber Mbf/acre</th>
<th>Pulpwood cords/ac.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present harvest and pulpwood production$^{198}$</td>
<td>5.0</td>
<td>3.5</td>
</tr>
<tr>
<td>Present harvest maximizing pulpwood$^{199}$</td>
<td>5.0</td>
<td>9.5</td>
</tr>
<tr>
<td>Clear-cut mature oak-hickory stands$^{200}$</td>
<td>8.4</td>
<td>20.5</td>
</tr>
<tr>
<td>Clear-cut for regeneration, ‘understocked’$^{201}$</td>
<td>2.4</td>
<td>8.2</td>
</tr>
</tbody>
</table>

There is a significant opportunity to increase pulpwood production by harvesting the wood that is presently being cut and left in the woods or at the sawmill, but a further increase of over 100 percent can be obtained by clear-cutting. The understocked oak-hickory stands are included to illustrate the significant pulpwood potential from the proposed ‘regeneration’ clear-cutting of this 2.1 million acres of forest. As demand and cost pressures increase, the pulpwood potential from clear-cutting will be hard to ignore.

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$^{198}$ Total harvests, 1.0 billion bf and 700,000 cords from 200,000 acres. See Chapter 1.

$^{199}$ Additional 1.2 million cords from tops, limbs and manufacturing residuals. See Chapter 1.

$^{200}$ From the “Silviculture Book” prescription. See Table 2.

$^{201}$ Table 2.
Pure softwood stands, which are estimated to total between 400,000 and 450,000\textsuperscript{202} acres in West Virginia, will most certainly be candidates for clear-cutting. They have no commercial value except as pulpwood. Annual demand, with the addition of Apple Grove, may exceed net growth, thereby increasing the pressure to clear-cut the most convenient sites.

Professional commodity oriented silviculturists are strong advocates of more clear-cutting in West Virginia. Increased demand for pulpwood provides a current economic justification for what they view as an imperative for long-term forest health. Health in this case appears to be defined as sustainable production of commercially desirable saw logs. The Division of Forestry's Ed Murriner bluntly stated that his solution for the "lesser-quality" forests around Apple Grove was to "clear-cut [them] and start over."\textsuperscript{203} The Division director is similarly unequivocal on the subject of clear-cutting. "[People] don't like clear cutting...just because of the lack of beauty..., the mess that it makes. [P]rofessionally I know that it really doesn't hurt anything other than the looks. And if it doesn't damage the adjacent landowners property in any way, and it doesn't, then I'm an advocate of clear cutting, [and] a strong advocate of landowners rights."\textsuperscript{204} Totally absent from every one of these utilitarian perspectives on silviculture is any consideration for the damage inflicted on the rest of the forest ecosystem by clear-cutting.

\textsuperscript{202} DiGiovanni, 1990, Table 2.
\textsuperscript{204} Maxey, Green Rolling Hills interview, 1994.
From a commercial forestry perspective, objecting to clear-cutting Appalachia’s predominately second-growth forests is analogous to “getting upset about repaving a parking lot.”205 That is an unfair characterization. In the words of Lucy Braun, the author of the definitive ecological analysis of the mixed mesophytic forests, “each time these diverse moisture loving forests are clear-cut the soil becomes thinner and drier and the succession forest reflects these changes.”206 According to the Forest Service, “clear-cutting wipes out all visible life on a plot of land, either by outright killing or destruction of habitat.”207 Eighty-five to ninety percent of the plant species in a forest are not trees, “they’re vines and herbs and little shrubs,”208 and 45 to 80 years after clear-cutting, most have not returned to the forest.209 Animal life, such as key species like salamanders, may take up to 120 years to recover.210

Nevertheless, Mary Ann Fajvan, a West Virginia University silviculturist, like her colleagues in the Division of Forestry, advocates clear-cutting, or some related form of ‘even-age’ management, as the solution to a progression of the forests to ‘non-commercial’ species. Currently, a typical harvest will call for cutting all the desired species, usually shade intolerant oaks and/or tulip-

207 Bouma, p. 7.
208 Bouma quoting Petranka, p. 6.
poplar, above a diameter limit. Low diameter limits, often 18 inches or less, result in all the shade intolerant trees being cut out of the forest canopy. This releases the shade tolerant species, particularly red and sugar maple, into the canopy where they shade out regeneration of oaks and poplars. Clear-cuts or a series of shelterwood cuts followed by a clear-cut will provide the light conditions for regeneration comparable to the frequency and abundance of species found in West Virginia’s forests today.²¹¹ The present even-aged diversity, however, has no biological significance; it is merely the result of the early 1900’s clear-cutting. The option of converting the forests back to the uneven-aged condition that existed prior to the turn of the century devastation is dismissed by Fajvan because it “takes many decades to convert...to a true uneven aged condition,” and “uneven-aged structures are hard to maintain.”²¹²

An ongoing, 30 year-old harvest study in the Fernow Experimental Forest near Parsons, West Virginia presents a contradictory view of the prevalent ‘diameter limit’ harvesting method. The study compares diameter limit harvests with a selection harvest designed to control the residual stand structure. The nuances of the differences between the two methods, both of which lead to uneven-aged stands, are not important here. They were slight in terms of the residual forest and in financial returns to

the landowner. What is significant, is that for a forest owner who wishes to harvest saw timber, both partial harvest methods provided real rates of return (about 6 percent) that were competitive with alternative investments. In both cases, forest cover was maintained and the residual stands "provide for sustained yield" of commercially desirable saw timber.213

What is a forest owner to do when the hawks are circling? In the first instance, a highly trained silviculturist predicts a 'crash' in the value of the forests induced by the predominant 'diameter limit' harvesting method, and promotes clear-cutting. In the other, a long-term study suggests that diameter limit harvests are sustainable and economically viable. Wendell Berry maintains that the public despoils the land out of economic necessity and ignorance.214 Economically, clear-cutting is liquidation of the forest 'principal.' Presumably it is done with a complete grasp of all the facts necessary to establish to the forest owner that the current value of the principal is greater than the present value of future returns. Certainly with individuals there are external factors that enter into such evaluations--the need for cash. Ignorance is more subtle. In confronting the question of clear-cutting or managing for protection of the forest and its biological diversity and income, a slothful

214 Berry, Wendell, Kentucky farmer, writer and ecologist. From a speech delivered at "The Forest Commons" Conference at Eastern Kentucky University, March 31, 1995.
disregard for knowledge is inexcusable. 'Knowledge' based on self-serving science put forth to effect an inequitable distribution of rewards and costs, suggests exploitation. It often requires exceptional diligence and perception to determine the real beneficiaries and those with the most at risk.

The common thread throughout all the Apple Grove issues is the relationship between control (power) and rewards. The people of the community are told they will benefit, with higher prices for timber or new jobs, but they have no power to achieve these benefits. The rewards to those controlling the process are beyond dispute. What are the implications of this concentration of power and control of rewards to the human and ecological community being "developed?"
Chapter Seven: Development or Maldevelopment?

Development "connotes the best of intentions," and "allows any intervention to be sanctified in the name of a higher goal."215 Governor Caperton's characterization of the Apple Grove mill as the "Super Bowl" of economic development was undoubtedly intended to connote something good--Super. The metaphor at the heart of the matter may instead be the game, the contest, the battle. One in which there is a big winner as well as numerous losers.

If West Virginia 'wins' the Apple Grove mill there will be more jobs for West Virginians and growth in economic activity. What about losers? Are there concentrations of power that will facilitate an inequitable distribution of rewards and penalties associated with the mill?

The governor, Gaston Caperton, appears to be in an enviable position. His political stature will be enhanced if he succeeds in bringing the mill to Apple Grove. His advocacy through politicization of the permitting process and non-disclosure of subsidies offered to the mill's developers has outraged citizen activists and some of the state's press, but is representative of the process of "Political Capitalism."216. It appears that one's belief that there are core American values of equality and democracy guiding the political

216 Kolko, 1976
process “is a soothing patriotic fiction.”217 If the governor fails to ‘win’ the mill, those to whom he owes allegiance should not fault him for lack of effort.

Parsons & Whittemore is using its position as the sponsor of this ‘Super Bowl’ to their advantage. They have built over sixty pulp and paper mills around the world and are major manufacturers of mill equipment. Through these activities they undoubtedly are familiar with most of the opportunities for new mills world-wide. They chose to build one for themselves in Apple Grove. Two of their principal risks are the cyclical fluctuations of the pulp and paper markets and the evolving awareness of the hazards of chlorine. It appears that others will assume most of these risks. The people of West Virginia by their subsidies of the capital and operating costs of the mill will reduce its vulnerability to the market. The mill will use chlorine bleaching technology thereby subjecting the biological community to organochlorines. Consequently, Parsons & Whittemore will avoid the costs of any technical, operating or market risks associated with building and operating a chlorine-free mill.

A reasonable expectation is that in return for state support the company will assure employment opportunities to unemployed West Virginians, who are ostensibly the reason for the state’s efforts to insure the mill locates there. To the contrary, the company hires based on ‘merit.’ Laudable as an open, democratic process may be, in  

this case it appears to be designed to marginalize the role of unions. There is no evidence of an obligation, formal or implied, for Parsons & Whittemore to show preference to the people subsidizing the mill.

What, besides a chance to compete for the jobs created by the mill, are the risks and opportunities for the people of West Virginia? The spending associated with the jobs, wood purchases and other supplies, materials and services is estimated to be $150 million per year. With this will come additional employment and economic activity as the funds circulate through the economy. The benefits of the economic multiplier effect are illusory, however, when new residents offset employment gains, purchased goods are largely produced outside the region and profits on purchases flow through to the headquarters of the chain-stores that move in to take advantage of new markets. In addition to the potential dilution of economic benefits, there are a host of risks that are not in dispute: The mill will pollute the already heavily impacted airshed and rivers.\(^{218}\) The concentration of economic activity and increased population will increase the demand for public services. The mill is expected to be exempt from property taxes, therefore, the rest of the community

\(^{218}\) According to Janet Fout of the Ohio Valley Environmental Coalition, a federal EPA comprehensive Ohio Valley airshed study revealed the region is "out of compliance" for air quality. Because the area falls into three EPA regions and none of the individual regions are out of compliance, no remedial action is required. The two principal water quality issues are dioxin and dissolved oxygen. Ongoing EPA dioxin monitoring reveals concentrations in fish tissue from above and below the mill site will in excess of allowable limits for human consumption. Reported in the *Herald-Dispatch*, Huntington, WV, August 2, 1995. The subject of potential excessive oxygen depletion is addressed in the pending appeal of Apple Grove's discharge permit by the Affiliated Construction Trades Foundation.
will have to fund these additional services. The proportion of economic development financial support devoted to this single project will constrain the state’s ability to assist other ventures with more desirable social and ecological characteristics. Truck traffic of 400 to 500 trucks per day will be added to the mill area’s roads.\(^{219}\) During busy times of the day this will equate to more than one truck per minute for someone unlucky enough to live on a main access road to the mill. Tourism, with direct support from the state amounting to little more than an 800 number (CALL-WVA), is growing by over $120 million per year, contrasted to the one-time, $150 million infusion from Apple Grove. Visitors to the state are attracted to its forests and rivers, both at risk from the Apple Grove mill, risks that will double when the mill expands to its planned capacity of 4000 tons per day.

There are significant differences of opinion about the implications of the present and potential wood harvest levels in the state. At one extreme there are those looking at trees, and at the other those with a focus on forests. The debate is primarily carried out in terms of trees while everyone believes they are talking about forests. To put this in perspective, a commodity, tree focused silviculturist’s belief is that the prevalent practice of diameter limit harvests of all trees greater than 17 inches dbh (diameter at breast height) should be modified to include periodic clear-cuts. This is necessary in her view to insure a continuation of ‘commercially

\(^{219}\) Parsons & Whittemore, 1994, p. 9.
desirable' species. Contrast this view-point with that of a proponent of 'sustainable silviculture:' "Trees should be managed in uneven-aged stands and harvested by single-tree selection or by selection of groups less than about one average tree height in diameter." Generally trees selected for harvest should be not less than 36 inches dbh and not expected to survive until the next cutting cycle (5-15 years).

Both of these students of forest management would contend that what they propose is sustainable, promotes diversity and is intended to prevent maldevelopment of forests. Nevertheless, the trees/forest and commodity/ecosystem dichotomies are still present. In the case of West Virginia's forests, there appear to be risks for maldevelopment regardless of one's viewpoint toward forests and forestry. From the commercial perspective, as much as 80 percent more wood will be harvested to meet the new pulpwood demand. This could lead to commercial stand improvement through thinnings and regeneration clear-cuts. Also possible, however, is the conversion of productive, easily harvested sites to short-rotation pulpwood harvests providing equal present value and more frequent cash-flow to the land owner. A process that would be viewed as maldevelopment by commercial silviculturists intent on maximizing production of high-quality sawlogs.

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220 Fajvan, 1995
221 Kalisz, Paul, Associate Professor of Soils & Silviculture at the University of Kentucky. From a presentation at "The Forest Commons" conference, sponsored by Appalachia-Science in the Public Interest. Eastern Kentucky University, March 31, 1995.
From the standpoint of the forests, the current timbering practices are fostering maldevelopment. Immature trees are being cut, high-impact logging methods are compacting soil, destroying riparian areas and filling streams with mud. With the growth in pulpwood demand, the ecosystem may be further fragmented by increased clear-cuts. Opportunities for re-establishment of patches of old-growth will be reduced. Increased harvests will increase the incidence of siltation and riparian area destruction as well as providing more opportunities for introduction of exotic species. Increased demand on West Virginia’s private forests may perpetuate the present landscape of fragmented, degraded, early successional forest patches and forestall the restoration of a healthy, diverse forest ecosystem.

The imperiled landscape is not only the visible forest, but equally at risk is our internal landscape nourished by forests. Human emotions elicited by forests “can be very profound, and sometimes take on a religious or spiritual quality.” Appalachia, the land of “endless mountains,” has never been an easy place to live, but humans have lived and been nourished physically and spiritually by this forested landscape for at least 12,000 years.

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224 Constantz, 1994, Chapter 22.
To what extent has the despair, poverty and out-migration that has characterized much of 20th century West Virginia been attributable to its devastated forests? It is a question which we will never answer, but our children, "the living messages we send to a time we will not see,"225 will experience and interpret the legacy we send with them. Is short-term economic self-interest worth perpetuation of fear and deprivation?

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Epilog

There is hope for the future in West Virginia. Despair, deprivation and poverty remains prevalent to be sure, but there is a new generation of “highlanders” striving to control their destiny. Political fealty to powerful business elites is anathema to this new generation. There are encouraging signs that the leading candidate to replace the incumbent governor is drawing the line at approving a paper mill that will use chlorine and is opposed to financial subsidies for new businesses without a quid pro quo for the citizens of the state. A policy supporting business creation commensurate with the physical, social and economic health of the citizenry and the environment is not only desirable but ultimately the most rewarding.

The private forests of the state are a complex issue. Clearly no one wants a repetition of the forest destruction of the early 1900’s. At this time, however, there is nothing to prevent it from happening again. The state has an opportunity now to adopt a pro-active policy toward forest use and development. The tremendous diversity in the size of forest parcels owned and in the characteristics of the landowners themselves are complicating factors. There is no one prescription to fit them all. I favor an approach beginning with a vision for the character of the state’s forest landscape. Overlaid on that vision would be an estimate of the mix of management approaches necessary to achieve that landscape. One must then craft a flexible mix of policies, regulations, incentives and educational
programs designed to motivate forest owners to follow management practices oriented toward protection and restoration of forest ecosystems. Strong, enforceable regulations prohibiting practices detrimental to protection are essential. There should also be a mechanism for forest owners with an objective of maximization of forest commodities that enables them to achieve their goal within the bounds of 'best and appropriate' silvicultural practices.

The forests of West Virginia have value far greater than "stumpage" prices for trees. The sense of place they provide for the state's residents and those attracted to the state should be nourished and supported. I am not suggesting that it is inappropriate to develop commercial value from the forests, but the full cost of loss of intrinsic, aesthetic and biologic value should enter into the calculus of the decision to proceed with commercial development.
Glossary

Pulpwood. Logs (roundwood), or chips (whole-tree or manufacturing residue) that are used for the production of woodpulp and composite products such as strand board. The unit of measure for pulpwood is the standard cord.

Saw timber. Roundwood from which products such as lumber are sawn. The logs must meet minimum standards of length (eight feet) and defect. The minimum diameter (inside the bark) for softwoods is six inches and hardwoods is eight inches. The unit of measure for saw timber is the volumetric ‘board foot.’ Usually expressed in thousand board feet (M Mbf).

Sawmill or Manufacturing Plant Residuals. Wood chips or other by-product materials generated when roundwood is converted into wood products.

Standard Cord. A stack of wood, bark and air space totaling 128 cubic feet. A cord comprises 85 cubic feet of solid wood.

Thousand Board Feet (Mbf). Mbf is the unit of measure for saw timber. Mbf equivalencies are, for hardwood logs (international 1/4 in rule) = 136.6 ft\(^3\) = 1.6 cords and for softwood logs = 149.1 ft\(^3\) = 1.75 cords.
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