OKLAHOMA FORESTS AND WOODLANDS

J. CLIFFORD SHIRLEY, Phillips University, Enid

A wise professor of mine in the University of California once quoted for me the old English saying, "He who knows England only, does not know England". That statement may well be paraphrased as follows: "He who knows Botany only, does not know Botany", or "He who knows the Botany of Oklahoma only, does not know Oklahoma Botany".

Let us consider first then the six forest regions of the United States. We will thus be able to develop a frame of reference for a discussion on the subject selected:

FOREST REGIONS OF THE UNITED STATES. There are six forest regions in the United States as follows:

1. *The Northern Forest Region* which includes the New England states, south to Georgia, and west to Minnesota. It has 16 per cent of the forests of the United States. The forest includes Spruce, Fir, Pine, Hemlock, Maples, Oaks, Beeches, and Hickories.

2. *The Central Hardwood Forest Region* which includes Ohio, south to the Carolinas and west to Oklahoma and Texas. It has 27 per cent of the forests of the United States. The species include Oaks, Hickories, Ashes, Elms, Maples, Cherries, Beech, Sycamore, Walnut, Dogwood, Persimmon, Gum, and Holly.

3. *The Southern Forest Region* which includes the Atlantic and Gulf Coastal Plains from East Maryland to Eastern Texas, parts of Missouri, Arkansas and Oklahoma. It has 30 per cent of the forests of the United States. Species of trees include Pines, Red Cedar, Oaks, Hickories, Elms, Bald Cypress, Ashes, Magnolias, Birches, Maples, and Hollies.

4. *The Tropical Forest Region* is limited to very small areas in southern Florida and Texas. It has 1 per cent of the forests of the United States.

5. *The Rocky Mountain Forest Region* extends from Canada to Mexico, a distance of 1,300 miles, and from the Great Plains to Nevada, Oregon, and Washington, a distance of 800 miles. It has 13 per cent of the forests of the United States. This area is comprised of 40 isolated forest areas. The species include Western yellow Pine, Western White Pine, Englemann Spruce, Douglas Fir, White and Red Fir, and Hemlocks.

6. *The Pacific Coast Region* includes parts of California, Oregon, and Washington. It has 13 per cent of the forests of the United States. The Pacific coast region is the native home of Douglas fir, Sugar and Western Yellow pines, Hemlocks, and Redwoods. There are also some Oaks, Ashes, and Maples. The coastal belt of Oregon and Washington, eastward to the timber line of the Cascade Range, has dense stands of Douglas Fir. The Coast Redwood forms beautiful forests in the fog belt region of Northern California to the Oregon line.

RELATION OF OKLAHOMA FORESTS TO OTHER FORESTS. At least two of the six forest regions of the United States extend into Oklahoma. Plants from at least two other regions are to be found in Oklahoma.

The Central Hardwood Forest region is represented by a large number of species of Oaks, Hickories, Ashes, Elms, Maples, and Sycamore, Walnut, Dogwood, Persimmon, Sweet Gum, Sour Gum, and Holly.

The Southern Forest Region is represented in Oklahoma by Short leaf Pine, Loblolly pine, Bald Cypress, Sweet Gum, and other forms which occur also in the Hardwood Forest; such as Ashes, Maples, Hollies and Hickories.

The Rocky Mountain Forest Region is represented in Oklahoma by Western Yellow Pine, One-seeded Juniper, Nut Pine, Western Sugar Maple, and Western Walnut.

A number of species of trees found in the Arbuckle Mountains are definitely representative of the Edwards Plateau of Central Texas. Some of these are Texas Redbud (*Cercis reniformis* Englo.), Mountain Ash (*Fraxinus texensis* Sarg.), Mexican Mulberry (*Morus microphylla* Buckl.), Coral Bean (*Sophora affinis* T. & G.), and Ozark White Cedar (*Juniperus mexicana* Spreng.).

The Pacific Coast Region is not directly related to the Oklahoma forests, except through a common origin from an original northern American forest. Bald Cypress is a member of the Redwood family and is closely related to the Sequoias of California.

Oklahoma flora is definitely related to the forests of China and Japan; the relations probably due to a common origin. More than 70 genera of trees found in China have representatives in Oklahoma.

Oklahoma is thus the meeting ground for plants from East, West, North, and South.

CLIMATIC RELATIONS. Climatic conditions vitally affect growing plants. The varied climatic factors in Oklahoma produce some interesting results in the distribution of the forests of the State. Let us now consider some of those factors.

1. Elevation of Oklahoma. The altitudes of Oklahoma range from 300 feet at the Southeastern corner to 4,978 feet at the summit of Black Mesa near the northwestern corner of the panhandle. This gradual increase in elevation is interrupted by five mountainous areas:

a. The Ozark Mountains, which reach an altitude of 1700 feet,
b. The Ouachita Mountains, which reach an altitude of 2,850 feet,
c. The Arbuckle Mountains, which reach an altitude of 1400 feet,
d. The Wichita Mountains, which reach an altitude of 2480 feet.
e. Black Mesa, which reaches an altitude of 4978 feet.

2. Precipitation. The most important environmental factor in Oklahoma is the precipitation. The annual average precipitation ranges from 45 inches in the southeast corner of the state to only 10 or 15 inches in the extreme western portion of the panhandle.

3. Temperature of Oklahoma. The range of temperature is an important factor in determining the type of vegetation of an area. The suddenness of change of temperature appears to be very detrimental to growing plants in central and western Oklahoma. During the winter months, temperatures often drop 20° F. to 30° F. in a few hours. Within another 24 hour period, the temperature may rise from almost zero to 65°F or 70°F. Temperatures in the state range from 16°F. below to 116°F. above.

Due to the varied elevation (300 to 4978 feet), rainfall (10 to 45 inches), and temperature (-16°F. to 116°F.) as well as soil and other environmental factors, the flora of the state is quite abundant and varied. Due also to these conditions 95 per cent of the woody plants of the state reach their range limits within the state. One hundred twenty-three species of woody plants, approximately 45 per cent, are found in only one Plant Region, and thus are unusually limited in Oklahoma distribution.

KINDS OF WOODY PLANTS IN OKLAHOMA. The woody plants of the state are made up of both Softwoods (Gymnosperms) and Hardwoods (Angiosperms). The Gymnosperms include four families and four genera. There are four species of Pine (*Pinaceae*); Western Yellow Pine (*Pinus ponderosa* Laws.), Nut Pine (*Pinus Edulis* Engelm.), Short-leaved Pine (*Pinus echinata* Mill.), and Loblolly Pine (*Pinus Taeda* L.); a Bald Cypress (*Taxodium distichum*

Rich.), a relative of the Redwoods, which grows in the swamps of Southeastern Oklahoma; three junipers (*Juniperus L.*) and one *Ephedra* (Tourn.), a small shrub, making a total of nine species of Gymnosperms. Of these nine species, eight would be considered trees, although at least four of them are small as they occur in Oklahoma.

The Angiosperms are trees, shrubs, and vines including 51 families, 106 genera and nearly 300 species. The following six families are represented by 125 species, thus representing 40 per cent of the woody plants of the state: Rose (*Rosaceae*) 42; Beech (*Fagaceae*) 25; Legume (*Leguminoseae*) 18; Elm and Hackberries (*Ulmnaceae*) 14; Grape (*Vitaceae*) 14; and Walnut and Hickory (*Juglandecae*) 12. Thus Roses (*Rosa*), Blackberries (*Rubus*), Plums (*Pimus*), Oaks (*Quercus*), Elms (*Ulmus*), Hackberries (*Celtis*), Hickories (*Carya*), Walnuts (*Juglans*), and Grapes (*Vitis*) are abundant in the state.

There are approximately 140 kinds of trees, 150 shrubs and 10 woody vines in the State.

VEGETATION REGIONS OF OKLAHOMA. Shantz and Zon in *Natural Vegetation, Atlas of American Agriculture,* divide the state of Oklahoma into six vegetation regions. In this discussion, the Oak-Hickory region is subdivided into the Oak-Hickory Forest and the Oak-Hickory Woodland, making seven regions. These regions are as follows:

1. *The Swamp Forest Vegetative Region,* which is limited to a small area of Southeastern Oklahoma. The average elevation is approximately 300 to 500 above sea level. The annual rainfall is about 45 inches.

At least 75 species of woody plants have been collected in the Swamp Forest Region. 16 species are limited to that region.

Oaks (*Quercus*), Willows (*Salix*), and Elms (*Ulmus*) are abundant. Species which occur rather sparingly are: Overcup Oak (*Quercus lyrata* Walt.), Sweetleaf (*Symplocos tinctoria* L'Her.), Yaupon (*Ilex vomitoria* Ait.), Wax-myrtle (*Myrica cerifera* L.), and Hercules' Club (*Aralia spinosa* L.). Probably the most interesting species is *Taxodium distichum* Rich., a member of the Redwood family.

2. *The Pine Oak Forest Region,* which practically coincides with the physiographic region known as the Ouachita Mountains. The elevation ranges from 500 feet above sea level to an elevation at the top of Rich Mountain of 2850 feet. The annual average rainfall is about 45 inches. More than 156 different species of woody plants have been collected in the Pine-Oak Forest Region. 47 species are limited to this area.

Species of Hickory *(Carya)*, Willows *(Salix)*, Oaks *(Quercus)*, and Elms (*Ulmus*) are abundant in this vegetative region. Considering the area of this region, it is one of the richest plant regions of the state. The following species occur rarely: two species of magnolia, Cucumber-tree (*Magnolia acuminata* L.) and Umbrella-tree (*Magnolia tripetala* L.); Smoke tree (*Continus americanus* Nutt.); Beech (*Fagus grandifolia,* var. *caroliniana* Fern & Rehd.); White bark maple (*Acer leucoderme* Small.); Linden (*Tilia,* sp.) and Silver Bell tree (*Halesia monticola,* var. *vestita* Sarg.).

Rich Mountain is located in this region in the Southeastern part of LeFlore county. It reaches an elevation of 2850 feet above sea level, which is almost 2,000 feet above its base. The mountain extends into Arkansas on the east. The vegetation of the mountain is unusually abundant, especially on its north-facing, humid slope. A great many species found in the Pine-Oak Forest have been collected only from Rich Mountain or its immediate vicinity. Magnolias, Beeches, Lindens, Silver bells, and Witchhazel occur sparingly in this area.

3. *The Oak Hickory Forest Vegetative Region* includes most of the physiographic region known as the Ozark Plateau. The elevation ranges from 700 feet up to 1700 feet above sea level. The rainfall is about 40 inches annually. More than 100 species of woody plants have been collected in the Oak Hickory Forest. Seven species are limited to this area.

Species of Hickories (*Carya*), Oaks (*Quercus*), Elms (*Ulmus*), Plums and Cherries (*Prunus*), Hawthorn (*Craetagus*) and Maples (*Acer*) are unusually abundant in the Oak-Hickory Forest. Many of the species range westward into the Oak-Hickory Woodland and the Prairie Grassland Regions. Yellow Wood (*Cladastris lutea* K. Kock.) is of rare occurrence.

4. *The Oak Hickory Woodland* includes most of the Sandstone Hills, the Wichita Mountains, most of the River Valleys which extend into Western Oklahoma and an interesting botanical area known as Devil's Canyon.

It is a region where forests are mixed with grassland, and even in the forested areas the forest is not as dense as in the Oak-Hickory Forest. The elevation ranges from 490 feet to 2480 feet in the Wichita mountains. The rainfall is 30 to 40 inches annually. At least 115 species of woody plants have been collected in this area. Thirteen are limited to this area.

Many of the species which are found in the Swamp Forest, Pine-Oak Forest and Oak-Hickory Forest do not occur in this region. The effect of drier conditions has begun to show in the smaller and more sparse vegetation. Many of the species which occur in the Eastern edge of this area soon drop out westward. There are few species in this region which do not occur in some other vegetation region.

It includes a few species of western and southwestern origin, as Western Walnut (*Juglans major* Hell.), Big Leaf Maple (*Acer grandidentatum* Nutt.), and Live Oak (*Quercus virginiana* Mill.)

This region is the meeting ground for Eastern and Western species. It is the western limit of range for many of the Eastern forms such as Maple (*Acer*), Birch (*Betula*), Pawpaw (*Asimina*), Sycamore (*Platanus*), Black Locust (*Robinia*), Honey Locust (*Gleditsia*), and Pecan (*Carya*).

Species of Hickories (*Carya*), Oaks (*Quercus*), Elms (*Ulmus*), Plums (*Prunus*), Maple (*Acer*), and Ashes (*Fraxinus*) are abundant in the region.

The Wichita Mountains, located in the western part of the Oak-Hickory Woodland, constitute one of the most thickly wooded sections of the western part of the region.

The Western Sugar Maple (*Acer grandidentatum* Nutt.) occurs on the slopes of Mount Scott and near Camp Boulder in Boulder Canyon.

Western Walnut (*Juglans major* Hell.) is another Western species which has a rather limited distribution in Oklahoma. It does occur in other sections, in the Arbuckle Mountains and along the western edge of the state north to Woodward county.

Mesquite (*Prosopis chilensis* Molina-Stuntz.) which ordinarily is a shrub in the Gypsum Hills and Western Plains in Oklahoma becomes a small tree, 15-20 feet tall in the Wichita Mountains. It does not form thickets, but is scattered on a level grassy plain in a region in which no other trees are present.

Devil's Canyon is also a western extension of the Oak-Hickory Woodland Vegetative Region. It is located in the western edge of Canadian county and the eastern edge of Caddo county. It is a deep narrow canyon, 60 to 70 feet deep with almost perpendicular sandstone walls. The canyon varies in width from 20 to 100 feet. Springs are numerous along the sides of the steep banks. A small creek winds along the bottom of the canyon.

The vegetation is considered to be a relict type, much of it being characteristic of regions much farther east of this area. Sugar maple (*Acer saccharum* March.) grows abundantly in the canyon, forming trees up to 40-50 feet tall.

The vegetation at the top of the canyon and extending back from it is typical semi-arid grassland type.

5. *The Prairie Grassland Vegetative Region* includes most of the Prairie plains, Gypsum Hills, and Arbuckle Mountains, part of the high plains, most of the Redbeds Plains, and the Osage Hills of the Sandstone Hills. The elevation ranges from 600 feet to 2300 feet. The rainfall is from 20-35 inches annually. At least 147 species have been collected in this region. Twenty-seven species are limited to the area.

The woody plants of the region occur principally along the streams and in deep canyons. Black Jack Oak (*Quercus marilandica* Muench.) covers large areas in dry sandy soil. Other species of Oaks (*Quercus*) are abundant in the region, and also various species of Hackberry (*Celtis*) Soap Berry (*Sapindus*), Redbud (*Cercis*) and Ash (*Fraxinus*). Many of the species are Southwestern, such as those which occur in the Arbuckle Mountains from the Edwards Plateau flora. Shrubs and vines of many kinds are abundant. One of the most distinctive regions in the State is the Arbuckle Mountain section of the Prairie Grassland.

A number of species which represent a northern extension of the Edwards Plateau flora are to be found in the region. The Arbuckle Mountains thus constitute a meeting ground for Southern, Eastern, and Western species. The following are known as Edwards Plateau forms and most of them occur exclusively in Oklahoma in this region: Ozark White Cedar (*Juniperus mexicana* Spreng.); Texas Redbud (*Cercis reniformis* Engl.); Mexican Mulberry (*Morus microphylla* Buckl.); Coral bean (*Sophora affinis* T. & G.); Mountain Ash (*Fraxinus texensis* Sarg.):

Such western species as Western Walnut (*Juglana major* Hell.) and Mexican Plum (*Prunus mexicana* S. Wats.) are found in the region.

Winged Elm (*Ulmus alata* Michx.) Sycamore (*Platanus occidentalis* L.) Flowering Dogwood (*Cornus florida* L.), and Indian Cherry (*Rhamnus caroliniana* Walt.) occur here in their extreme western range limit in Oklahoma.

6. *The Plains Grassland Vegetative Region* consists of that part of the High Plains Region which occurs in Beaver, Cimarron and Texas counties, exclusive of the Black Mesa, which is considered a separate vegetative region. It also includes a very small section in Southwest Oklahoma along the western edge of the state. The elevation ranges from 2500 feet to 3500 feet. The rainfall is 15-25 inches annually.

At least 20 species of woody plants have been collected in this region. Eight species are limited to the area. The flora is largely limited to deep canyons and river banks and plains.

7. *The Pinyon-Juniper Vegetative Region* is a small section in the northwestern part of the state consisting of a plateau of mesas and buttes, including Black Mesa. Elevation ranges from 3500 to 4978 feet. Rainfall is 10-15 inches annually. It contains a number of species which are strictly limited to the region. The following species are so limited: Nut Pine (*Pinus edulis* Engelm.), Western Yellow Pine (*Pinus ponderosa* var. *scopulorum* Engelm.) One-seeded Juniper (*Juniperus monosperma* Sarg.), and Mountain Mahogany (*Carcocarpus parvifolius* Sarg.)

This region presents an interesting contrast to the small Southeastern Swamp Forest Region. This is the highest point in the state and the Swamp Forest is the lowest. This region contains xerophytic plants, while the Swamp Forest contains hydrophytic plants. This has the lowest annual rainfall

of the state and the Swamp Forest has the highest. This has a very limited, stunted vegetation, and the Swamp Forest has a rich, vigorous vegetation.

VALUES OF OKLAHOMA FORESTS AND WOODLANDS. Considering the richness and abundance of forest trees in Oklahoma there are some real values which are available for Oklahoma citizens.

1. *Lumber.* Approximately twenty-five to twenty-six per cent of the acreage of Oklahoma is classified as forest land. This amounts to nearly 13,000,000 acres, 6,000,000 of which is of distinct commercial value. These include about 4,000,000 acres of pine-oak-hickory type in southeastern Oklahoma and nearly 2,000,000 acres of upland hardwoods along the eastern border of Oklahoma.

2. *Posts.* The demand for fence posts is great in this state. The southeastern counties of Oklahoma furnish about 4,000,000 posts annually. The best species for posts are Osage Orange (*Maclura pomifera* Schn.), Black Locust (*Robina Pseudoacacia* L.), Catalpa (*Satalpa speciosa* Engelm.) Red Cedar (*Juniperus virginia* L.), Red Mulberry (*Morus rubra* L.) and Bald Cypress (*Taxodium distichum* Rich.) Many of these are grown in farm woodlots.

3. *Fuel Wood.* Fuel wood is an important, but low-value product of the farm woodland. Since almost any wood that is reasonably sound can be used for fuel, fuel wood provides an outlet for material that might otherwise be wasted.

4. *Windbreaks.* Many farmers have planted tree windbreaks around their farm buildings and lots. These plantings provide wind protection and furnish shade for poultry and livestock. Native species of trees have been used most abundantly.

5. *Shelterbelts.* The Shelterbelt Project started in 1935, and since then more than 3,000 miles of shelterbelts have been planted on more than 5,000 Oklahoma farms. This required about 20 million trees. Most of these small trees were grown in nurseries in Oklahoma from seed collected from trees in the state. One or more rows in a shelterbelt may consist of a species suitable for fence posts. Fuel wood is a second product of the shelterbelt.

(A few years ago a list of Oklahoma plants was prepared, giving the uses, other than the ones mentioned above, of the various species. The list included more than sixty woody plants of the state, which are of value either for food, drinks, dyes, tannins, medicines, perfumes, or soap. Many of these plants in the following list are not abundant enough in Oklahoma to be of much value.)

6. *Pharmaceuticals.* Drugs include preparations from Bittersweet fruits (*Celastrus scandens* L.,) Root and trunk bark of White Ash (*Fraxinus Americana* L.), Bark of Ironwood (*Ostrya virginiana* K. Koch.), Bark of root of the Hop Tree (*Ptelea trifoliata* L.), Bark and buds of Black Willow (*Salix nigra* Marsh.), Mucilaginous inner bark of Slippery Elm (*Ulmus fulva* Michx.) and Bark of Black Haw (*Viburnum prunifolium* L.)

7. *Dyes.* Yellow dye from heartwood of Yellow Wood (*Cladastris lutea*), Red dye procured from root of Red Root (*Ceanothus ovatus* Desf.) and Cinnamon dye from New Jersey Tea (*Ceanothus americanus* L.) Bark of Indian Cherry (*Rhamnus caroliniana* Walt.) is a source of blue and green dyes.

8. *Tannins.* Osage Orange (*Maclura pomifera* Schn.), Yaupon (*Ilex vomitoria* Ait.), Smooth Sumac (*Rhus glabra* L.), and many Oaks (*Quercus*) are rich in tannin.

9. *Foods.* This category includes nuts, fruits, and plants from which beverages are made.

(a) Pecans. The bulk of the pecan crop comes from wild trees growing in profusion in the river bottoms of Texas, Oklahoma, Louisiana, and other States south of the Ohio River. Texas, Oklahoma, and Louisiana produce about 90 per cent of the wild crop.

(b) Black Walnuts. Although not produced in such large quantities as the pecan, the nut of the native black walnut has achieved an important position in commerce.

(c) Hickory Nuts. The nuts of the Shagbark Hickory (*Carya Ovata* Mill. K. Koch) has large sweet kernels which are valuable source of food. It is the common hickory nut of commerce.

(d) Fruits. Berries and other fleshy fruits are excellent sources of food. Blackberries, Raspberries, Mulberries, Huckleberries, Gooseberries, Elderberries, Service berries, Pawpaws, Persimmons, Red haws and Plums are the principal fruits used as foods.

(e) Tea. New Jersey Tea (*Ceanothus* L.), Sassafras (*Sassafras* Nees.) and Spice Bush (Benzoin Fabric.) are used to prepare a substitute for tea. Leaves, root bark, young twigs, and even flowers are used in preparation of tea.

(f) A lemonade-like drink is made from the fruits of Smooth Sumac, (*Rhus glabra* L.)

(g) Wine. Elderberry fruits (*Sambucus* L.) are often used to make a delicious wine.

10. *Ornamentals.* Many Oklahoma woody plants are valuable as ornamentals. Enid, although located in the North Central section of the State where climatic conditions are sometimes unfavorable, has at least 6 native species of Gymnosperms and 37 native species of Angiosperm trees.

These include those used abundantly as silver maples, American Elm, Sycamore, Green Ash, Black Locust, Redbud, Hackberry, and Red Cedar. Rarer forms are Pin Oak, Sweet Gum, Sugar Maple, Black Walnut, Soapberry, Box Elder, and Western Yellow Pine.

Shrubs and vines which are valuable ornamentals are: Coral Berry (*Symphoricarpus orbiculatus* Moench.), French Mulberry or Beauty Berry (*Callicarpa americana* L.), Deciduous Holly (*Ilex decidua* Walt.) Buttonbush (*Cephalanthus occidentalis* L.) Wahoo or Burning Bush (*Evonymus atropurpureus* Jacq.) and Buckeye (*Aesculus* sp.), Virginia Creeper (*Parthenocissus quinquefolia L. Greene.*), Trumpet Creeper (*Tecoma radicans* L. Juss.) and Bitter Sweet (*Celastrus Scandens* L.).

Conservation of Oklahoma Forests and Woodlands. "Our forests are an indispensable basic national resource, vastly important in the material sense and perhaps in the long run equally important *spiritually,*" said Herbert Hoover.

"When the natural resources of any nation become exhausted, disaster and decay in every department of national life follow. *Conservation of natural resources is basic to national success,*" said Gifford Pinchot.

After a tour of the United States, Lord Northcliffe said: "The one dominant thing about the United States of America which stands out in bold relief is her people's *wanton waste of their natural resources*: I mean particularly their forests, and if America does not wake up and immediately realize the necessity of conservation and reforestation, she will not only bankrupt herself, but *bankrupt the world.*"

Stuart Chase wrote a book entitled *Rich Land, Poor Land.* This book may be summarized with the following statement: "Erosion is the curse of people who have no vision—those who destroy forests, but do not replant."

Paul B. Sears has written two books: *Deserts on the March* and *This is Our World.* These two books may be summarized by saying, "This is our world if

we conserve it and protect it, but in many sections of the world, and especially Western Oklahoma, it ceases to be our world and becomes Deserts on the March."

A Norwegian, who was visiting in Yosemite National Park said, "You Americans amaze me. You cut, burn and destroy your beautiful forests and thus affect your whole civilization. In Norway and in many sections of France, Sweden, Germany, and Switzerland we must replant a tree everytime one is cut down."

There is an educational film called *The River*, which shows mighty forests of an early America in Minnesota, Michigan, Wisconsin. A great rainstorm is shown with moisture being absorbed by thick cover of leaves, mold and humus and then being sent out to thousands of farms along the Mississippi River. The next part of the picture shows the forests cut, stumps burned and no seed trees left to replant. Another rain storm quickly runs off to form rivulets, then creeks, and ever-enlarging streams until the Mississippi River and its tributaries cut thru the heart of America as a raging torrent. This mighty river began to destroy cities, wash away farms and destroy livestock. Millions of tons of the best top soil of a number of states were carried into the Gulf of Mexico and lost.

When forests go, the waters go, soils go, fish and game go, crops go, MAN GOES—as part of the process: FLOOD, DROUTH, FIRE, AND FAMINE.

Seven state parks with an area of 43,000 acres have been set aside by the State for the preservation of the plant and animal life and for the enjoyment of visitors who may visit the areas. These seven parks are as follows:

1. Quartz Mountain State Park—Southwest Oklahoma
2. Roman Nose State Park—Northwest Oklahoma
3. Boiling Springs State Park—Northwest Oklahoma
4. Osage Hills State Park—North Oklahoma
5. Robbers Cave State Park—Eastern Oklahoma
6. Lake Murray State Park—South Oklahoma
7. Beavers Bend State Park—Southeast Oklahoma

The plants are typical of the areas in which the parks are located. One National Park — Platt National Park — one National forest, Ouachita National Forest — two wild life refugees, Wichita Mountains and Great Salt Plains, and a number of other areas have been set aside for special purposes.

To be able to make conservation practices effective, the public schools must teach the principles and practices of Conservation. The universities and colleges of the state, through an aggressive program and special courses must continue to stress the importance of the proper use and conservation of our Natural resources.

If the Colleges and Universities of the state cooperate with the State and National Agencies interested in our natural Resources, a bright future for our woodland heritage will be assured.

BIBLIOGRAPHY

1. Hill, Albert F., 1937. Economic botany. New York: McGraw-Hill Book Company, Inc.
2. Hylander, Clarence J. 1939. The world of plant life, New York: The MacMillian Company.
3. Sargent, Charles Sprague, 1926. Manual of the trees of North America. New York: Houghton Mifflin Company, 1926.
4. Shirley, J. Clifford, 1937. Unpublished Thesis; The woody plants of Oklahoma. Enid, Oklahoma.
5. Sparhak, William N. and Raphael Zon, 1923. Forest resources of the world. Vols. I and II. McGraw-Hill Book Company, Inc.
6. United States Department of Agriculture. 1949. Trees. The yearbook of agriculture. Washington: Government Printing Office.