THE NATIONAL FORESTS IN MISSISSIPPI AND THEIR WATER RESOURCES

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INTRODUCTION

The National Forests in Mississippi are directly made up of 1.1 million acres of land. The products from these lands are timber, wildlife, forage, recreation, minerals and water. Each of these has a definite value. Timber produces 150 million feet per year for a value of 2 million 700 thousand dollars; minerals, through oil production, returns 1 million 800 thousand dollars.

All this we take for granted. When you say "National Forests" everyone thinks about trees and, to most, this is the most important product. But, what about water? The streams from National Forests in Mississippi produce 718 billion gallons of water a year. If we placed a value of 10¢ per thousand gallons, this would represent about 72 million dollars per year. This is more than 14 times the combined values of all other resources.

When you look at water in this manner it is easy to see that it is the most valuable resource of the National Forests. Our efforts to date to manage the water resource have been generally limited to rehabilitation of damaged watersheds. In the course of the Nation's growth a great deal of damage was done to the forest and range lands. The causes and consequences are now well known to all and it is improbable that we would permit the wide-spread denudation and depletion of the past to be repeated. However, in acquiring lands for National Forest purposes we purchased many thousands of acres of land which are now sources of accelerated flood runoff and damaging sediment. Such areas need rehabilitation to restore their productivity.

The application of remedial measures has been painfully slow. Factors which have caused low accomplishment rates include the following:

1. The long period sometimes required for measures to become effective.

2. Lack of adequate financing.

3. Deterioration of site quality so severe that restoration is physically difficult.

4. Incomplete technical knowledge for the solution of particularly difficult problems.

Our rehabilitation program has been slow but steady. It has been a long road but we can now see the end.

A few years ago we re-evaluated the National Forest Watershed Program and took a new look at the water resource. The old adage, "An ounce of prevention is worth a pound of cure," is applicable to watershed management in Mississippi. However, we still have all too many horrible examples of what not to do. We are exerting all our efforts to prevent mistakes again. The Forest now has a Watershed Scientist on its Staff to assist and advise the other resource activities in protecting and enhancing the soil and water resources. Without them there can be no forest or wildlife. It is the responsibility of all other resources to develop the soil and water and thereby enhance conditions for their resource. The Watershed Scientist is constantly searching for new ways to protect and develop the soil and water of the Forest.

Management of vegetation to alter streamflow behavior and increase usable water yields is probably the most intriguing prospect in applied watershed management. Research has demonstrated on study plots and a few small watersheds that the vegetation on forest lands can be managed or modified to produce such results. Such practices, however, have not been applied on an operational scale in the Southern Region.

The management of water is and will become more important as this Nation grows. How is the Forest Service managing its land for the protection and development of its water resources? Let's look at the resources one by one and see.

TIMBER

The early history of Mississippi's forests can best be described as - "the ax, the torch, and the plow." Mississippi just had too much of a good thing, at least to the early settlers. The torch and ax cleared paths for the plows. The woods yielded clearings, clearings became fields, and fields merged into plantations.

By the mid 1930's, the timbermen had moved to the south and their mills finished the job the pioneers started. Mississippi, like other states, discovered that the forest resource wasn't really inexhaustible after all.

Many of these emblems of desolation and torn empty acres became, in 1935, part of the National Forests in Mississippi.

The road back has been long and slow. Acre by acre the land has returned to forest. I doubt if anyone could guess how many acres, or even better, how many trees have been planted. Even though much of this desolation is with us today, it has had some educational value. The people of Mississippi have begun to realize the need and importance of forested watersheds.

Today, as in the early thirties, our timber management policies are aimed at building up the growing stock on the cut-over lands in order to

produce high quality sawtimber of the species best suited to the site, soil, water and other conditions.

Timber stands are a vital part of the natural resource base of our State's economy. Meeting future demands for forest products will require substantial increases in forest yields. The National Forests will meet this challenge through more intensive forest management and utilization.

Harvesting timber unavoidably results in some disturbance of natural conditions. It has been amply demonstrated, however, that with thoughtful planning and careful, alert supervision, timber products can be harvested without serious effect on soil and water relationships.

Timber harvesting must be coordinated with protection of watershed values beginning with the first plans to open up a cutting area. Of major consideration are:

1. Location and design standards of roads.

2. Cutting area boundaries.

3. Yarding routes and landing locations.

4. Location of water courses.

5. Stability of soils and slopes.

6. Logging methods.

Some areas may be excluded from the cutting plan or harvested by special methods. Timber harvesting must give attention to probable disturbance of the soil mantle and damage to the water resource. Only that method causing the least watershed damage should be used.

We are learning new ways to harvest timber with minimum disturbance and are incorporating these into our timber management policies.

RECREATION

Except for hunting and fishing, the National Forests in Mississippi have been somewhat slow at grasping, or I should say catching, the outdoor recreation movement. In years past recreation was a family picnic, church picnic or some other group-type activity. With this type demand, the facilities were kept to a minimum. A few picnic areas located close to towns were more than adequate to satisfy the needs. Few people swam and no one had ever thought of water skiing. Few land managers realized how good they had it.

How times have changed! The interstate highway system improved transportation to the point where 500 miles is an easy drive. The work week has been shortened, thus producing more leisure time; even the population has increased. Some place along the line a policy of a boat and trailer in every carport was adopted, not to mention the fishing pole, skiis, and camping gear.

Everywhere water has become the powerful magnet which attracts recreation-minded people to the National Forest. Recreation has changed to the point where it is almost entirely water-oriented. This type demand has and will increase much faster than any other type of recreation use. It is threatening to exceed the supply of suitable areas. For example, on July 4, 1966, there were 5,300 boats on Ross Barnett Reservoir. This represents only 6 acres of water per boat.

In years past, any body of water that was deep enough to swim in was suitable. Now all this has changed. We are having all of our water areas tested to be assured of their safety for water-contact sports. We are making surveys of our recreation areas to insure maintenance of desirable plant cover, infiltration rates, and natural control of runoff. Our basic management direction is to modify silvicultural practices, livestock use, minerals and other activities as necessary to protect and enhance acquatic values for maximum recreation use.

Our water related recreation facilities have had a complete overhaul in planning concepts. In the beginning, we placed the facilities where they were most accessible to the public and easy to build. The thinking was that they were small areas in comparison to the whole watershed so they seldom created serious problems. The results have been disastrous. Compaction, erosion, and in some cases, complete denuding of the site have resulted. No one knew recreation would become such a big business. Far more startling was the resulting damage to the soil and water resource.

Our present recreation area planning is detailed and considers all our resources with major emphasis on soil and water. Once a site is selected and the need established, a series of surveys are begun. The first is a general survey of the watershed to determine the health hazards and water supply to support a suitable lake and development. Should this prove satisfactory, we then proceed with an intensive soil survey of the watershed. It is from the soil survey that the developable area for recreation is determined. Topography is important, yes, but the soil must be able to support the activities desired. The Soil Scientist's interpretation of the survey tells us not only what activities the soils will support but also what type of sewerage system will be required. If these soil and water surveys prove satisfactory, we then proceed with our normal engineering and recreational planning.

Soil and water are now greatly considered in our detail planning. We have found it best to zone a strip 100 - 200' wide around all lakes for dispersed use. By this we mean foot traffic in limited amounts. The only exceptions to this are swimming and boat launching facilities. By this zoning we are able to maintain an adequate filter strip around the lake to help protect our water quality. This zoning also provides access to all visitors rather than restricting the area to a few.

Even our sewerage systems have a new look. The days of the pit toilet are long gone. Our systems today are quite elaborate and efficient. Since the size of our areas are larger, our systems are similar to those of a

small modern city. All State and Federal standards are met to assure complete treatment and absolutely no surface or ground pollution.

Recreation development today must consider the quantity and quality of water needed, the soil in which the use will occur, and the hazards of pollution. Recreation and watershed objectives must be coordinated so that adequate facilities are provided and that they are constructed and managed so as to protect both the recreationist and the downstream water user.

RANGE

The early Mississippi settlers were stock raisers and hunters who desired isolation. This country was one great pasture where stock could roam at will and remain fat with little or no care. The natural cane, grasses and hardwood mast provided year-round food. There was complete disregard for the management of any resource other than range and that was completely mismanaged.

As the range deteriorated ecologically as a result of overgrazing and indiscriminate burning, the settlers migrated from one locality to another until the entire desirable habitat was depleted. Although the natural pastures have ecologically disappeared, the heritage of year-round grazing by the early settlers was passed on to their descendants who are intent on maintaining these customs and ideas.

The Forest Service recognized range as a valuable resource and feels the need to help supply a part of the range for the local people. However, we believe range should take its rightful place and be managed.

We believe that suitable range is that area which is accessible to livestock, has the potential to produce forage, and can be grazed on a sustained yield basis under an intensive management system without causing damage to the range, watershed or other resource values. Where we have a usable range resource our management practices are designed to utilize the forage while protecting the watershed. The primary control of all range allotment sizes, number of cattle and length of use is determined by the soil and water resource.

To maintain a good range or build up a poor one, utilization is limited to 40 - 45% of the vegetation by weight. This provides adequate litter to protect the soil, seed heads to replace decadent plants and to start new plants on poor areas.

Cattle are basically grass eaters but where you have over-use or poor range they will change their eating habits. They begin browsing and their choice is climax vegetation which is most important for soil and water. Soon these desirable species are reduced to the point where they are replaced by less desirable species. To prevent this, we rotate the use by prescribed burning, fencing, water holes and salting. Adequate cover must be maintained and grazing is modified and managed to protect it.

We have an extensive program of range analysis. Only the most experienced and knowledgeable personnel available determine the suitability of land for livestock grazing. Watershed protection and development are considered in determining the suitability. Also, we have a system of reanalysis and inspection of the range. Management on range allotments is constantly being modified to coordinate range with other resources. A few of the reasons are:

1. To prevent damage to watershed restoration projects, including vegetative measures, structural land treatment and gully stabilization.

2. Maintain and re-establish desirable range plants by proper use of resource.

3. Proper distribution; even use throughout allotment.

4. Protection against soil erosion.

5. To abate pollution resulting from range management activities.

6. Prevent trampling of water courses.

7. To prevent accelerated erosion, floods, diminution of usable yield or pollution of the water supply.

8. Prevent the depletion of vegetation along streambanks and in the watershed which would result in siltation and loss of shade producing cover on streams.

9. Prevent compaction.

10. To protect the cover necessary for stable soils and adequate water yields.

These are just a few of the many things we look for in our range inspection and analysis.

WILDLIFE

The history of wildlife is also the history of Mississippi, that is, one of exploitation. Mississippi was one vast forest, mostly pine, with hardwoods along streams and low areas.

The early settlers were mainly hunters and stock growers who lived a simple life. In 1840, Etienne Maxon observed that:

> "The bear, deer, and turkey roamed the forest; wild game was so plentiful up to the Civil War, that the deer had trails in the woods like cattle. All the hunter needed to do was to take a stand behind a tree near the trail and wait for his game."

Indiscrimante cutting and the widespread use of fire depleted the wildlife habitat. With food and cover gone, wildlife either starved or were preyed upon by meat hunters and loose running dogs to the point where species were in danger of becoming extinct.

In the 1930's, the Mississippi Game and Fish Commission became an operating agency. A cooperative program was begun to protect and rebuild wildlife populations on lands acquired for National Forest purposes.

Soil and water have played an important role in the re-establishment of a wildlife resource. The forage and cover plants that build soils and protect the watershed also provide food for game species. However, as in range management, the balance of game herds must be carefully watched and a balance maintained.

For example, browsing by excessive populations of deer can prevent establishment and development of young trees needed for future timber crops. There have been cases where all of the lower cover has been completely eliminated from many acres of wildlife range. It is hard to believe that game animals can eat themselves out of a home. We must maintain herd numbers that the land can carry. By recommending the length of seasons and the type of hunts, we maintain the balance needed to maintain cover and healthy populations.

A few years ago we started a program to provide water for our wildlife. In the next few years we will have water available on every square mile of National Forest land. With the development of new explosives, we are now blasting water holes to satisfy this need. These water holes are approximately 8' deep and 22' in diameter and provide water year-round.

The waterfowl resource is just coming into its own in Mississippi. In recent years we have found that we can flood hardwood bottoms from October until March without killing the timber. We call these areas "greentree reservoirs." The object is to flood the maximum acreage three feet deep or less. This provides food and rest for ducks and geese. Many proposed impoundments are being planned for greentree reservoirs. This provides flood control downstream and a manageable waterfowl resource. It is hoped that in the near future we will have a network of greentree reservoirs providing good duck habitat in many sections of the State.

Fishing has become big business. Nation-wide a recent survey shows that 24 million freshwater fishermen spent 427 million days fishing and generated over 2 billion dollars of gross business activity for equipment, services and supplies. This is an average of $89 per year or $4.98 per day for each person. Mississippi had 2 million man-days of fishing by its nearly one million residents during he same period. Everyone takes fishing for granted; all you need is a stream or pond, fishing pole and a small boy. There is a lot more to it now. We have lost many of our good streams from poor watershed management. Many of the streams which provide sport fishing originate or flow through Forest lands and the management of these lands affects both watershed management values and wildlife management values. Silt and other coarser sediments from slopes and streambanks pollute water

supplies and often cause downstream damages. From the standpoint of fish habitat, sediment deposits frequently smother spawning beds, reduce acquatic life, fill resting pools and reduce stream depths. Streamside cover must be maintained to provide filter strips along streams and keep the stream temperature as low as possible. The National Forest development program has taken into consideration the management practices that are necessary to protect the quantity and quality of our fishing resource.

ROADS AND HIGHWAYS

Roads and highways now occupy many acres throughout the Forest lands. Many otherwise usable Forest areas are relatively unused because of lack of access. Our future needs for forest-land resources will require expansion of the present road system. This expansion will materially affect the National Forest watersheds.

Many hundreds of additional acres of Forest land will be disturbed by road building. After construction, the hydrology of these lands will be greatly altered. Inherent in road construction are several objectives which run counter to the normal soil-water relationship objectives of watershed management.

These include: (1) waterproofing the road surface, (2) quick drainage of the road surface, shoulders and roadside ditches, (3) deep incision of the soil mantle, (4) cut and fill slopes which expose soil and sub-soil to erosion, (5) artificial channels which intercept and quickly concentrate surface runoff from uphill slopes.

Reducing the damaging impacts of road construction on water resources begins with locating the road properly and continues through the planning, construction and maintenance phases. Everyone is involved from the transportation planner to the bulldozer operator. The watershed manager must lead the way by appraising the effects upon water resources and by aiding in the development of criteria, methods and standards to prevent avoidable damage and obtain post-construction conditions of cover and water disposal which are acceptable for watershed management purposes.

MINERALS

Oil and gas are essential parts of our natural resources and their production from Forest lands will continue as our Country grows. Drilling operations pose a number of serious watershed problems such as:

1. Destruction or damage to plant cover.
2. Creation of erosion hazards.
3. Sediment contributions to streams from spoil banks.
4. Waste discharge of acid, oil or salt water into streams and lakes.
5. Destruction or long postponement of soil productivity.

Land managers must be alert to such situations and take the lead in obtaining preventive or corrective treatment. Through close on-the-ground supervision we have found that considerable site restoration can be achieved.

OTHER USES

Several other forest land uses need to be coordinated with watershed management objectives. Pipelines, power transmission lines and private roads sometimes create watershed management problems. As these projects are built, adherence to sound watershed management principles will be needed to minimize the damaging effects of disturbance of cover, soil and stream flow resulting from construction or operation.

FOREST AND RANGE FIRES

In many watersheds wildfire is the most serious threat to water values. After a hot and destructive fire, even moderate storms may severely erode the burned area and produce floods that carry silt and debris to areas below.

Also, soluble salts leached from the ash may make water supplies temporarily unfit for use and result in death of some acquatic plant and animal life.

Watershed management objectives are considered in establishing fire prevention and control objectives. Fire control planning, however, recognizes the practical limitations of prevention and suppression efforts in setting allowable burns and other goals.

Man-caused fire risk increases as the number of visitors and users of Forest lands increases. Keeping soil in place and preventing floods and water pollution are immediate aims of post-fire treatments.

SUMMARY

I hope this discussion contributes to better understanding of the interrelationship of all resources to produce water. Soil and water are our basic resources. All other resources must be managed in such a fashion as to protect and improve the watersheds.

The whole issue of watershed management is complex and difficult. There are no simple solutions. Our satisfaction with today's accomplishments diminishes when we think of what yet needs to be done. But the job ahead need not dismay us; it can be done and, somehow, must be done if the Nation is to remain strong and prosperous.

Regardless of the difficulties, water is the most important natural resource issue before us as a people. Each of us is vitally involved and, therefore, each is obligated to practice and promote more intensive watershed management at every opportunity. The health of our watersheds can well determine the economic health of our communities and our Nation. With well-managed watersheds we can grow in strength and prosperity.