

The Role of Forestry  
in the Present  
War  
by  
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Introduction:

In an emergency such as we are experiencing these days it is rather comforting to know that this country has a good supply of one vital material with which to replace in many ways other raw materials which are not so abundant. This material is unique in that it is not mined from the earth as is the larger part of our raw materials, but it is grown from that earth and can therefore be replaced by merely planting trees and putting into practice certain sound forestry principles. Oil and the minerals, once they are removed from the ground cannot be regrown or replaced.

Modern research and the development of improved timber techniques are responsible for the increased use of wood in jobs which formerly required costlier and scarcer materials, and now these materials can be put to work in the construction of fighting tools. For example, with the use of wood for construction in some 120,000 freight cars scheduled for 1942, thousands of tons of steel can be diverted to the manufacture of munitions.

"Metals, chemicals, oils, and dozens of other raw materials, of course, each fill important war needs, but it appears safe to say that no other material fulfills so great a number of wartime requirements as does wood.



As one German newspaper puts it, 'to be without wood in time of war is almost as bad as being without bread.'" (8)

And so the saws in our mills move to the front with the tanks, planes, and guns. The writing of this thesis is an effort to determine the value of forestry and its product, wood, in the present emergency in which we find our own country now playing a leading role. How does forestry fit into the war effort? What are the uses that wood may be put to to help win the war?

### History:

Everyone is familiar with the famous wooden horse of Troy. . . .

There is a saying in England that the ships and therefore the victory of Nelson was made possible by the tree planting of John Evelyn in the seventeenth century. (8)

In this country we have had evidences of the importance of forests in war from an early date. While this country was still under English rule many of the white pines of New England were picked out for use of the Royal English Navy.

John Quincy Adams became known as the "tree planting president." In 1826 he established the first timber reservation in this country, the sole purpose of which was to grow oak for the sturdy wooden ships used by the American Navy in that day.

In 1917 a request came from France asking for troops to be sent to produce lumber and timber products. The 10th Engineer unit was organized and sailed for that country in September of 1917. This unit was made up of loggers, lumbermen, and foresters. By November, 1918 there were eighty-four going sawmills in that country, all run by Americans and producing two million feet of lumber and round products daily.

"While the forest engineers were cutting French forests, American foresters--state and federal foresters and research foresters--were no less busy at home helping to win a war to which we wistfully referred as 'a war to save democracy.' The Forest Products Laboratory made real and lasting contributions in many lines in the use of wood. The famous Spruce Division in the Pacific North West--hardly a forestry effort but rather the reverse--while busy felling spruce was busier telling us how spruce would win the War--in the air! We are not yet through with the aftermath of the Spruce Division--out in Lincoln County, Oregon." (6)

#### On the Home Front:

It is essential that this country keep abreast of the wider uses of wood that have been discovered in other countries. In Germany they have put wood in second place in the list of materials essential in warfare. Because of the shortage of food and fuel in that country, they have given attention to the production of sugar and alcohol from wood. They feed raw wood sugar to animals, and with refinement it is fit for humans. They ferment it with yeast and form ethyl alcohol which replaces gasoline.



They also have perfected a wood-gas generator, and their busses and trucks are powered by this means.

The high cost of producing sugars and alcohol from wood makes it impractical at present in this country. But should we run short of the certain materials which do economically produce these products, the method of producing them from wood is known and it can be used here. (9)

In Germany a certain percentage of wood-wool is used in all uniforms.

In this country the use of bark from redwood trees to make a substitute fibre for cloth and other textiles is being considered by the Research Division of the War Production Board.

"Approximately 120,000,000 pounds of synthetic wool could be manufactured annually from the bark of redwood trees, now largely a waste product of lumbering, according to Edric E. Brown of the Pacific Lumber Company, San Francisco." (4) In consulting with the Research Division he said that with a few minor changes in standard textile machinery it can be used to make yarn and felt from a mixture of natural wool and synthetic wool--the new fabric would contain from twenty to fifty per cent synthetic wool.

Among the advantages claimed for bark-wool is that it has a high rating as an insulator of heat and is resistant to fire and rot.

There is a present shortage of sheep's wool due to the stoppage of American imports and from the expanded requirements of the Army and Navy.

With new developments in the plywood industry, this material is now finding many new uses on our home front. By the use of phenolic resin adhesives and the hot plate process, plywood of exterior quality has been developed. These resins will endure as long as the wood itself. In Canada the timber framed Canadian aircraft factory is notable for the use of five-ply Douglas fir weather board as exterior siding. (2)

In Portland, Oregon the administration building of the Oregon Shipbuilding Corporation was erected in a matter of weeks by the intelligent use of plywood as an outside finish. Time schedules on defense housing have been cut in half by the use of plywood.

Also on our home front plywood finds a value in preventing light to escape from windows during periods of blackout. The biggest order for this purpose was the 233,000 square feet purchased to cover the windows of the plant buildings of Boeing Aircraft Company at Seattle, Washington. Another war installation of plywood was that made at Fort Lewis where 40,000 feet of the panels were placed over windows of the mess halls, offices, and utility buildings. Here we find the product of the forest playing a new role in the defense of America. "There already has

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been established a long list of plywood defense uses, including everything from soldiers' lockers to barracks, pontoon bridges to patrol vessels." (3)

Another new use of wood on the home front is being made in England. There in the flatter and less hilly countries, where there is a possibility of enemy aircraft landing they have put numerous posts in the ground. "These posts are some fifteen feet high and about six to twelve inches in diameter and are scattered through the fields in certain districts to the number of two or three and more to the acre." (1) These posts are cut from the local trees. In many cases, especially willow, these posts are sprouting and if left alone will grow into trees and transform almost completely treeless areas into semi forests. The total volume of timber used in making the obstructions for aircraft is about fifteen million cubic feet. (1)

In the event of air raids upon our country the recent research in impregnating wood with fire-retardant chemicals will find practical use in protecting our Navy yards, hangers, and other important buildings from incendiary bombs. A new type of paint, developed by the Forest Products Laboratory, containing borax to prevent the spread of fire is at present being put to use in Canada.

After an air raid much timber is required for the repair of buildings and other structures. "A special concession

has now been made in England to occupants and owners of houses whose premises have been damaged in air raids, whereby they can obtain timber up to the value of \$25.00 on declaring that such timber will only be used to repair such damage." (9)

In the Air:

No place for wood in the air in this metal age? During the last war, wood and plywood were accepted as materials for aircraft. Millions of feet of spruce were taken out to fill the need. Today we need planes in numbers so large that in those days the figures would have been thought to be a product of an overworked imagination. Wood and plywood are still the chief structural materials for training planes. Combat planes though, according to orders, call for metal alloys. Synthetic resin glues unaffected by moisture and the changing of the basic properties of wood and plywood by impregnating it with resin like materials may again make wood the important material for combat planes.

There are many advantages in favor of wood for use in aircraft: the ease with which it can be worked; the ease with which damaged parts can be replaced and repaired; its surface smoothness; its mass production possibilities; its use in relieving the aluminum shortage which is very likely to come. (8)



Outstanding needs in the aircraft industry are for spruce for wing spars and for plywood for fuselages and wings for trainers.

A recent survey by the Forest Products Laboratory has shown widespread interest on the part of the Army, Navy, and aircraft manufacturers, in molding plywood under fluid pressure into skins of acceptable weight that will be secure against the wrinkling and buckling to which metals are subject. These skins or coverings which can be varied from one part of the surface to another in accordance with the strength requirements, will form a shell that has high efficiency both structurally and aerodynamically and will require only light framing members to support it. Although this moulding process is still in the experimental stage, rapid development is expected. If such type of construction were adopted it would greatly lessen the need for wood without defect for spars. (9)

The new synthetic resin treatment offers possibilities that veneer may be employed in making wings, fuselages, and other external parts. This treatment may be applicable to the construction of propellers. "It offers the possibility with low pressures and in one pressing operation of controlling the density as desired from hub to tip and gives practically a moisture-proof nonshrink product." (9)

In the aircraft factories thousands of feet of wood are used in making forms, patterns, and models for testing.

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RAS CONTENT

Undoubtedly many industries are using wood as a substitute for aluminum so that aircraft can protect our country.

On the Land:

As our army increases in size barracks must be built to house it, and only by the use of wood can these be constructed quickly and economically. Besides the barracks there must be canteens, hospitals, theaters, fire departments, recreation halls, post offices, churches, general offices---all of these make up a modern army camp. The furniture alone needed in a camp consisting of 30,000 soldiers is an astounding item, and wood is the logical and quickly available material for this item.

"Last year, 1941, the forest industry met the emergency with its established equipment and manpower. One item alone, the prompt delivery of 2,157,000,000 board feet of lumber to build the cantonments, staggers the imagination---the biggest single carpentry job in American history." (5) Each cantonment calls for around 1,000 car loads of lumber.

The Army Engineers Corps needs a large amount of pontoon lumber. This has to be in planks three to six inches thick and able to withstand the weight of heavy tanks. This stock must be free of every defect and capable of a bending strength of 1,800 pounds per square inch. Douglas fir, kiln dried produces this stock, but kiln drying is difficult with such large planks. However,



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forest research has solved the problem by a chemical anti-checking treatment called urea, and when the Army order came through, mills familiar with this treatment were set to work preparing these big planks. The new treatment fits in with modern wartime needs; it cuts down loss due to checking in large planks from forty-five per cent to one per cent and enables the Army to cross rivers on the finest pontoon bridges ever built. (7)

The food which the soldier eats and the munitions which he needs are supplied him in boxes and crates which originated in the woods.

Thousands of skis are being made for the ski troops of the army. These are of wood bonded with synthetic resin glues--a structural material which was unknown during the last war. (8)

#### On the Sea:

Hundreds of shipyards on our coasts took on renewed activity when the call came for ships and still more ships. For wooden ships the amount of wood required is almost beyond belief, but even ships made of steel require large quantities of wood. A steel battleship requires thousands of feet of lumber for props, staging, platforms, ways, etc. Steel is scarce and wooden ships can carry cargo, transport troops, and tug the big boats into the wharves.

During the next year the Navy will want some twelve million feet of ship decking which must be forty feet in length, close grained, and tough. These orders are being cut from Douglas fir at present in mills on Puget Sound and the Columbia River.

Oregon and Washington are producing timbers 110 feet long, 18 by 10 inches. These are for Navy orders for the keels of two hundred mine sweepers the Navy is building.

At Los Angeles, the California Shipbuilding Company used the patented steel connectors and wood to erect their plant. This building is erected on Douglas fir trusses 116 feet long, and it was put up in the record time of five and one half hours. Wood, used with steel connectors, is releasing thousands of tons of steel which were formerly used in heavy construction. "Every three tons of lumber used saves a ton of steel for Defense. The raw product from which lumber is made is renewable. Iron ore isn't" (7)

#### Wood in Munitions:

Projectiles are not made of wood, but it might be a possibility. Nitrocellulose, the main material used in high explosives, is made from cotton--and wood. Short-fibered cotton linters are processed to produce this vital material, but wood pulp of high purity can fill the bill as well.

Ordinary black powder contains charcoal which is made from our hardwoods. Resin from the southern pines is used to



to fill the spaces between pellets in shrapnel. Turpentine, also from the southern pines, is used in flame throwers. (8)

Contributions by Public Forestry Agencies:

A direct contribution has recently been made to the war effort by the federal Forest Service consisting of about 536,000 acres of national forest land.

1. The whole of the Choctawatchee National Forest in Florida was given to the War Department in June 1940 to be used as a practice bombing range.

2. The Kisatchie Forest in Louisiana will be turned over to the War Department for the training of tank divisions. This comprises an area of 33,000 acres.

3. In California 90,000 acres of the Las Padres Forest has been contributed to furnish room for the training of troops in mountain warfare.

4. Part of the Mark Twain Forest in Missouri--about 20,000 acres of national forest land--will form part of a central training area.

5. A block of 65,000 acres of the DeSoto Forest Unit in Mississippi was turned over to the Army as a training ground.

Other contributions have come from experience and the development of equipment and machinery. For example: the experience gained in parachuting men and equipment in

rough country; the development of photographs while in the air; power driven timber saws; new developments in portable radio; portable water pumpers; mobile flame throwers. These and many other results of the program of forest research are finding direct application in our war effort. (6)

#### Forests in Domestic Economy:

In times such as these the strengthening of our economic fronts is almost as important as the strengthening of our defenses. We have been seeking to unite the Western Hemisphere. Our forest industries and resources have and will continue to play a large part in this effort. For example in the development and use of plywood this country has become expert. Central and South America should be good markets for this product.

"Thus the forest is a storehouse of wealth tremendously important in our defense, both on the military and economic fronts. Those who have critically studied the subject say that what we have left in commercial forest land in this country is enough to meet our future needs. The national issue centers around the assurance that those areas be kept producing usable forest products in reasonable quantities. In other words, looking at it from the defense standpoint we want assurance that we can meet the needs not only of this emergency but of future emergencies. On large areas the cut of trees should be kept in balance with the growth. That is, what foresters call sustained yield. It amounts, in effect, to eating your cake and having it too. In the stress of meeting emergency needs in the last World War measures looking to the preservation of our forest resources, as for example on those lands bearing the much needed spruce for aircraft, did not receive the attention they merited. This should be guarded against now and in the future. Managed as a crop the forest can renew itself and yield its wealth indefinitely." (8)



Conclusion:

Metals are limited and exhaustable resources. Even in airplanes where aluminum and magnesium have replaced spruce and fabrics wood is being used again. Plastic bonded plywood is coming to the rescue of an industry seriously affected by a shortage of light metals. Other modern developments are allowing wood to replace metals in many ways.

A modern army's needs for wood are almost beyond counting. They range all the way from lumber for barracks and heavy timber for bridges to wooden poles for holding up camouflage nets and wooden crates for the safe transport of ammunition. Chemical uses for wood are highly important in warfare and range from nitrating pulp into explosives to the use of wood charcoal in replacing coconut-shell charcoal in the canisters of gas masks.

With more than half of its production already going into defense and war needs it is likely that still greater demands will be placed upon the only material which can be substituted for steel besides performing a thousand and one functions of its own.

"Thus in the defense of America, our forest resources are playing a vital role. They have in this time of need placed at the disposal of the nation an abundance of forest products and with proper management will in future emergencies again stand ready to render all-out aid in the preservation of democracy in the United States of America."

(8)

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