

Fortunes In Our Forests

The Forest Primeval Is Being Rediscovered in Arkansas. A New and Bigger Start Is Being Made Toward Rehabilitation and Protection for the Support of a Better Balanced Economy.

March 3-1935 By C. E. RANDALL

Arkansas is rediscovering its forests. For a century they have been taken as a matter of course. The sense of human responsibility for preservation and improvement of the woods as a permanent and continuing resource is a development only of recent years, but it has gained strength in Arkansas as the people have had to meet problems raised by economic depression which struck a severe blow at a forest crop and companion industry whose value to the state in 1923 was placed at \$73,000,000.

Now, with the cooperation of the United States government, a start is being made toward their protection and rehabilitation for the support of a better-balanced economy. The Forest Service of the United States Department of Agriculture and co-operating agencies are spending millions on the job. The "pinneries" that made Arkansas famous a generation ago are in prospect of being put in order to produce new crops of timber.

Meaning of New Program.

The new forest economy will be based upon permanence, upon "sustained yield." It will mean stable industries and sound communities built around a growing and continuing resource instead of a dwindling resource. It will mean that the forests can be looked to permanently for their full measure of service not only in the protection of watersheds, in provisions of recreational opportunities, in harboring wildlife, but in the permanent support of a substantial share of the state's population.

The people of Arkansas have reared the structure of their commonwealth upon the natural resources of soil and timber. They built rapidly and sometimes prodigally in the conviction that these resources were inexhaustible. This erroneous view was easily acquired in the face of the necessity of clearing large areas for tillable farms and in the presence of a timber stand of about 300,000,000,000 board feet—sufficient to have supplied the needs of the entire United States for a number of its most prosperous years.

Most of Land Once Forest.

When Hernando de Soto crossed the Mississippi in 1541, he was confronted by practically unbroken forests which covered about 95 per cent of the area of what is now the state of Arkansas. Indians lived and held almost undisputed sway in these woods for more than two centuries after the first European explorer gave his life in search for a wealthy kingdom.

It was not until after the Louisiana Purchase in 1803 that heavy tides of immigration from states further east poured into the forests and began to utilize the true wealth of woods and soil. Exploitation unfortunately took little heed of wasting soil and young growth. Habits of burning the woods to get them out of the way or for



—Photo by U. S. Forest Service.

Maintaining the natural beauty of Arkansas forests is one of the phases of Forestry Service work. This is a scene at Little Falls, in the Ouachita National Forest, one of the most inspiring scenes in the state.

the fancied purpose of getting rid of vermin took hold among settlers and farmers. Timber and soils declined. In the present century many men who looked to lumbering or a combination of forest work and farming to earn a good living found resources and opportunities on the wane or in many places lacking altogether.

As long as there were new lands to conquer and extensive new forests to cut, the American people took little thought of conservation. This state of indifference has been a relic of pioneer days in farming and industry. It required the pinch of shortage to smash the myth of inexhaustibility. When local yields declined and when forested states had to pay freight charges on lumber from distant states, it was high time for the introduction of management that would improve and maintain the yields of local and regional forests.

National Forests Founded.

A beginning was made with the founding of national forests and placing them under United States Forest Service direction about 30 years ago. Two of these national forests are in Arkansas. The Ouachita National Forest covers much of the area of the Ouachita mountains stretching from the Oklahoma line into Central Arkansas. It is a large rugged area partly settled more than 100 years ago. President Theodore Roosevelt in 1907 proclaimed portions of unreserved and unappropriated public lands in this area a national forest. From time to time additions have been made to the forest through purchases of lands by the government. The Ouachita is primarily a shortleaf pine forest, with some stands mixed with hardwoods. It is estimated by the Forest Service that 22,000,000 board feet of lumber could now be

cut from the area annually without depleting the supply.

Settlement of the Ozark highlands in the northwest part of the state also began about a century ago. But much of the land, either too rough or too remote from roads, was left in the public domain. In 1908, President Roosevelt created the Ozark National Forest and dedicated it to perpetual public service.

Headquarters for the two national forests were set up at Hot Springs and Russellville. Measures of fire protection, road building, stand improvement, timber sales and logging methods that maintained the growth of the forest, managed grazing and game protection were introduced. Campsites and other facilities were developed for public recreation.

Serve Many Purposes.

The system under which the Forest Service manages these forests is that of multiple use. Watershed protection, recreation, game and fish management, timber protection, and other uses are co-ordinated and a given area is devoted to the use or combination of uses to which it is best suited. The national forest thus serves many needs. "The greatest good to the greatest number of people" has been the guiding principle of the Forest Service from the beginning.

Wild game abounds in many sections of the Ozark and Ouachita Forests where it has sufficient cover. Ranger counts in 1933 gave the number of deer in the two national forests at 2,500. There are also many furbearers and small wild game, and a few bears are reported on the Ouachita.

The Forest Service last year planted over 43,000 fish, mostly bass and trout in the streams and lakes in the national for-

ests. The Forest Service co-operates with the state Game and Fish Commission in the protection of game and enforcement of the law, forest officers serving also as deputy state game wardens.

Livestock grazing is permitted in the national forests in the more open stands where there is a plentiful growth of grasses and other plants palatable to livestock. In 1933, counting pay and exempt livestock, 3,756 head of cattle and horses, a few sheep, and many droves of hogs were grazed. The Forest Service encourages improvement of the herds and prevention of diseases of livestock.

It is noteworthy that \$1,215,810 or 85 per cent of last year's regular and emergency expenditures for national forest purposes, were classed as investment expenditures. These were largely for new roads, trails, bridges,

fire breaks, telephone lines, permanent buildings, land purchases and tree planting. An additional sum of \$112,663 was used for forest highway construction, in co-operation with the Bureau of Public Roads. The cost of protecting the Ouachita and Ozark National Forests from fires was \$24,664, and the maintenance of improvements \$42,120. Current operating expenses on the national forests were \$22,701.

Value of Products.

Receipts from timber sales in the two national forests and for grazing and special uses of federal lands amounted to \$123,619 last year. Of this amount, one-fourth, or \$30,904 was remitted to counties containing national forest land to be used for schools and roads. This return is made in lieu of taxes that might have been collected had the land been under solvent private ownership. An additional 10 per cent of receipts, amounting to \$12,361 last year, is expended annually by the Forest Service for construction of national forest roads within the counties embraced in the national forests. These direct and indirect remittances, together amounting to 35 per cent, represent a substantial return to the communities.

Forestry Nursery.

Production capacity of the United States Forest Service nursery at Russellville was increased this year from 1,600,000 to more than 2,500,000 young trees annually. The nursery is on the Arkansas Tech grounds. The seed extraction plant also took care of quantities of cones collected from pines in Arkansas and other states. Trees grown in the Forest Service nursery are used for reforesting portions of the national forests, particularly for planting old field sites suited to growing pine.

Another event of the year was the creation of the Sylamore experimental forest of 2,500 acres for research in forestry on

(Continued on Page 4)

(Continued from Page 1.)

the Ozark plateau. Here Forest Service experts will carry on continuous studies of the forestry and land-use problems typical of the Ozark and central Mississippi forest region.

Federal Money for Arkansas.

The year 1934 saw great increases in federal funds available for rehabilitation and improvement on lands of Arkansas. Besides purchasing new acreages for the two national forests, and keeping up the usual constructive work for protection, improvement and administration, the government allocated Civilian Conservation Camps to Arkansas and hired many emergency workers. The United States Forest Service, in co-operation with other federal and state agencies has superintended the work, which continues in 1935.

Arkansas had a quota of 20 CCC camps, with 4,000 men, and as many as 39 camps with 7,000 to 8,000 men were in operation some of the time. Twenty-nine to 34 camps were under supervision of the Forest Service. Hundreds of experienced foresters, superintendents, foremen and local woodsmen were employed. The enrollees, in addition to their food, housing and other care, received \$30 per month in cash, about five-sixths of which was remitted by the government directly to families, keeping them off the local relief rolls, and others were helped sufficiently to maintain their home life. PWA workers were also employed under supervision of the Forest Service, building roads, fire defenses and improvements in the forests.

By last September, the CCC camps under Forest Service supervision in Arkansas had already constructed 819 miles of telephone lines and had maintained 2,800 miles more. They had built 340 miles of firebreaks and 1,891 miles of truck trails for protection of the woods against fires. Nearly 1,000 bridges were constructed. Over 254,000 acres of timber stands had received improvement cuttings. Snags and other fire hazards had been removed from 5,700 acres. Lesser jobs included the planting of 30,000 fish in the streams and lakes and the collection of thousands of bushels of pine cones for seed extraction at the new Forest Service plant. Some 600-man-days of labor were put into the erection of a dam for a recreational center in the Ouachita forest.

CCC work, like other work under Forest Service direction has been aimed largely toward protection and development of the state's timber resources. Defenses against forest fires have been strengthened on federal and state lands, and on private lands where their construction was warranted in the public interest. Recreational facilities have been improved in the national forests and landscaping work completed about locations of recreational and inspirational value.

Along with the administration of the national forests, Forest Service officials have co-operated with other agencies in

the effort to extend to the people of Arkansas information and aid in forestry methods which would save the forests and at the same time improve and keep them in condition to produce new crops of timber. Some outstanding private concerns have long since adopted methods of using the forests without lowering their productive capacity. Need of future supplies of timber to maintain their business have led them to provide careful protection of young and old stands. Hundreds of owners of forests and farm woodlands have adopted their methods. But large areas of now unproductive forest land still need such management.

Measured in production and dollars and cents, the lumber business of Arkansas has been a large factor in the state's economy. The state ranked fifth in the United States

lumber cut fell to 960,000,000 board feet in 1930 and to 276,000,000 in 1932 when only 250 mills were running.

This story of exploitation without thought of the future, followed by declining industry and impoverished communities as the virgin timber supplies disappeared, has been enacted in many states. Fortunately for Arkansas, it did not go as far as in some other states, and Arkansas has large areas of potentially productive forest land that can readily be brought back to production under proper protection and management. The forest products industries of the future can be built upon a permanent foundation, adjusted to the sustained productive capacity of the land. Communities dependent upon the forest industries can then look to stability and sound development.

The state is playing a part in forest rehabilitation. Thanks to new legislation, popular subscription, and co-operation of officials and other citizens, the state Forestry Department now has nearly 4,000,000 acres of privately-owned lands under some degree of fire protection. More than \$80,000 has been raised for support of forestry activities in the fiscal year 1935 and state, private and federal activities for the protection and improvement of forest lands for greater community service are highly co-ordinated.

The forestry problem comes home to every community in Arkansas, where practically two-thirds the state's area remains in forest or cut-over lands. As every county in the state has one-third or more of its area in some form of woodlands, every county has to consider its forests in re-



—Photo by U. S. Forest Service.

Building a bridge on Gladstone road in the Ouachita National Forest.

as a lumber producer in 1910. In 1928 it ranked eighth. Commercial lumber production rose from a value of \$123,000 in 1850 to nearly \$2,000,000 in 1880 and over \$8,000,000 in 1900, when mills numbered 1,142, and the cut was 1,623,000,000 board feet. By 1909 the cut passed 2,000,000,000 board feet and there were 2,060 mills. In 1923 the value of all timber and timber products were estimated at \$73,000,000 for the year. About 50,000 men were employed, or two-thirds of the industrially employed in the state.

In 1929, however, production had already dropped one-third, although this was the peak of the post-war boom. The value of timber and manufactured products had dropped to \$50,000,000. The lum-

This social value of the forests is now so well recognized in Arkansas that a popular subscription last year raised several thousand dollars for support of the state Forestry Department.

Under the Clarke-McNary forest law, the Forest Service is aiding Arkansas in extending co-operative fire protection to state and private lands. The amounts contributed by the federal Forest Service have gradually increased as the state and private land owners have extended protection. There has also been an increase in forest educational activities in co-operation with state and extension service agencies. A total of \$19,000 of federal funds was used for fire protection on state and private lands and for forestry extension last year.

shaping its economy, sustaining its social life, and in meeting its taxation and educational problem.

Not more than one-tenth of the remaining forests are virgin. Practically all the forests in populous counties have been treated badly. Yet so great is the vitality of the Arkansas woods that under far-seeing management, they assuredly can be made to come back. Arkansas has an unusually productive forest soil and climate. Only a start has been made toward retrieving their early richness. But now that the forests have been appraised once more, this time at their social value, we can look forward with confidence in their future development and administration for the welfare of the people.

Commission's Work Summarized.

Summarizing the work of the state Forestry Commission during the first year of its organization, June 1, 1933, to June 1, 1934, the report lists:

1. Built up under intensive protection 2,484,208 acres of forest land.
2. Established eight active protection units involving 49 employees.
3. Secured 542 agreements for forest protection.
4. Took over eight observation towers, purchased one and obtained (15) from ECW making a total of 24. Obtained and constructed 23 three-room cabins from the ECW. Constructed 562 miles of telephone line by ECW.
5. Suppressed 1,596 fires which burned 52,196 acres causing estimated damage of \$58,664.32.
6. Established a co-operative arrangement for fire protection with the Ouachita National Forest for lands adjoining and with the Louisiana Department of Conservation.
7. Secured a motion picture truck fully equipped for sound pictures. Seventy-four meetings were held for 13,292 persons.
8. Printed and distributed materials for educational purposes.
9. Established a bi-weekly news service.
11. Worked out the organization for complete fire protection in the state and laid the groundwork for the establishment of two new units in north Arkansas.

FORESTRY WORK'S BENEFIT DESCRIBED

Planning Board Hopes for Eventual Complete State-Wide Protection.

May 19, 1935

Expansion of present forest protection policies in Arkansas as rapidly as economic conditions warrant with complete state-wide forest protection as the ultimate goal is recommended in the chapter on forestry of the Second Planning Report submitted to Governor Futrell by the state Planning Board April 17. Roy W. Spence, secretary of the board, revealed yesterday. The chapter was compiled under direction of Earl O. Mills, federal consultant to the Planning Board.

Recommendations include:

Continuation of present forest protection policies.

Development of an educational program, especially among children in the schools, to bring about a public forest consciousness.

Suggestions that public schools include courses in relation to the program.

That the state's agricultural schools be required to have several courses in forestry.

Forests Sadly Depleted.

The report says that not less than 32,000,000 of the state's area of 33,616,000 acres were originally forests. Forests now have been reduced to 22,000,000 acres of which fully 20,000,000 have been cut over.

"The passing of large-scale lumber operations, followed by a material shrinkage in taxable values has necessitated placing heavier tax burdens on other property since revenue must be obtained for various public activities," says the report. "Haphazard agricultural settlements motivated largely by selfish desire of previous owners to dispose of their property has resulted in damage to forest land without any compensating success in agriculture for settlers. "Persons looking for land in the past have rushed in without consideration of agricultural or other value of the land, or the cost of bringing it into production. The state sold much of its cut-over land to settlers for farms although the land was not suited for agriculture.

"Some of this land not needed or not suited for agricultural or other uses is well suited for forestry.

"In terms of interest earned, direct results from expenditures on reforestation may be rather small. These direct returns will come from sale of logs, for lumber, pulp, poles, ties and other uses. However, other indirect returns are not to be ignored.

"By putting lands not suitable for agriculture into forests the state can save many prospective settlers from wasting their lives in futile effort to make successful farms out of unproductive areas. The state can stabilize economic life of the cities and villages in the area and give some hope of rebuilding small wood-working plants in the future. It can protect public waters and game resources. It can save itself large sums which otherwise would be spent in state aid and public relief for scattered settlers and their schools and roads."

State Nursery Established.

By June 30 Arkansas will have a state nursery at Conway fully equipped for production of tree seedlings for distribution to farmers without cost to the state, the report says. A total of 3,000,000 black locust seedlings were planted at Conway through funds totaling \$10,000 obtained from the Soil Erosion Service of the Department of Interior. These trees will serve as a check to soil erosion and will be durable when harvested for use as fence posts.

CCC Work Valuable.

The report says: "By far the greatest impetus to forestry and a creation of a forest consciousness among the American public has been brought about by the Emergency Conservation Corps Works program." The report values property and physical improvements from the CCC program at more than \$950,000 up to June 30, 1934, in construction of telephone lines, steel look-out towers, forest truck trails, culverts, bridges, wells, and dams and labor given in reducing fire hazards and fighting forest fires.

Ouachita Forest to Be Summer Playground

LANDS SET ASIDE FOR FOREST USES

Governor's Action Makes Forfeited Acreage Available for Exchange With U. S.

Governor Futrell issued a proclamation yesterday setting aside thousands of acres of tax-delinquent land within the Ouachita National Forest area as state forests to be exchanged later for land outside the forest area.

The action was taken under authority of Act 57 of 1935, which authorized tax-forfeited lands to be designated by the governor as state forest areas, and to be exchanged for lands purchased by the federal government outside national forest areas.

Under the system, the federal government will purchase submarginal timber and waste lands outside of national forest from private owners and exchange such lands for acreage owned by the state within the forests.

The proclamation issued yesterday, prepared from data furnished by the state Forestry Commission, includes all tax-forfeited land in the Ouachita National Forest area within Polk, Montgomery, Yell, Perry, Saline and Garland counties.

The acreage and number of tracts cannot be determined until state land records are checked and surveys made in some cases.

Act 57 became effective soon after the legislature adjourned, but its operation was withheld by a temporary land redemption act which will expire today.

The state land commissioner's office was crowded yesterday by delinquent property owners and others who sought to redeem property under the emergency act upon payment of the taxes and penalties for the year the land first became delinquent plus one year's tax without penalty.



Work being done as a part of the government's five-year development program in the Ouachita National Forest is clearly demonstrated above. This picture, taken along North Fork Creek, shows the Gladstone development road, cut through a heavily wooded section. Such roads as these have been constructed in order that visitors to the forest might penetrate as far as possible into the primitive area.

Five-Year Development Program to Convert Government Reservation Into Vacationists' Paradise

Oct 27, 1935

By K. J. RUSH.

Hot Springs—A five-year development plan designed to convert large areas of virgin timbered forest lands into a virtual vacationist's paradise, is underway in the Ouachita National Forest.

Ever increasing use of this forest as a playground, like others in the far-flung national forest system, has brought about the task of developing, for the out-of-doors lovers, a system of camp grounds, scenic roads, trails and other recreational facilities.

To the job, Uncle Sam has assigned men trained for this particular phase of work, which, in the past few years, has made rapid strides.

The policy of the forest is to put each parcel of land to its highest use—the use that benefits the greatest number of persons.

And, while the primary purpose is the growing of timber, officials point out that incidental to the growing of the timber crop, which takes in the neighborhood of 150 years, the forest may be used as a playground.

60,000 Visit Forest.

Statistical reports show that approximately 60,000 persons annually take advantage of the facilities for recreation on the Ouachita forest.

During 1934 there were 26,683 campers; 5,633 picnickers; 6,757 hunters; 5,500 fishermen; 3,000 motorists, and other activities, 11,654.

Estimated time spent by each person in the forest was one day. An additional 117,000 persons passed through the Ouachitas on travel routes.

A far-sighted policy has been adopted in the development of the recreational resources with much thought being given to such improvements as the camp grounds,

lakes, summer home sites, and the roads and trails over the approximately 1,500,000 acres embraced in the Ouachita, lying in Arkansas and Oklahoma.

The hordes of vacationists who spent much of their leisure time in the forest last year is ample proof of the popularity of such a plan, officials in charge of the program declare.

To date there have been constructed in the forest six camp grounds. Nine more are in the process of building and many others are contemplated during the five-year development period.

In addition, dams are being built at each of the camp grounds with the view of impounding water for lovers of aquatic sports.

A bulletin board is posted at each of the grounds, setting forth rules and regulations and also a rough map of roads leading to and from the camp and connecting with the main arteries of travel.

The government only requires that those taking advantage of the facilities abide by the rules and regulations and register their presence.

To Build Foot Trails.

Where the raucous voice of the automobile horn and other noises of civilization cannot encroach, there will be built approximately 200 miles of foot trails leading into primitive regions and scenes of rugged forest beauty.

No effort will be made here to modernize the country and no artificial development of any sort will be attempted in these stretches of solitude where the lover of the great outdoors can pack his or her kit bag and hike to their heart's content.

Only in the most remote and isolated areas will the new system of

trails be constructed. There will be no automobile roads and the vacationist will be able, if he wishes, to find seclusion away from the hum and bustle of modern civilization.

Approximately 1,400 miles of road, winding like a ribbon throughout the forest, affords the vacationist access at all times to recreational locations.

When the present construction of roads is finished, there will be a total of about 2,000 miles, much of it surfaced. But that will not end the work as the roads will be constantly maintained by forest road crews, given better drainage and more bridges built.

Any point in the Ouachita forest is now accessible by a fairly good road.

Scenic towers will be built at strategic locations to afford vistas of the forest clad hills, steep, jagged cliffs, rugged gorges and high peaks that form an unforgettable picture for the traveler.

Sanctuaries for wild game embrace nearly 40,000 acres in the Ouachita. By presidential proclamation, four game refuges have been established and will be stocked with deer, wild turkey and other game.

Also streams in the refuges will be annually supplied with desirable species of fish. Since the areas were set aside for the sole purpose of game propagation no hunting or fishing is allowed within the boundaries.

To Re-stock Other Areas.

Sites for the refuges were selected principally because the areas in which they are located abound with the various species of game. The overflows from the areas will eventually restock the depleted surrounding non-protected areas, thus

assuring a continuous supply of game for the sportsman.

Stream improvement work has been done mainly within the limits of the game refuges with the view of utilizing the waters in maintaining the maximum of fish population and for propagation. One hundred and fifty small dams to help regulate stream flow have been constructed.

All natural springs on the forest are being developed to protect them from surface waters.

Eventually the development of the summer home site phase of the recreational plan will assume great

importance, but this part of the program, because of many issues involved, is being brought along slowly.

There will be certain areas set aside on the forest where summer home sites will be leased by the government, contingent upon the acceptance of sanitation requirements, building restrictions and other regulations. An annual rental will be charged.

At the present time three or four areas especially adaptable to summer homesite development are under consideration. One of these is

now under construction. It is located on the upper end of Lake Hamilton, about 13 miles west of Hot Springs. Specifications call for the construction of 18 log cabins of four rooms each.

There will be a complete water system and many other modern conveniences and facilities.

While funds for the others have been allocated and their construction approved, work has been held up because the money has not yet been made available.

Enrollees in the Civilian Conservation Corps in the Ouachita have

been playing a big role in the development plan, with much of the work already done due to their labor. There are 16 CCC camps in the forest, 13 in Arkansas and three in Oklahoma.

Directly in charge of the development plan for the Ouachita is Z. B. Byrd, a specialist in forest recreational activities, with headquarters in Hot Springs at the U. S. National Forest office.

Working under Mr. Byrd are Harry S. Clark, landscape architect; A. D. Holloway, stream improvement supervisor, and Fred L. Joy, junior forester.

Camp Sites Listed.

A list of camp grounds and facilities afforded follows:

Bard Springs camp ground, Polk county; two swimming pools built from dams; overnight shelters, picnic shelters.

Mine Creek camp ground, Polk county; lake and other development.

Albert Pike camp ground, Montgomery county; Little Missouri river; probable summer home site and below primitive area for trails.

Crystal camp ground, Montgomery county; lake under construction and all facilities.

Knoppers Ford camp ground, Scott county; on Sugar creek, has all modern conveniences.

Sugar Creek camp ground, Scott county; natural lake and all facilities.

Iron Springs, Saline county; dam under construction, practically complete.

South Fourche camp ground, on No. 7 highway, Perry county; natural lake, all developments.

Camps now under construction are:

Ouachita camp ground, Lake Hamilton, Garland county; probable summer home site, playground with tennis courts, baseball grounds, community center.

Walnut camp ground, highway 270, beyond Crystal Springs, Garland; all developments.

Charlton camp ground — named for old supervisor—on 270 near Mt. Ida, Garland county; public camp ground, lake.

Camp Wilder, Brushy Creek, Polk county; lake and camp grounds.

Saline Dam camp ground, Polk county; 25 acres to be flooded for lake, summer home sites.

PROTECTION

FORESTRY AREAS
HELD ESSENTIAL

Gazette 11-15-36

Board Offers Rec-
ommendations.

11-15-36

Any land utilization program adopted by Arkansas should have as its primary purpose statewide protection and development of forest areas, the Arkansas Planning Board said in the second chapter of its annual report released yesterday.

Reviewing the economic, social and industrial features of the forestry question, the board outlined an 11-point program design to rehabilitate and develop forests and forestry products in the state.

The board reported that Arkansas ranks third among the Southern states in total number of acres in forests. The 22,000,000 acres of forest land in Arkansas is exceeded only by Florida and Georgia, but all except 2,000,000 of that huge area is cutover land.

Utilizing Some Acreage.

This transition from virgin forests to cutover woodland in a comparatively few years means that the state must produce its forests of the future from approximately the same acreage from which the most valuable timber has been removed. This situation will make it necessary to treat forest development as a long range crop, since much of the cutover land is not suitable for profitable farming.

The board said many families have settled upon land which did not yield a good living, even in prosperous times, because income from timber products, sold to supplement farm income, was uncertain. Housing conditions in these areas are poor, schools and trading centers far apart, necessitating travel for long distances over little used roads to attend church services and community

to the state, the report said, because farms would be concentrated in the more suitable areas, giving farmers a better prospect for success, allowing the state to protect its public waters and conserve its game resources, and reducing the cost of maintaining roads and schools. Such a reforestation plan would help raise the standards of living throughout the state, the report said.

Board's Recommendations.

The board recommended that:

1. Present forest protection be continued and expanded as rapidly as economic conditions will permit, with a view towards state-wide forest protection at the earliest possible date.
2. Relief from excessive drainage and levee taxes, particularly in the alluvial plain, be provided.
3. Every effort be made to bring about the prevention of soil erosion through sound forest and grazing practices.
4. Plans be continued for the establishment of a timber buying and marketing service for woodland owners and the buyers of forest products in co-operation with existing agencies.
5. The facilities of the state forest nursery be increased for the purpose of statewide distribution of tree seedlings for farm planting as an aid in the prevention of erosion.
6. A course in the conservation of natural resources, including forestry, be required in the curricula of public schools.
7. Increased appropriations be provided for maintenance of the facilities constructed by the Civilian Conservation Corps during the past three years.
8. A branch of management in the forestry commission be established to manage the state-owned forests and to assist industries and other forest landowners in better forest management.
9. All acts relating to timber theft and the regulation of timber cutting in Arkansas be incorporated in one act.
10. A simple method of handling timber theft prosecutions under the timber theft law be developed.
11. The administration of all forest lands, to which title is at present confirmed in the state, be placed under the state Forestry Commission and funds be made available for the efficient management and protection of these lands so that the state may obtain the maximum revenue from them.

W. L. Lear
To Direct
New Section
Gazette
Nov 22 1936

In answer to the demands of lumbermen and other forest users for specific information regarding timber growth and yield, availability, markets and most economical utilization, the state Forestry Commission is organizing a utilization service to supply it. Charles A. Gillett, state forester, announced yesterday that W. L. Lear would have charge of the new service, which will work in conjunction with the forest protection program of the commission.

Many commodities used in the state are manufactured from materials which must be imported into state. In many instances it would be possible to produce these from material available within the state, and with local labor. If industries might be shown some way of utilizing material produced in the state, it will aid materially in furnishing work to many persons.

Finishing of Materials
From State Sought.

The Forestry Commission, through its utilization service will encourage the use of materials produced in the state. Many new methods of manufacture are being discovered and worked out by the United States Forest Products laboratory, at Madison, Wis., and the staffs of various lumber associations. An attempt will be made by the Arkansas Forestry Commission to make this information available to manufacturers through news letters and other publications.

Inquiries come to the state forester every day from various industries for basic information on the forest resources of the state. These industries are attempting to find sources of timber, labor and power which would make it possible for them to locate their plants in localities where these materials, power and labor are available. In most cases definite answers may be given concerning available labor, power and other factors, but due to a lack of up-to-date information concerning the timber available, its condition and location, definite information concerning this raw material, cannot always be furnished.

The United States Forest Service Southern Forest Experiment Station at New Orleans, recently made a survey which will furnish information concerning the stand and growth of timber in Arkansas. A study is being made on the amount of material removed from the forests during certain years. This survey and study, however, does not cover the entire state.

Comprehensive Survey
Of State Contemplated.

To supplement the work the state Forestry Commission plans to conduct a survey of all timber operations and industries using wood in manufacturing in the state. At the same time an attempt will be made to determine the annual consumption of wood on farms. Retail lumber dealers will be listed to determine the amount of material produced in the state being handled by these firms. Retail dealers will be placed on a mailing list to receive information concerning the industry in the state.

In the survey to be made by the state commission, an attempt will be made to compile a complete list of mills in the state. These will be classified by size, products produced, and type and species of material they require. Timber owners will be classified, by location, species and type of material they have available. With information of this nature properly classified, the state commission hopes to be of service to any organization wishing to locate raw material and those having this material for sale, and those using lumber or other forms of wood in manufacture. Manufacturers will be classified as to the product being manufactured and the type of material being utilized. The possibility of a box factory which might utilize the slabbing accumulated at mills presents one possibility which it is hoped may be worked out in the future.

Improved Methods Of
Forestry to Be Fostered.

With the removal of most of the virgin timber, the quality of the lumber and other wood products being produced

UTILIZATION SERVICE
OBJECTIVES OUTLINED

After 18 months of study the first objectives of the utilization service have been set up as follows:

1. To encourage wood using industries to enter the state so that lumber may be manufactured into finished products without leaving.
2. To aid the lumber owner and lumber manufacturer obtain favorable markets for his timber.
3. To aid manufacturers who utilize wood obtain their raw material by listing firms or individuals producing the material needed.
4. To assist the consumer of lumber or finished wood products in the selection of suitable material for any purpose by making available information relative to lumber and timber grades, dimensions, forms and terminology common to the lumber industry.
5. To encourage close and complete utilization of all timber cut and to assist in determining uses for the less valuable material commonly wasted.
6. To encourage certain silvicultural treatments to the end that quality material may be produced.
7. To encourage silvicultural practices and proper management which it is felt will lead ultimately to the economic stabilization of the industry, and to the security of all the communities depending on the lumber industry for existence.
8. To aid in the collection and compilation of data relative to the lumber industry and which may aid in shaping the future policies of the industry and the improvement of the practices now in vogue.
9. To co-operate with existing agencies and institutions linked with the industry and to assist in the organization of other agencies which may tend to aid the industry and state in solving problems associated with the lumber industry.
10. To aid the owners of small tracts of timber in selecting markets, and in solving problems associated with the determination of the best utilization practices.
11. To demonstrate through the practice of management and good silviculture the value of these practices from a utilization standpoint.

has suffered. However, according to observations and studies made by foresters and lumbermen, it is possible to produce quality material from second growth timber if certain cultural practices are followed. Methods of cutting and thinning have been worked out that if followed will produce a better quality of timber. A few large concerns are already practicing these measures. An effort will be made by the state Forestry Commission utilization service to encourage these practices by making available to those interested in information concerning this phase of forestry. An effort will be made in co-operation with other agencies to establish demonstrations.

No thought is being given by many operators to a future crop of timber from the lands over which they are operating. Forest fires for many years have made the reproduction of a good stand of timber practically impossible in many areas. The forest protection program being carried on by the state commission has accomplished much in reducing this damage. Under the old policy of "cut out and get out," the life of the average timber operation was measured by stand of merchantable material that was immediate available and accessible to the operation. Under this type of operation the industry was never stabilized. Many communities in the state are directly dependent upon industries utilizing material produced in the forests for their existence. Examples of what takes place in these communities with the removal of the local forest resources and the ultimate closing of the operations, are familiar.

Past experience has shown that with proper management, protection, and close utilization of forest resources many of the mills and similar industries might have continued to operate. "Cut-out and get-out" methods have closed many mills and made ghost towns of the communities which depended upon them. One of the most important functions of the Forestry Commission is to encourage sound forest practices which in the end, will insure an adequate supply of raw material for the future.

Library on Pattern, Etc.,
Being Established.

Another function of the utilization service will be concerned with making information relative to patterns, grades and dimensions of lumber available to those who might desire such information. A library containing information of this nature is being maintained. From time to time as new material is published by various institutions and organizations, it will be classified and made available to those desiring the information.

An enormous amount of material being cut now is wasted, either by being left in the woods or destroyed as slabbing or edgings at mills. A few mills have begun to utilize portions of tree tops commonly left after the removal of saw timber. This practice and similar practices will be encouraged by the state Forestry Commission by assisting operators in finding markets for material of this nature. An effort will also be made to find new uses for which culls or other low grade material may be used.

It will be a function of the utilization service to co-operate with various organizations associated with industries using wood as a raw material. Many of these organizations employ men trained in definite lines of manufacture and trade promotion. From time to time it is planned to sponsor meetings of men interested in various phases of the industry that they may be brought together to discuss the problems which arise. Technically trained men and men

with outstanding records associated with the industry may be brought in to attend and address these meetings. Plans are being made to publish a news letter at intervals which will contain information of interest to the industry. Digests of articles from publications of lumber and manufacturing associations and technical information published by the Forest Products Laboratory and Forest Experiment Stations will be included in the new letter. It is planned to co-operate and offer assistance of technical nature to civic organizations that are interested in bringing other industries to the state.

Present Industries
To Be Protected.

In encouraging wood using industries to enter the state, Mr. Lear said every effort will be made first to determine whether or not the industry will be in direct competition with industries already established. Industries in direct competition with industries already established will not be encouraged. The primary purpose of the service will be to hold present markets for material produced in the state, the introduction of new industries into the state to utilize fully the material now being produced, and the introduction of industries which might utilize semi-finished or manufacture material for the re-manufacture into some other product.

According to Mr. Lear, an enormous amount of material is being wasted now that might be utilized if a market could be developed in the state. Mr. Lear said that the forests of the state, if managed properly, are capable of pro-

ducing much more material than they are producing and if good cutting practices are following, will continue to produce more than is now being derived from them.

Plans are being made by the Forestry Commission to hold a forest products exhibit some time in December. It is planned to exhibit many of the products now manufactured in the state, and to exhibit other products which might be manufactured from raw material now being produced in the state.

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PRINCIPLES OF INDUSTRY.

The Congress of American Industry, in its recent session in New York, adopted a declaration of principles which should

Arkansas Faces Prosperous

Leaders Say Uplifting Feature of Brightening S. Means of Employment and Income; More In

Continuing Production of Our Forest and Farm Products, Is Declared First Job

Dem. 12-27-36

By WILLIAM JOHNSON.

Just ahead of us lies a new year. As upward of forty-nine billion persons have remarked, "How time does fly!" It doesn't seem a year ago that, as the last week of December, 1935, zipped into history, we were discussing Little Rock's purchase of the local water system; the state's 29 deaths from Christmas accidents; the Lindbergh family's movement to England; plans for celebrating Arkansas's centennial; a country-wide blast of frigid temperatures that took 212 lives in two days; a freakish local storm on the 28th that combined thunder, lightning and sleet; Speaker of the House Byrns' promise of a successful compromise on the soldiers' bonus; Italy's war machine rolling into Abyssinia; and the part Al Smith would play in the coming national election. All of those matters, so vivid a year ago, have now pretty well faded from our minds. New events and questions are claiming our attention. And the old but ever-new wonderment of last year and the year before, and of every year since man kept the first calendar with notches on a stick, is again engaging our interest. What do the next 12 months hold for us?

The answer is a cheerful one unless all signs, tokens and portents are combined in a brazen piece of deception. All of the state's affairs—its agriculture, industry and business—are on the up-grade. Employment is rising, and a swelling volume of money is flowing through our pockets, cash registers and banks in a widening spiral of prosperity.

Of course, as Granddad used to say, the weather vane is never nailed. Economic winds can change. Untoward things may happen. But all informed observers of Arkansas conditions agree that the indications lean heavily toward an expanding prosperity in 1937.

And an uplifting feature of the brightening situation is the opportunities it holds for expanding our means of employment and income. We can, in the opinion of men whose words carry weight, add to our working and earning equipment during the next year. We are in a position, they tell us, to acquire more of one thing we particularly need—and that is industries to diversify our income and balance up our agriculture in a stronger economic organization.

Steps are being taken to profit by the chances for industrial development which are believed to lie open to the state in the months and years ahead. We'll get to that phase of the matter a few paragraphs later. Right now let's glance at some of the comfortable appraisals of the near future by folks who make a study of what is cooking up.

Babson's Belief.

As a sort of general background to the outlook for Arkansas, a recent pronouncement by Roger W. Babson, distinguished market economist, is calculated to light a gleam of gladness in any Southern eye. He said in part:

"Get a share in the brilliant upward swing that is developing in the South. This region is going ahead faster than most other localities. During the past five years or more it has led the entire nation in growth of population and manufacturing activity. Its speed of progress has been almost double that of the country as a whole. Moreover, this forward movement . . . seems to be the start of sound and lasting expansion."

Declaring the South should get "a continual influx of population, industry and capital," Mr. Babson said it will also be helped by aircraft transportation. And he added:

"This part of the country is likewise in line to benefit by decentralization of industry. New factories are springing up rapidly. They include meat packing and other food products, metals, paper, chemicals and an expanding list of other industries. This in turn creates a bigger consuming market; it will become busier in manufacturing goods for its own use. This may be the start of an upward spiral."

Enticing to industry, the economist asserted, is the fact that the South is "less ridden by the labor unions" than some other sections of the country. That advantage will eventually fade out, he said, as growing industrialization leads to unionizing of Dixie's workers. But the South will continue to hold one advantage over the North, in Mr. Babson's view, and that is lower living costs, due to a milder climate.

"Heretofore, this climate has not always been favorable to various industries," the economist noted. "But where handicaps have existed, the whole situation is now being revolutionized by air conditioning. With this modern equipment, this country stays open for business all summer."

As Applied to Arkansas.

Bringing the view down to our own state, we find the happy tone of Mr. Babson's predictions for the entire South echoed to a pleasant degree for Arkansas by men whose fingers are on the pulse of its affairs.

A higher percentage of gain for Arkansas business in 1937 and 1938 than for the business of the country as a whole, is the joyous prophecy of the state university school of business administration. The school officials base that judgment on economic history of the past, which shows that, as a rule, prices of raw materials fall faster and harder when a depression hits, and climb back livelier when it lets go, than prices of manufactured goods do. Since Arkansas produces mainly raw materials, you see the reason for the pleasant outlook envisioned for the state by the university economists.

That inspiring forecast has a lot of support in the prognostications for 1937 of economic seers here and there about the country. For instance, the raw materials turned out by Arkansas are largely farm products, and the experts of the U. S. department of agriculture have expressed the opinion that farm income may take a rise of about 10 per cent next year. They gave as one reason for their conclusion the probability, as they see it, of a continuing improvement in city business, which will increase the buying power of urban consumers.

Larger production of some farm-stuffs and juicier prices for others, are the prospects on which the department of agriculture experts rested their estimate of mounting farm returns—or maybe "guesstimate" would be a better word than "estimate" in the light of the uncertainty of weather.

Better Dairy Prices.

Dairy products, poultry and meat

are among the farm products expected by the federal economists to pull down higher prices as we swing into the new year. That won't sound so much like harps and violins to the city housewife as it will to the proprietors of ambitious cows, chickens and other farm livestock. But money paid to the farmers jingles back to town to prod all sorts of urban business into nimbler activity.

Some expansion of the cotton acreage may be in order for 1937, the government experts said, though they warned that much of a swell in production might overload markets to the detriment of prices.

All together, agriculture appears to be sitting pretty for next year, if the economists have "evaluated" everything correctly and got all the decimal points in the right places. Their predictions make beamy reading for Arkansas, which has come through with a total crop value of \$157,184,000—nearly 50 per cent above last year's figure—and is ready and eager for a try at the rosier promise held out for 1937.

Other activities in Arkansas, too, are hitting a brisker stride as Father Time prepares to flin open the portals of the new year. There's our lumber industry, for instance, which has been practically raised from the economic dead of the depression.

"Every sawmill wheel is turning, or being made ready to turn," said Charles A. Gillett, state forest commissioner. "Some of the smaller mills that have stood idle for years are going back into operation. Our stove industry is humming, and the railroads are again buying ties in about normal volume."

Big Timber Sale.

The federal government has just recently sold \$600,000 worth of white oak from the Ozark forest. Mr. Gillett asserted, adding that this is the biggest government sale of timber ever made in the state.

Purchase of bolts by the new \$4,000,000 paper mill at Crossett has begun, the forester mentioned in citing a number of incidents pointing to further improvement in the timber department of our economy for 1937. This mill will use 150 cords of bolts a day, he said.

Officials of Arkansas lumber companies are looking with optimism to the new year. Writing in the Southern Lumberman, Carl L. White, president of the West Side Hardwood Club, Eudora, expressed the view that business is going to increase during the next two or three years though he foresees rising costs which will hold profits to a moderate level.

F. T. Dooley, president of the F. T. Dooley Lumber Co., Inc., Brinkley, gave it as his opinion in the Southern Lumberman, that "all indications point to steady improvement in the old hardwood game during 1937."

The officials of pine-cutting mills are in the same hopeful frame of mind. In fact, throughout the lumbering industry confidence is growing with returning demand. Larger purchases of all sorts of wood supplies are expected next year, by the railroads and for building. A considerable uplift in the construction of residences is looked for in 1937.

Summing up the entire situation, the Southern Lumberman declared in a December editorial: "There seems to be no immediate cloud in the lumberman's sky, unless it may be the trouble growing out of inability to fill all the orders offered. . . . Latest statistics show a big increase in new business, with new orders amounting to 42 per cent more than production."

Since two-thirds of the industrial wage earners of Arkansas are employed in industries which tie directly or indirectly into timber, the revival of lumbering reflects a steady recovery of payrolls throughout the state's manufactures.

And minerals, too, are showing substantial evidences of contributing more heartily to our income in 1937. Minerals took a dismaying flop when the depression cracked down on us. Our oil income fell to a fraction of the boom figures. It was only 7,570,000 in 1935, and may be less for 1936, according to Dr. George C. Branner, state geologist.

Bauxite returns, too, went crashing down under the impact of the depression, tumbling out of the millions of dollars annually into the thousands. It brought the state only \$196,515 in 1932. But by 1935 our bauxite income had climbed back to \$681,500, and Dr. Branner thinks 1936 will show a further gain which will carry on into 1937.

All together, our minerals, starting a comeback in 1934, paid the state \$16,081,000 that year. In 1935 they brought us \$18,726,000, and Dr. Branner estimates another rise for 1936. Next year, he is inclined to think, will show a larger figure.

Oil is the big question mark, the state geologist said. Our income from that top yielder of mineral returns has slumped, he pointed out, not only as a result of the depression, but most of all from the depletion of the great Smackover field.

Dr. Branner is convinced that Arkansas has important reserves of oil waiting discovery. He holds the same view of natural gas. And our fuel minerals—oil, gas and coal—are, in total, not only by far the most important source of our mineral cash, but the best hope we have of an industrial development, as Dr. Branner sees the matter.

Our fuel minerals, the geologist said, have paid the state 82.2 per cent of its entire mineral income, an aggregate value of \$600,827,466, over a 55-year period. He thinks the state government should do everything it can to foster the further development of our oil reserves. It has previously taken a number of helpful steps, he added.

Cheap Gas Would Help.

Speaking of gas, the geologist declared: "A large, cheap supply brought to Little Rock from the reserves which I believe we possess, would be a powerful influence in our getting industries here. A wide range of industries depend heavily on fuel, and are attracted by an abundance of cheap gas as bees are by a honey-pot."

Dr. Branner, who has given much thought to the subject, views Arkansas as having a great many natural attractions to industry. We've got large stores of a wide variety of minerals, he cited, while the state is rich in timber and in agricultural raw materials.

"And within 250 miles of our borders," the geologist continued, "there are 22,917,000 people. Within 500 miles, are 55,033,000 people."

But Dr. Branner and others have gone deeply into the matter to find certain barriers in the way of an industrial development for the state, with all its advantages. One is high distribution costs—steep freight charges compared with those of states to the East and North. Another is our lack of a workmen's compensation law, and related excessive damage awards against corporations. And then many think our tax system slants too sharp an edge toward industry.

Something is being done about these difficulties, however, and more effective remedial measures are in prospect. The traffic department of the Little Rock Chamber of Commerce, headed by J. C. Murray, is leading a fight for lower freight rates that is getting results. Water transportation, too, is receiving more attention. A project is now under way to have the government barge lines operate on White river. That would aid the rice growers, and might be the beginning of further advances in river carriage of heavy, slow-moving freights.

Meanwhile, plans are simmering to give the state an adequate workmen's compensation law, for the protection of labor and employers alike.

Industrial Future.

And a good deal of hope has been aroused by the honorary Industrial Development Commission, which Gov.-elect Carl E. Bailey appointed, Nathaniel Dyke Jr. of Little Rock, its chairman, while recognizing obstacles in the way, believes in an industrial future for Arkansas. He has expressed the view that efforts should be made to obtain for the various sections of the state industries using the raw materials of each, as wood-product manufactories for the timber areas and factories using agricultural materials for the farming localities.

Many new industries based on farm and timber products are coming up, Mr. Dyke pointed out, and the states that get them first will take a long stride forward in prosperity.

It seems clear that Arkansas must look chiefly to industries using farm, forest and such mineral materials as it has. Being without iron, the main dependency would seem to be on farm and forest materials. And these, as Mr. Gillett stated, can be provided in an endless supply, where mineral stores must some day be exhausted.

"So," said Mr. Gillett, "the state's first job is to insure a continuing production of forest and farm products. Great progress has been made in that direction. In forestry this year, the State Forest Commission, co-operating with owners, has had 5,860,279 acres of woodland under protection from fire—its worst enemy. The commission has established a utilization service, and hopes to collect data that will be of much aid in obtaining wood-consuming plants. Our greatest future in that field, I think, is in chemical industries based on wood, particularly paper mills. I'm convinced Arkansas is going to get more of these mills."

Big industries are decentralizing—scattering around, and largely moving Southward. But every Southern state is after these opportunities. If Arkansas is to share in them on a satisfactory scale, the state must, as informed men see it, know just what it has in the way of raw materials, and then tell its story in the right places. That means there must be research, inventorying and publicity. The State Planning Board has recommended the creation of a state agency for that job—to gather up information from other departments, round it out with surveys, and analyze and assemble it in a form that will appeal to industries seeking locations.

Forests and Floods

By David Campbell

Assistant Forester
State Forestry
Commission

Showing How Proper Forestation Is Necessary for Success of Agriculture and Industry and the Existence of Mankind.

Jan. 2-21-37
A forest is not merely a group of trees growing on an area of land; it is a complex community of living things varying in size from microscopic plants and animals which we cannot see, to great trees and larger animals. Services rendered by a forest are complex and interrelated and depend not only upon the timber producing trees, but upon all of the organisms which make up the forest community.

The most obvious service of the forest is the production of timber, but other services such as the storage of water and the holding of soil against washing, or erosion, are equally important to mankind. Upon these latter two services the success of our industrial and agricultural endeavors and the existence of mankind depend in large part.

Diagram 1 illustrates the paths taken by water in its endless rounds from sky to earth and back again. While falling as rain from the clouds, some is evaporated before it reaches the ground; more strikes the tops of trees or other plants, from which part is evaporated into the air while the remainder falls to the ground; some strikes the soil directly into which it may penetrate or over which it may run. That which runs along the surface of the soil finds its way in a short time to the nearest rivulet where it starts toward a river. The amount of run-off over a large area therefore controls the height of the rivers draining the area immediately following a heavy rain.

The amount of water permitted to "run-off" after a rain depends directly upon the amount held by the soil. The greater the soil storage capacity and permeability, the less the "run-off;" the less the soil storage, the greater the "run-off," and therefore the greater the likelihood of flooding in lower river channels.

Once in the soil, water moves slowly; it may take weeks, months, or frequently years, for the water so stored to see the light of day again. It is upon this soil water that the continued flow of our rivers throughout the year depends, and upon which all vegetable and animal life depends. In no part of the country is the rainfall during the growing season sufficient for the plant growth during this season, so all farming depends upon the supply of soil water available.

Water supplies for stock and man come

largely from the water in the soil, not from the water which runs over the soil. Our rivers depend for up to 50 per cent of their water load on the water which reaches them from underground sources. The amount of soil water, therefore, determines not only the severity of floods, but also the success of all of our industrial and agricultural activities.

Diagram 2 illustrates some of the factors upon which depend water percolation into the soil and water storage by the soil. Water which falls on the litter of dead leaves, needles, bark and twigs beneath a forest of trees is absorbed by this "sponge" until it has absorbed from five to ten times its own weight of moisture. Following this absorption additional water is

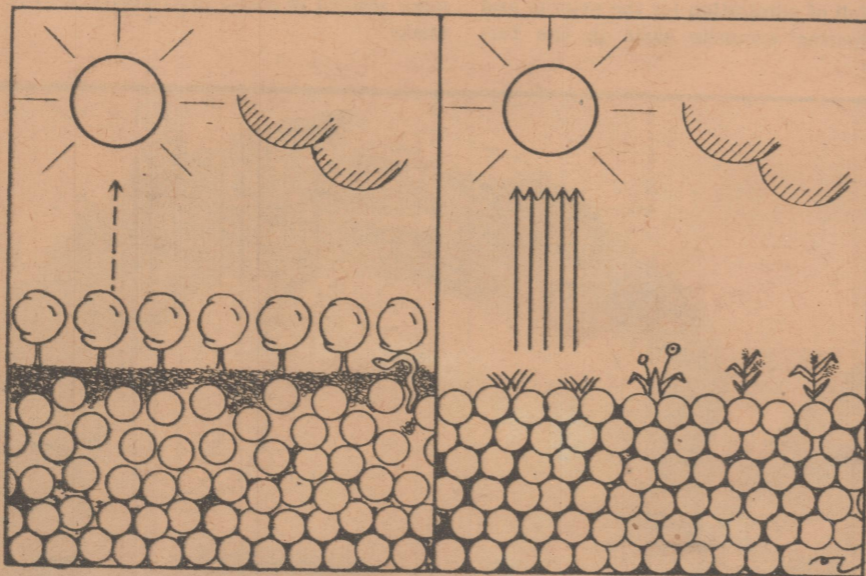


Diagram 2.—At the left is a diagram of forest land, at the right, farm or open land. Note that the water from the open land is drawn out much more rapidly than from the forest land.

retarded from running along the surface of the soil by this barricade of decayed, or decaying, vegetable matter. This excess of water is now absorbed by the colloidal material in the surface soil. This material is the result of decay, or digestion of the leaf litter and it acts like a jelly which absorbs water until it can hold no more. Additional water percolates between the particles of soil under the pull of gravity and seeps down into the water table slowly and becomes a part of the permanent soil water supply. It is not until the surface

deposit in the top few inches of soil. It is in this manner that the soil is fertilized and that the litter is destroyed. The activities of the soil animals particularly result in a constant interchange of organic matter and mineral soil. In addition, the tiny animals burrowing in the soil fill it with passages which facilitate the passage of water through it. A forest soil in which there is considerable plant and animal activity becomes light and crumbly with many crevases and spaces between the larger masses of soil. This action is so marked that the earthworm has been called the forester's plow. Considerable colloidal material, resulting from the rotting of the organic material, is usually present closely adhering to each minute soil particle. Both water absorption by the top layers of soil and percolation into the lower layers is thus at a maximum in this type of soil.

In direct contrast with this we have the case of farm land or open land. The soil is exposed to the heat of the sun and the drying effect of winds. Organic matter supplied by leaves, twigs and bark is at a minimum and as a result of these poor living conditions within the top layers of the soil the plants and animals within it die, and the soil slowly loses its fertility, the cultivating action is lost, and the soil particles lodge closer and closer together. This closing up of the spaces in the soil has a marked effect on the rate of percolation of water into the soil and of evaporation from the soil.

Differences in the rate percolation into forest and field soils has been demonstrated in many experiments. During one rain in 1932, 62 per cent of the rain falling on a cultivated field ran off and 38 per cent percolated into the soil. In the same rainstorm, and on similar soil lying

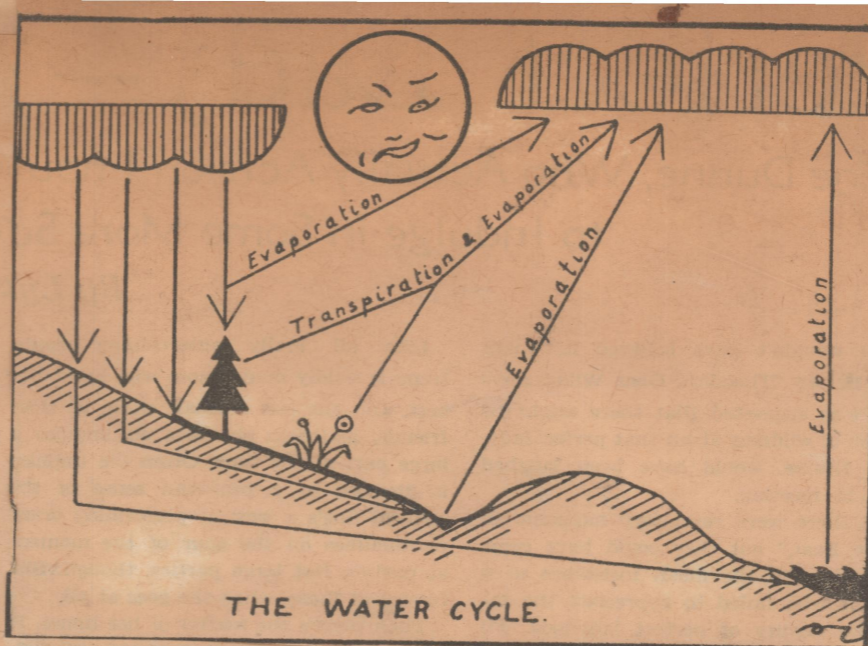


Diagram 1.—Showing the numerous paths taken by water after it leaves the sky on its route back.

soil has absorbed its limit and the rate of percolation into the lower layers of soil has become slower than the rate of rainfall that any great amount of run-off occurs.

In the layer of litter beneath a forest and in the top few inches of the forest soil, live countless billions of tiny plants and animals. In size they vary from microscopic bacteria to large earthworms. In the normal course of their existence they live on the organic matter falling from the trees to the ground. This they digest and

on the same grade as the farm land, less than one-half of one per cent ran off of forest land and 99 1-2 per cent percolated into the soil.

Evaporation of water directly from the soil into the air depends upon the rate at which water can be raised from the lower levels of the soil to the surface and on the amount of exposure of the surface soil to the sun and wind. Water is raised upward in the soil by capillarity, the same force which raises oil in a lamp wick, and the height which can be reached depends upon the size of the passages through which the water is to be carried. As the size of the passages increases, the height reached by the water decreases and when the passages become large enough all water movement in this manner ceases. Because the open land has smaller spaces between the soil particles than has forest land and because the surface of open land is exposed to the sun and the wind, water loss by evaporation from open land is much greater than the similar loss from protected forest land. This causes of water loss from the soil is illustrated in diagram No. 2 by the shaded area between the large circles which represent the fine soil particles.

With the water loss by run-off from open land there is a staggering loss of soil as muddy streams and rivers testify. As compared with good forest land, open land may lose 900 times, or more, as much soil as the forest land in every rainstorm. Experiments show that over a long period of years 26,000,000 tons of soil flow under the Main street bridge at Little Rock every year in the waters of the Arkansas river. This soil would be enough to cover 14,528 acres of farm land, or 363 40-acre farms, six inches deep. It would support 1,633 people, and would have a cash value of in excess of \$145,000. This loss through soil washing, or erosion, is neither sudden nor spectacular, it is proceeding all the time, yet it amounts to the destruction of almost one farm a day for the area drained by the Arkansas river alone.

Diagram 3 shows the areas in Arkansas in which forests have a major, moderate and slight influence on floods in Arkansas and the lower Mississippi river valley. The forests in these critical flood causing areas must be protected and improved, for it is only luxuriant forests that can keep the soil in its best condition for the absorption of water. When the forests are thus protected, we will, in effect, have a water reservoir covering two-thirds of the state, or 22,000,000 acres. If, in addition, we terrace our farm lands and control our gulleys with trees, plants or check dams, we will go a long way toward preventing the rapid rises in our rivers and streams and the concentration of stream flow into a few days or weeks which results in disastrous floods.

Problems of water use and control are intimately interwoven with the use and abuse of land. Water is the chief force of erosion, which is responsible for the fashioning of valleys, stream channels, and other familiar land patterns. Where land conditions are relatively stable there is a maximum regularity of streamflow, and the extremes of high and low water are moderated. Abuse of land which accelerates erosion, increases surface run-off and decreases underground seepage, may powerfully influence the problems of water conservation and control.

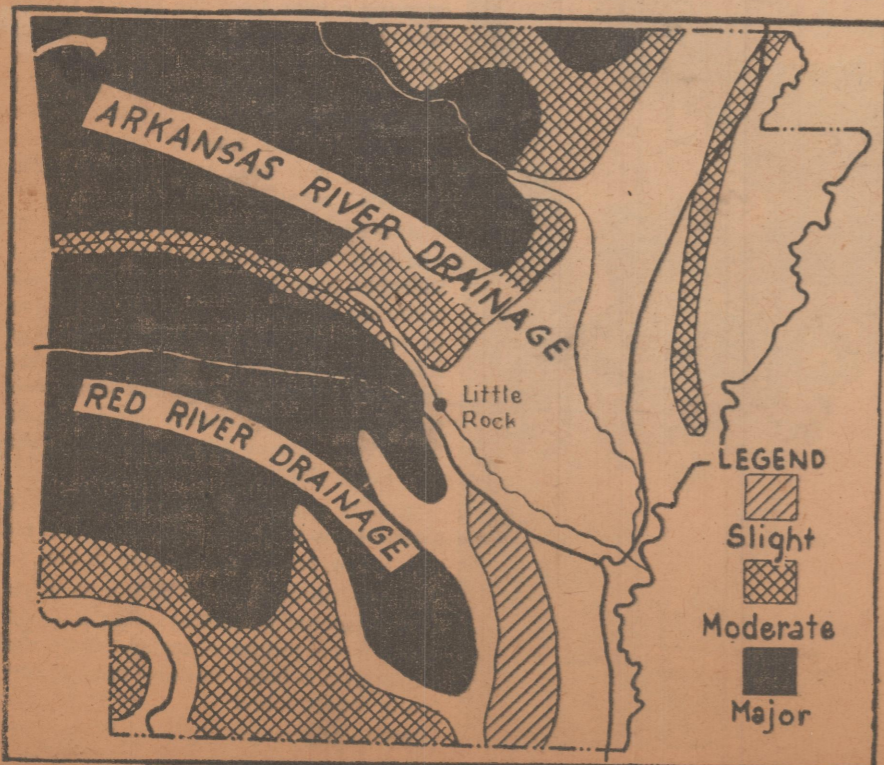


Diagram 3.—This diagram shows the forest influence on floods in Arkansas.