Fortunes In Our Forests


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 compared industry whose value in the state in 1933 was placed at $70,000,000.

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 "pioneers" that made Arkansas famous a generation ago are in prospect of better gain in order to produce new crops of timber.

Meaning of New Program.

The new forest economy will be based upon permanent, 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 realized 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 their belongings. This extravagant 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 660,000,000 board feet—sufficient to 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 85 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 tide 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. Halls of burning the woods to get them out of the way or for maintaining the natural beauty of Arkansas forest 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, where the forest is the favored purpose of getting rid of vermin looks bold among settlers and farmers. Timber and sets 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 pluck of shortage to smash the myth of inextricability. 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 36 years ago. The Ouachita 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 160 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 additional areas 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 200,000,000 board feet of timber could now be cut from the area annually without depleting the supply.

Settlement of the Ozark highlands in the northwest of the state also gave about a century ago. But much of the land, either too rough or too remote from roads, was left in the public domain. In 1907, 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. Campgrounds 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 with one area 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. Hare and rabbits in 1932 gave the number of deer in the two national forests at 2,000. There are also many turkeys and small wild game, and a few bears are reported on the Ouachita.

The Forest Service last year planted over 75,000 fish, mostly bass and trout in the streams and lakes in the national for-
Building a bridge on Gladstone road in the Ouachita National Forest.

As a lumber producer in 1918. In 1928 it ranked eighth. Commercial lumber production rose from a value of $125,000 in 1910 to nearly $2,000,000 in 1920 and over $3,000,000 in 1920, when mills numbered 1,142, and the cut was 1,625,000,000 board feet. By 1999 the cut passed 2,000,000,000 board feet and there were 9,000 mills. In 1923 the sale of all timber and timber products were estimated at $73,000,000 for the year. About 60,000 men were employed, two-thirds of the industry employed in the state.

In 1930, however, production had already dropped one-third, although this was the peak of the post-war boom. The value of timber and manufactured products dropped to $59,000,000. The lumber cut fell to 6,000,000 board feet in 1935 and to 2,000,000 in 1936 when only 200 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 thus look to stability and sound development.
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 Patett issued a proclamation yesterday setting aside thousands of acres of tax-delinquent lands within the Ouachita National Forest area as state forests to be exchanged later for lands outside the forest area.

The action was taken under authority of Act 93 of 1935 which authorizes the governor to set aside land to be exchanged for the great state forests area, and to be exchanged for lands purchased by the federal government outside national forest areas.

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

The proclamation issued yesterday, signed by the State Forestry Commission, includes all tax-delinquent land in the Ouachita National Forest area within Polk, Montgomery, Yell, Perry, Saline and Logan counties.

The acreage and number of tracts cannot be determined until state lands are sold and the acreage owned by the state purchased, but the governor's proclamation in effect sets aside for federal purchase and ownership the land within the forest area.

Act 93 becomes effective upon final adoption by the legislature adjourned, but its operation was withheld by a temporary two-year moratorium act which will expire in 1937.

The state land commissioner's office will proceed to purchase delinquent property owners and others who had before the proclamation. The proclamation authority upon payment of, the taxes delinquent and interest thereon, but, may become delinquent after one year's time without penalty.

By K. J. RUSH

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

Ever increasing use of this forest as a playground, like all others in the far-northeastern forest section, has brought about the lack of development of such areas, a problem of campgrounds, streams, trails and other recreational facilities.

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

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

And, while the primary goal is the growing of timber, officials point out that incidental to the growing of the timber crop, as taken in the neighborhood of 100 million board feet a year, is a recreational use for the area.

The program has a total appropriation of $10,000,000.

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

During 1934 there were 50,000 campers on 11,000 camps, 2,700 hunters, 5,000 fishermen, 3,000 motorists, and other recreational users.

Estimated time spent by each person in the forest was in the neighborhood of 100 days.

An additional 137,000 persons passed through the Ouachita Forest, by road or foot.

A far-sighted policy has been followed by the state in the matter of recreational resources with much thought being given not only to improvements as the camp grounds, lakes, summer home sites, and the roads and trails over approximately 1,500,000 acres embraced in the Ouachita, being in Arkansas and Oklahoma.

The program of vacationists who spend 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 that, to date, there have been constructed in the forest seven camp grounds, nine miles are in the process of being built, and a trail is being maintained during the five-year period.

In addition, dams are being built which will be used to produce power, and the program of stream improvement is being started.

A bulletin board is posted at each of the seven campgrounds, outlining 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 Camp Trails

Where the remote voice of the automobile horn and other noise is not near, the trails are being made more attractive to those who desire a place to rest and play.

Trails are being constructed in the Ouachita area, and there will be built approximately 150 miles of forest trails leading into primitive regions and areas of rugged forest beauty.

The work will be made here to modernize the country and the state forest in such a way that it will be utilized in these thousands of acres which are suitable for use as recreation areas.

These roads will be graded so that they can be used by both motor and horse power and like their hearts content.

Only in the remote and isolated areas will the new system of trails be constructed. There will be no automobile roads and the vacationists will, if he wishes, find solace away from the hum and bustle of modern civilization.

Approximately 1,400 miles of roads, winding like a ribbon through the forest, affords the vacationist as much as he desires.

When the present construction of roads is finished, there will be a total of about 2,400 miles, much of it through primitive regions.

As the roads are constructed, a through route for the traveler will be established.

At the present time, the one or four members of a group are not known to its owners, as the only ones who need a real home here is the bear, who will be provided with better homes and more food.

Point seen in the Ouachita forest is a new opportunity for a fresh start, for this area is not too far from the city.

Some streams will be built to attract visitors to the spot, and the streams are being constructed to include desirable species of fish.

Since the area was set aside for the sole purpose of game propagation, no fishing or hunting is allowed within the boundaries.

There will be a complete modern water system and many other modern partake of the facilities and amenities.

While funds for the others have been appropriated and their construction work has been held in suspense, the money has not yet been made available.

Enrollment in the Civilian Conservation Corps in the Ouachita has been playing a big role in the development of the area, with much of the work already done during their active period. The Corps have done much in the area, and the work is expected to continue in the future.

United States Forest Service Photo

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

July 27, 1935

A list of camp grounds and facilities afforded following:

Bard Springs camp ground, Polk county; two swimming basins; one dining hall; one 150 feet long shelter, picnic area.

Lone Creek camp ground, Polk county; one swimming basin, picnic area.

Albert Pike camp ground, Montgomery county; Little cemetery, swimming pool, picnic area.

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

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

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

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

Three Rivers camp ground, on No. 7 highway, Perry county; water lake, all developments.

Warm Spring camp ground, located near Highway 7, beyond Crystal Springs, Garland county; all developments.

Chicot camp ground — named for old surveyor—on 271 acre site, Chicot county; public camp ground, lake.

Lake Hamilton, Garland county; probably summer home site, playground with tennis courts, baseball grounds, community center.

Walden camp ground, highway 72, beyond Crystal Springs, Garland county; all developments.

The development of the Ouachita Forest is clearly demonstrated above. This picture, taken along North Fork Creek, shows the Gladeville dam, the main road, and a heavily wooded section. The roads as these have been constructed in order that visitors to the forest might appreciate the form and shape of the area.
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 utilized to its fullest extent.
2. To aid the lumber owner and timber manufacturer obtain favorable lumber markets.
3. To aid manufacturers who utilize wood obtain their raw material by leasing, renting or purchasing the lumber.
4. To assist the consumer of lumber or finished wood products in purchasing 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 new and complete utilization of all timber cut and to make in determinations for the less valuable varieties.
6. To encourage certain agricultural enterprises to the end that quality timber may be produced.
7. To encourage agricultural practices and procedures that are conducive to the economic utilization of the industry, and to the security of all the communities depending on the lumber industry for existence.
8. To encourage all enterprises in the industry and which may aid in shaping future policies of the industry and the improvement of the problems now in existence.
9. To co-operate with existing agencies and institutions licensed with the intention of assisting in the organization of other agencies that will be 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 selling markets, and in solving problems associated with the determination of the best utilization practices.
11. To demonstrate through the practice of management and good administration the value of these practices from a utilization standpoint.

Completion of Data Relative to Forests

W.L. Lear, To Direct New Section

In answer to the demand of lumbermen and other forest users for specific information regarding timber growth and utilization, the Forest Commission undertook to collect, analyze and make available, the most economical utilization of the service to supply it. Charles R. Lear was appointed by the Governor yesterday that W. L. Lear would have the duty of compiling and preparing a comprehensive report of this work in conjunction with the forest protection region managers. Many commodities used in the state are not produced in sufficient quantities on the farm and must be imported into state. In many instances these commodities are not available within the state with local labor. If industries might be shown some way of producing or utilizing these materials, a large percentage of them might be used in furnishing forest products to many persons.

Finishing of Materials

The Forest Commission, through its forecasts and studies made by foresters and lumbermen, it is possible to produce quality material from second growth timber in certain areas, as well as to improve. Following methods of cutting and harvesting have been worked out that if followed will produce a better quality of timber. A few large concerns are adopting these practices. An effort will be made by the state Forest Commission service utilization to encourage these practices by making available to those interested in information concerning this phase of forestry. An effort will be made in cooperation 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 trading production of a good stand of timber practically impossible in many areas. The forest protection program being carried on by the state department has accomplished much in reducing this damage. Under the old policy of "cut out and get out," the loss of the stand timber operation was measured by the stand of marketable material that was taken away from and available to the operation. Under this type of operation, the industry was never standardized. More conditions in the state are directly dependent upon industries utilizing more material produced in the forests for their existence. For example, production 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 careful utilization of forest resources many of the mills and similar industries might have continued to operate. "Cut 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 Forest Commission is to encourage forest practices which in the end, will insure an adequate supply of raw material for the future.

Comprehensive Survey Of State Contemplated

To support a comprehensive state Forest Commission plans to conduct a survey of timber operations and industries using wood in manufacturing in the state. The survey will be conducted by the Forest Commission and will be made to determine the annual consumption on non-farm. Retail lumber dealers will be listed to determine the annual consumption of material 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 determine a complete list of mills in the state. These list will be made up by the officers, order and type and sparsity of material they require. Timber operators will also be listed by location, species, and type of material they have in mind. With information from this nature properly classified, the state commission will then contact all organization wishing to locate raw material and supplying the material for sale, and those using lumber or other forms of wood. Manufacturers of material will be classified as to the type of material they use and type of material being utilized. The production of the factory which might utilize the material accumulated at mills will be recorded. Improvements may be worked out in the future.

Improved Methods Of Forestry to Be Fostered

The use of small wood products for the attire, the utility of the lumber and other wood products being produced
Arkansas Faces Prosperous Leads in Uplifting Feature of Brightening Means of Employment and Income; More In

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

By WILLIAM JOHNSON.

Just ahead of us looms a long year of hard work. As up to date as forty-nine million people have remarked, that is a long time. The last one, the only one, But, the statistics of Little Rock's purchase of the last great water system; the state's commercial and industrial development, from the standpoint of the Home, have been the chief of these. Both are now largely taken for granted. All of the facts and figures are in the state's public records, but it is a long journey to the history of a company. What does this mean to Mr. Al Smith? He is one of the biggest industrialists in the state, and he is in the same boat as many others. What is the future of the little city with a population of 10,000? What is the future of the state?

The answer is a cheerful one, unless all signs, tokens, and portents are combined in a hurricane of crisis. All of the state's affairs are being handled with the up-grade equipment. Employment is increasing and a year's loan is being paid off our pockets, cash and bank balances are in a growing spiral of prosperity. Of course, as Grandfather says, the weather vane is never mended. Change, unheard-of changes, they happen. But the long-range and permanent results of Arkansas conditions agree that the industries now being driven toward a larger and more prosperous activity is best and most needed — that is industries to diversify our income and establish the state as a part of a stronger economic organization.

The question is, then, how can the chances for industrial development be gauged in the coming year? The statistics of the state's industrial development are open to the state's needs and year-end. And there seems to be a phase of the matter a few paragraphs from the illustrative of the state's industrial development. Moreover, this forward movement is going to be accompanied by a sound and lasting expansion.

Arkansas, for its part, is like a swing that is developing in the general trend and is far ahead faster than most other localities in the state. And with the state's financial condition, it is a swing for the good of the state's future. Arkansas, for its part, is like a swing that is developing in the general trend and is far ahead faster than most other localities in the state.

Arkansas is a well-known and respected company in the field of agriculture, and its reputation is in the forefront of the state's economy. The Daily News is an important newspaper and has a wide circulation in the state. The newspaper has been in operation for over 100 years and has a strong following among the people of the state. The newspaper is known for its coverage of local and national news, as well as its in-depth reporting on agricultural issues. The newspaper has won numerous awards for its journalism, including the Pulitzer Prize for its coverage of the Great Depression. The newspaper is owned by a local family and is run by a group of dedicated journalists who are committed to providing accurate and informative news to the people of Arkansas.

As Applied in Arkansas.

Bringing down the view to our own state, we find the happy tidings of Mr. Al Smith's predictions for the prosperous outlook for our local industries. He says that the farmers' rights are on the pulse of its well-being.

Larger production of both farm and timber products is expected to increase the state's income. The timber industry is expected to benefit from the increased demand for wood products. The state's timber resources are vast, and the potential for growth is great. The state's agriculture is also expected to benefit from the increased demand for farm products. The state's agricultural sector is diverse, with a wide range of crops and livestock. The state's climate is ideal for growing a variety of crops, and the state has a strong tradition of agricultural development.

But Dr. Branner and others have gone deeply into the matter of weather, and they have concluded that certain favorable conditions in the way of an industrial development for the state, with all its advantages. One is high distribution costs—store-front store-front. A second is a low rate of living. The third is a good agricultural climate, the fourth is a good agricultural climate, and the fifth is the well-established agricultural climate of the state. The Little Rock Chamber of Commerce, led by C. Murray, is leading a fight for lower freight rates on the state's grain. That will add the rice growers, and might be the beginning of another great step in the state's development.
Forests and Floods

By David Campbell
Assistant Forrester
State Forestry Commission

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

A forest is not merely a grove 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 protection 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" and the greater the "drip-down" and therefore the greater the likelihood of flooding in lower river channeled.

Once in the soil, water moves slowly; it may take weeks, months, or frequently years, for the water so stored to seep through the soil. The greater the soil storage capacity and permeability, the less the "run-off," and the greater the "drip-down" and therefore the greater the likelihood of flooding in lower river channeled.

In some parts of the country, the rainfall during the growing season is sufficient for the plant growth during the 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 surface of the soil.

Our rivers depend for up to 30 per cent of their water load on the water which comes 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 which determine the 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 "soil" until it has absorbed from five to ten times its own weight of moisture. Following the absorption additional water is retained 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 as 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 soil has absorbed its limit and the rate of percolation in the lower layers of soil becomes 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 floor, there are countless billions of tiny plants and animals. In size they vary from microscopic bacteria to large earthworms. In the formation 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 percent of land run 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 it leaves the surface, 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 which the water is forced through. The size of the passages increases, the height reached by the water decreases and when the passages become small enough the water movement in this manner ceases. Because the open land has smaller spaces between the soil particles than forested land and because the surface of open land is exposed to the sun and wind, water lost by evaporation from grassland is much greater than the similar loss from protected forest land. This causes of water loss from the soil is shown in Diagram 3 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 carry the lost material. As compared with good forest land, open land may lose 900 times as much soil as the forest land in every ten years. Experiments show that over a long period of years 26,000,000 tons of soil are washed away from the Mississippi river every year in the waters of the Arkansas river. This soil would be enough to cover 14,328 acres of farm land, or 362 acres of farm land, six inches deep. It would support 1,633 people, and would have a value in excess of $41,000,000. 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 ranging areas must be protected and improved, for it is only the 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 farms and lands and ensure the use of trees, plants or other covers, we can go a long way toward preventing the rapid rise in our rivers and streams and the concentration of stream flow into a few days or weeks which result in disastrous floods.

Problems of water use and control are intimately interwoven with the problem of erosion and other abuse of land. Water is the chief source of erosion, which is responsible for the fanning 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 water run-off and decreases underground seepage may powerfully increase the problems of water control and regulation.