

**WOOD PELLET
MANUFACTURING:
RISKS FOR THE ECONOMY
OF THE US SOUTH**

An issue brief from Dogwood
Alliance Prepared by Spencer
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SUMMARY

The wood pellet industry is rapidly expanding across the Southern US, spurred by renewable energy mandates and associated subsidies in European Union member states. While some see this as beneficial for the economy of the rural South where pellet facilities are being built, a closer look raises significant cautions regarding the industry's effects on the region's economy.

In addition, and while the goal of a net reduction in greenhouse gas emissions is laudable, there are several reasons why the EU strategy is one of pursuing a worthy end by inappropriate, and possibly self-defeating, means. Details follow, but in summary, this issue brief identifies a range of concerns including:

- *Switching fuel to biomass pellets imported from the US South may increase rather than reduce greenhouse gas emissions – an effect opposite the one intended.*
- *Possible declines in forest health due to whole-tree harvesting, and relatively more forestland in plantations could harm timber productivity and broader ecosystem service values.*
- *Loss of amenity and increased industrialization of rural landscapes could limit the attractiveness of the region as a location for new residents and businesses.*
- *Expansion of biomass pellet manufacturing in the US Coastal South will raise timber prices in the short term and could change industry structure for decades to come.*
- *Pellet manufacturing will increase at the expense of lumber, panel and paper manufacturing, in which job creation is typically stronger than it may be in pellets.*
- *All signs point to biomass energy being a boom-bust market, and the bust will leave communities with stranded assets, denuded forests and diminished job and other economic prospects long before the hoped-for reductions in greenhouse gas concentrations have a chance to occur.*
- *Subsidies in Europe and tax breaks and other assistance to the industry in the US South distort investment and forest management decisions and exacerbate the problems above.*

Through a combination of mandates and subsidies to electric utilities, the European Union's Renewable Energy Directive aims to reduce greenhouse gas emissions from electricity generation. In the US coastal South, tax-payer-funded subsidies and other assistance to biomass pellet manufacturers are intended to boost pellet supply and give an advantage to that portion of the forest products sector. Some may see these as public investments in reducing greenhouse gas emissions relative to other strategies and/or enhancing a sustainable regional forest products industry. But as any economist – and many a policymaker – knows, interventions in the marketplace always produce distortions. And however well-intentioned the intervention might be, one must consider carefully the unintended, but still highly foreseeable, consequences before concluding that the benefits outweigh the costs. In this policy brief, we examine two major types of consequences.

First is the potential for short- and long-term changes in the regional forest products industry that favor export of pellets over other uses of timber, wood by-products and, ultimately, forestland. The result could be a loss of capacity to produce higher-value products that have greater potential for supporting job and income growth.

The second and probably greater consequence is the risk that spillover effects (externalities) from expanded pellet fuel production will erode the scenic amenities, water quality and other natural values that support the broader economic development potential of the region. Some of these externalities can be biophysical and result in greater cost of production in industries that rely on clean water, high-quality recreational opportunities and other ecosystem services. Others can result simply from a loss of reputation as a suitable or desirable location for 21st century industries, for retirement or for footloose entrepreneurs who value quality of life as much or more than more traditional business development concerns.

WILL IT EVEN WORK?

Before getting to those problems of economics, we must first recognize a deeper problem posed by physics: namely that the effect on greenhouse gas emissions could be opposite the one intended.

While it is true that trees absorb carbon dioxide, tree harvesting, pellet manufacturing and pellet combustion, plus the transportation from forest to mill to generating facility, all emit carbon and other greenhouse gasses. Law and Harmon (2011) note that the harvested area itself becomes “a large CO₂ source for 5-50 years (p. 74)” due to the release of carbon from logging debris and the soil. Even in the best of circumstances, and taking into account all emission sources, cutting down and burning a tree today will impose a “carbon debt” – an initial release of stored carbon – that won’t be “repaid” for as long as a century or more (Walker et al. 2010; Aguilar 2015; Nelson 2012; Ter-Mikaelian, Colombo and Chen 2015). Under some scenarios more plausible for the US coastal South that involve shortened rotations and more intense forest management, greenhouse gas emissions per unit of electricity-generated biomass could actually be higher for biomass than for coal (Stephenson and MacKay 2014). Since coal is the fuel the Renewable Energy Directive aims to have biomass displace, the UK and wider EU could actually increase greenhouse gas emissions in their attempts to reduce them.

The worst biomass of all would be if the surge in UK demand for wood pellets sees US forests harvested more frequently than they would have been otherwise. Evidence from the US government suggests this is already happening, and the climate impacts could be worse than coal. – Simon Evans (2015)

The result of this dynamic would be further increases in greenhouse gas concentrations, acceleration of climate change and many serious ecological and economic impacts on communities in the coastal US. Miami, Florida, for example, ranks first among as the world’s port cities in terms of assets at risk due to coastal flooding and other effects of climate change (Rosten 2015; Nicholls et al. 2008). Within the US, coastal communities in the Southeast are likely to see some of the highest increases in storm damage, erosion and flooding (U.S. Global Change Research Program 2009).

For the remainder of this brief, however, we simply acknowledge this major, meta-economic problem, and move on to the issues that arise from, or operate within, the economic subsystem.

THE ECONOMIC DYNAMIC

According to a recent analysis by the US Forest Service, the increase in demand for biomass pellets will induce changes in the region’s forest products industry, including “sharp price increases and potential leakage and displacement (Abt et al. 2014, 28).” In other words, higher prices for trees harvested in the region will cause traditional lumber, wood products and paper manufactures to import more logs from other regions to supply their own operations – that’s the “leakage” – while some operations will cut back on production, and others may shut down altogether.¹

¹ “Leakage” refers to funds leaking out of the regional economy and occurs whenever a local firm must spend funds on inputs from afar when they might, in slightly different circumstances, be able to spend the funds on local resources.

Further along, this dynamic will produce changes in the allocation and management of land in the US coastal South. Increased demand for pellet mill feedstock could increase the value of forestland at the margin, and some that is on the brink of conversion to non-forest uses (residential or commercial development) might stay forest for a bit longer. Similarly, some crop and pastureland that is not quite getting by in its agricultural use could revert to forest as farmers switch from growing crops to growing trees for the pellet mills. While the number of acres for which the land use could tip toward growing trees for biomass fuel is probably small, some of the changes could persist for decades.

Based on its model, the Forest Service surmises that the regional timber market will return to something like the pre-pellet-boom equilibrium by 2040. That is to say that the amount of biomass grown and harvested in the region and the prices at which timber is sold will be about the same then as they are now. However, as the Forest Service puts it, the “potential shift in the use of pine from traditional products to bioenergy could lead to structural changes in the industry and have job and income effects, which are beyond the scope of [their analysis] (Abt et al. 2014).”

But those structural changes in the industry, not to mention the conditions on the ground in the region’s forestland that they entail, are vitally important to the people and ecosystems in the region and beyond. The future balance of supply and demand at some market clearing price (i.e., what economists call equilibrium) will not, in other words, derive from the same industry or the same forest that today’s equilibrium does. And while those broader and more fundamental changes have not yet been fully researched, it is important to consider them now, before either the importing or the exporting region invests too heavily in an uncertain future.

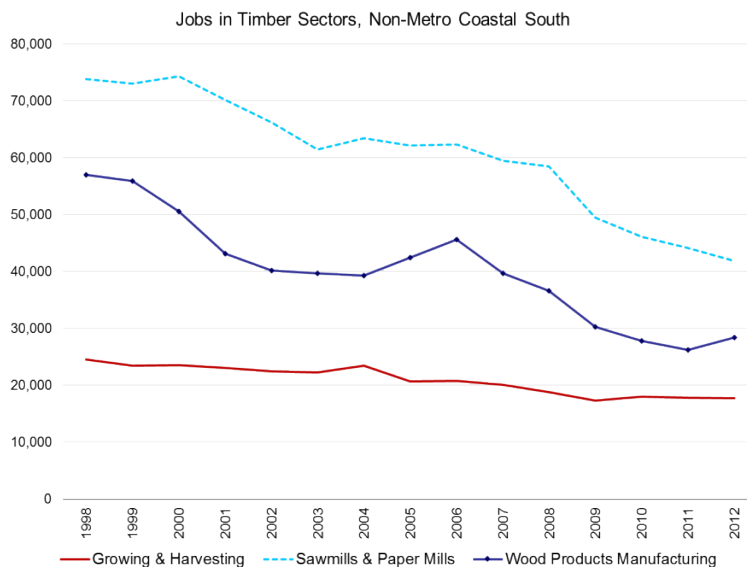


Figure 1. In the rural portion of the US coastal south, managing and processing timber accounts for 3.6 percent of all private employment. Sawmills (including primary lumber mills and panel manufacturers) and Paper Mills employ 48 out of every 100 timber sector workers. Pellet Mills would be classified as part of “Wood Products Manufacturing.”

ECONOMIC COST

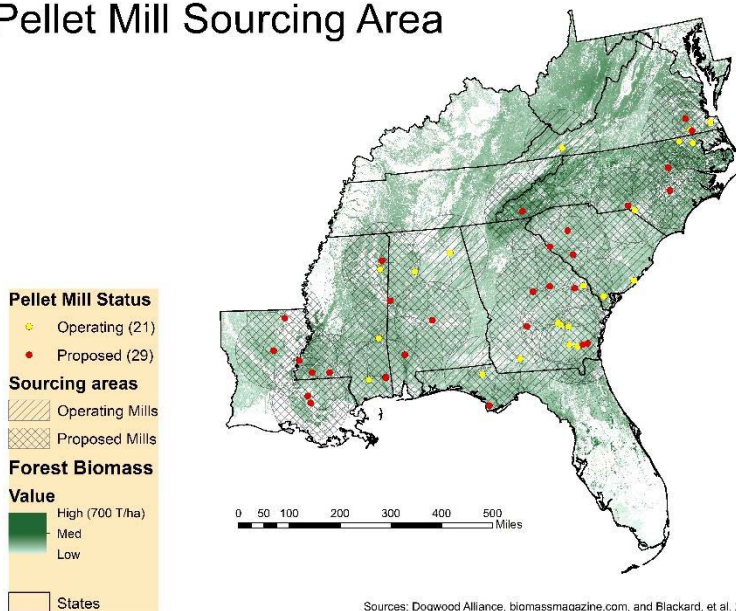
Timber-Related Job Creation

Unlike in many parts of the United States, paper, lumber and other solid wood products manufacturing continue to be an important component of the economy of the coastal South. This is particularly so in the more rural areas where the industry employs 3.6 percent of all private sector workers, versus 0.9 percent if you include the urban areas, and in contrast to 0.7 percent for the US as a whole. (BEA 2015; Headwaters Economics 2015). (See Figure 1.) At the level of such statistics, it may seem that one forest products manufacturing job is the same as another. But as the Forest Service analysis' allusion to structural change and "displacement" suggests, there are differences in those jobs and in the downstream effects of various jobs in the regional economy.

Each new job in a sawmill or in a paper mill, respectively, results in the creation of a total of 2.3 and 2.9 additional jobs in the regional economy. These are the result of spending by the mills on goods and services supplied by landowners and other firms (Bureau of Economic Analysis, Regional Product Division 2014). By contrast, each new job in "miscellaneous wood product manufacturing" (where pellet mills would be classified), results in less than one additional job in the rest of the economy. Thus, and from the standpoint of stabilizing employment in the forest products sector (it has been declining for some time), one would expect a higher return investment in more traditional forest products industries than in biomass pellet manufacturing.

The leakage effect mentioned above would tend to change this comparison over time, but only because leakage means that sawmills and paper mills would either import more of their raw material from outside the coastal South, thereby exporting to other regions the job gains that would otherwise occur closer to the mills, or they might relocate to regions where suitable raw materials are more abundant, less expensive or both. The displacement effect would simply mean that, relative to existing trends, there will be fewer jobs in paper and traditional solid wood products manufacturing overall. The shift to pellet manufacturing would therefore have a double impact on the region's economy: a decline in employment in exactly those portions of the forest products sector that spawn the most jobs in the rest of the economy.

Pellet Mill Sourcing Area



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Timber Productivity

Another economic downside is that a shift in forest management in the region to support pellet manufacturing will mean changes in the forest itself. Projections indicate that there would be little long-run effect on the sheer volume of timber available and, possibly, even a slight increase in forestland acreage (Abt et al. 2014). The portion of the forest that is in plantations would increase relative to natural forests, however, and the

Figure 2: Pellet mills have a sourcing radius of roughly 75 miles. That puts nearly all of six coastal states, and major portions of two others in the "fiber shed" for the 60 mills operating or proposed as sources of pellets for export to the European Union.

timber produced would come more in the form of younger, smaller trees that will be less suitable for uses other than biomass pellets. This dynamic sacrifices future sawtimber and broader forest values, including carbon storage, for the sake of a lower-value forest product in the short run.

Because biomass harvesting entails removal of more of the tree from the harvest site, more nutrients like nitrogen, potassium and phosphorus important to future tree growth are also removed, and that could compromise future growth (Walmsley et al. 2009; Janowiak and Webster 2010). While this effect has not been universally proven, it does urge caution and, perhaps, stricter environmental management requirements for forests managed to produce biofuels (Thiffault et al. 2011).²

Ecosystem Services

Regardless of the impact on tree growth itself, ecosystem services other than fiber production would be affected by expansion of biomass fuel production. In their review, Janowiak and Webster (2010) cite concerns for damage to hydrology, “detrimental effects on some species (p. 20)” and diminished biodiversity overall. They further note that because state-level best management practices intended to address these concerns are typically voluntary, firmer regulations may be required to avoid deleterious effects of increased biomass harvest. Again, increases in plantation forestry would occur against a backdrop of an already worrisome trend toward conversion of land to non-forested uses. As poor a simulation of natural conditions as a pine plantation may be, it is still more natural than most agricultural fields and much more so than almost any housing subdivision. But the net impacts on biodiversity, hydrology and other processes that ultimately deliver diverse ecosystem services to people in and out of the US Coastal South must be considered before concluding that biomass energy harvesting is ecologically benign.



Tree plantations, which are likely to expand with increasing pellet manufacturing, do not provide the same level and diversity of ecosystem services as the natural forests they will displace. Photo: Dogwood Alliance

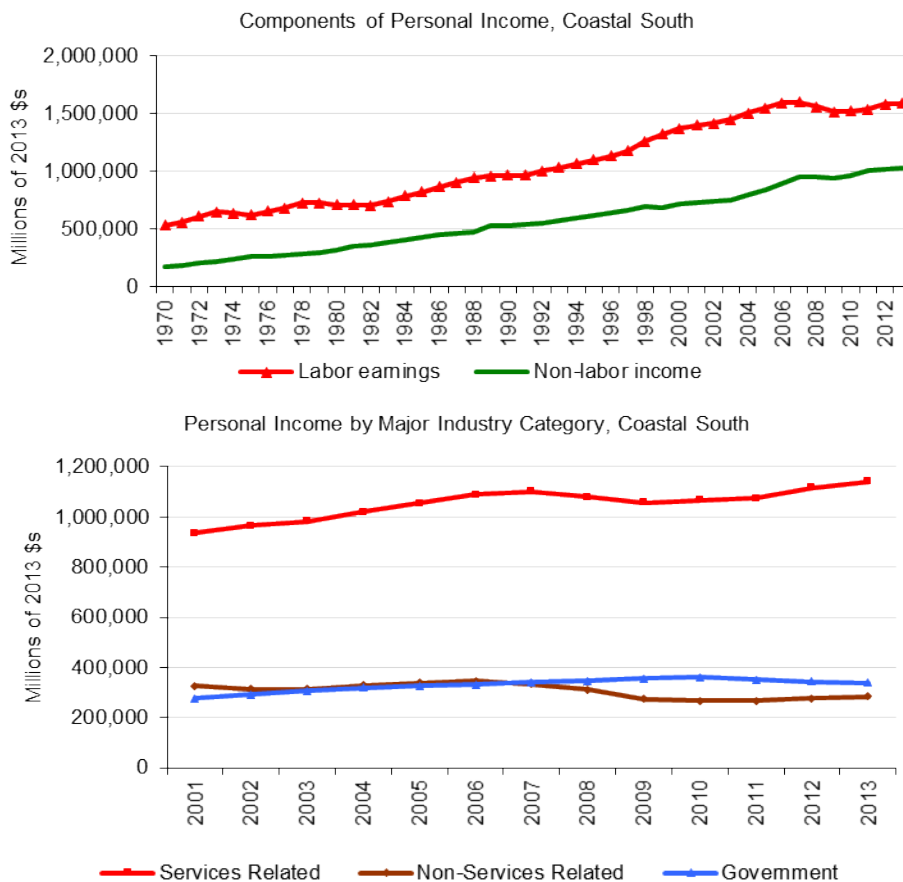
Moreover, and because ecosystem services are important to people, they are also quite valuable economically. In a recent study from coastal Georgia, for example, Schmidt, Moore and Alber (2014) found that the non-timber value of forests, such as from water filtration, carbon sequestration, nutrient cycling and protection from storms, greatly exceed the value of the timber. By comparing those ecosystem service values to the value of timber harvested to feed pellet mills, we might well conclude that such harvest is as economically detrimental as it is ecologically damaging.

Broader Economic Consequences

Changes in ecosystem services flows raise the specter of a third major unintended effect of expanded pellet-fuel manufacturing. These vital services include flows of clean water, opportunities for nature-based outdoor recreation, maintenance of local temperature within favorable ranges, protection from extreme weather events and others. All of these support diverse economic and culturally important activity ranging from hunting, fishing and birding, to food and beverage production that depends on clean water, to myriad decisions about where to live, work, do business or retire. Owing to its warm climate, mix of scenic and recreational amenities and other factors, the US South has long been a favored location for retirees and businesses of all sorts who could just as well locate elsewhere.

² Improved harvest and other land management practices, whether accomplished through local regulation or third-party certification and labelling, could change the economics of biomass production and, at least at the margin, limit the scale of conversion to shorter rotations and whole-tree harvesting (Abt et al. 2014).

As important as the forest products industry remains in the region, the most rapidly growing sources of jobs and income have to do with investment income and transfer payments, including Social Security and Medicare payments received by or on behalf of retirees, and with jobs in service-related industries, such as healthcare, finance, education and real estate (BEA 2015; Headwaters Economics 2015). There has also been a rapid increase in the number of sole proprietors, whose income has increased by nearly 20 percent since 1970. Income from wage and salary employment, by contrast, has fallen by more than 3 percent (BEA 2015; Headwaters Economics 2015).



These trends are consistent with the now-established “supply-side” understanding of rural development that is commonly summarized this way: people follow amenities; and jobs follow people (Florida 2000). McGranahan, Wojan and Lambert (2010), among others, find that rural areas do best when they have a combination of a high proportion of creative class workers, a rich entrepreneurial context and high quality outdoor amenities like an abundance of conserved natural areas and the clean air, clear water and recreational opportunities such lands provide.

If the extent (see Figure 2) and intensity of industrial forestry in service of the export pellet market changes, or is even perceived to change, the availability of scenic and recreational amenities, air and water quality or ecosystem services in general, the desirability of the coastal South region as a location for long-term investment by individuals – not to mention by the companies who need individuals to work for them – would decline. Just as the coastal South could lose some of its remaining competitive advantage as a place to grow and process sawtimber and pulpwood, it could lose some of its advantages as a desirable business or residential locale.

Figure 3. In the US coastal South, non-labor income, such as retirement income and earnings from personal investments, has grown steadily for the past 33 years from about one quarter of total personal income in 1970 to more than two fifths today. Within the labor income category, meanwhile, service-related industries have been the source of most growth. Both of these trends illustrate the attractiveness of the region to retirees and diverse industries.

SUBSIDIES MAKE MATTERS WORSE

Government programs that alter prices faced by consumers or the costs faced by producers always distort behavior in some way. Indeed, that is entirely the point: the EU *wants* electric utilities to produce more power from renewable fuels than they otherwise would, and it is trying to achieve that desire by offering “feed-in tariffs” and “feed-in premiums” to the utilities estimated to be worth approximately €8 billion (\$8.5 billion) (Carlos Calvo Ambel 2015). The effect of these is that utilities are paid more for a KWH produced from the combustion of biomass than for a KWH produced from the combustion of fossil fuels.³ The overall and, again, *intended* result is an increase in the demand for wood pellets above and beyond what that demand “should” be, if prices were free to fluctuate according to the interplay of actual supply and demand in the global market for wood pellets.

³ Electricity consumption is clearly not the target of such programs, because the programs do not change the prices faced by consumers.

Artificially high demand for wood pellets pushes up the price faced by wood pellet manufacturers, and that artificially high price is what is driving the rapid expansion of wood pellet manufacturing in the coastal US South. The artificially high demand for wood pellets in Europe translates into an artificially high investment in plants, equipment and shipping capacity to meet that demand.



Enviva pellet mill in Ahoskie, North Carolina received \$1.5 million in local subsidies from Hertford County and the town of Ahoskie (Bryant 2010). Photo: Dogwood Alliance

Making matters worse, state and local governments in the US are introducing their own market distortions in the form of grants to the wood pellet manufacturers, government-sponsored training for employees, property tax abatement, provision of roads and other infrastructure and other inducements to either build a plant in the first place or to site the plant in one locality versus another. One plant in Southampton County, Virginia, for example, received \$300,000 in the form of one grant from the Commonwealth, plus unspecified amounts in the form of subsidized recruitment and job training assistance, funds from a community development block grant and a Virginia Port Tax Credit (Caldwell, West, and Woodworth 2011).

Faced with the dual incentive of artificially high prices for their product and artificially low costs of producing it, pellet manufacturers are making decisions that result in too much investment in these facilities. Two things will inevitably happen. First, both private and public investment will be diverted away from enterprises and/or economic development opportunities that could, in an undistorted market, produce higher returns or greater public benefit. Investments in solid wood manufacturing, for example, could produce more jobs, or cost-sharing for rigorous forest certification programs such as FSC could sustain higher productivity of diverse ecosystem services that would, in turn, attract other investment in the region.

The second inevitable outcome is that when European subsidies for wood pellets end in 2027, the boom in pellet manufacturing in the US will turn to a bust (Evans 2015). At that time, excess capacity including plants and workers will be idled, and the region will be left with unneeded factories, lost jobs and degraded forest ecosystems.

The bottom line is that, left to their own devices and operating in a market free of distortionary subsidies, European power generators would demand far less fuel in the form of biomass pellets. And in the US, forest landowners and forest products manufacturers would allocate less (perhaps almost no) land and other capital to the production of biomass pellets. They would instead direct those investments toward traditional forest products manufacturing or other enterprises where the market, and not shifts in European energy policy, provide the incentive. That does not mean that things would never change in the forest products sector or the larger economy of the Coastal US South, but it does suggest that those changes will be more manageable and that resources will not be wasted in the process.

Now, to be clear, public subsidies *can* sometimes provide a net public benefit, and we do not doubt that such is the intention in this case. That is, the incentives built into the EU's Renewable Energy Directive and Emission Trading Scheme are designed to counteract a different market problem: the failure of market prices to reflect the external environmental cost of greenhouse gas emissions from the combustion of fossil fuels. A subsidy in the EU to burn biomass instead of coal might therefore be justified as a way of replacing a larger inefficiency with a smaller one. That justification falls apart, however, if the net impact on GHG emissions is small and/or the remedy spawns its own set of external costs and market distortions, such as those outlined above.

CONCLUSION

We do not wish to overstate the case: these individual cautions are primarily about marginal or incremental, rather than wholesale, changes in forest productivity, availability of ecosystem services and economic opportunity in a range of sectors. Taken together however, they raise the specter of significant downside risk. Meanwhile, the intended benefits in the form of net reductions in greenhouse gas emissions would pale in comparison to the cumulative costs. Under some plausible scenarios, the benefits would themselves be negative – that is they would add to, rather than redeem, the societal costs.

Economic efficiency, not to mention good government and common sense, require that the benefits of public actions, such as easing regulations or spending taxpayer funds on subsidies to select industries, be weighed against the costs. This is especially true when such actions tend to bestow benefits on private firms while imposing costs on members of the public.

Production from local resources for local needs is the most rational way of economic life, while dependence on imports from afar and the consequent need to produce for export...is highly uneconomic and justifiable only in exceptional cases and on a small scale. — E.F. Schumacher

Further research is necessary to determine just how far from producing a net public benefit various efforts on both sides of the Atlantic to artificially increase demand for and supply of biomass pellets from the US Coastal South might be. Based on the evidence to date, there appears to be sufficient reason to halt future inducements that hasten the degradation of any more of the South's forests due to pellet industry expansion, or that sap any more of the region's economic vitality in favor of turning the region (back) into a resource colony.

Dogwood Alliance is a coalition of grassroots activists dedicated to defending the unique forests of the Southern United States. We have already transformed the paper and pulp buying practices of some of the largest corporations on the planet, and we're just getting started.



www.dogwoodalliance.org

Spencer Phillips, PhD, is a natural resource economist with 25 years' experience helping people, communities and institutions move, as Aldo Leopold wrote, the "key-log" of incomplete economic thinking that prevents ethical and efficient relationships with the land community.



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