

THE WATERSHED MANAGEMENT PROGRAM OF
THE U. S. DEPARTMENT OF AGRICULTURE

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It is gratifying to have this opportunity to outline for the Fifth Annual New Mexico Water Conference the watershed management programs of the Department of Agriculture.

Definition

The term watershed management connotes quite different sorts of activities to different audiences. In the Department, in fact, it encompasses a wide variety of activities which often have materially different objectives. To some people, especially in the Southwest, watershed management is identified with the land above the irrigated valleys. Watersheds are commonly thought of as the forested or brush-covered drainage areas of the mountains and foothills from whence comes the life-giving water for crops and livestock and domestic use. Watershed management to western water users may be protection of timber stands from cutting or from fire; it may be the clearing of brush or selective cutting to produce greater water yield; it may be erosion control to reduce the heavy sediment load that threatens destruction of valley storage reservoirs.

In other sections of the country, however, watershed management may mean something quite different. In the Southeastern Coastal Plain, or the Minnesota pothole country, it may mean a well developed system of drainage canals and laterals on lands so flat that only a transit will reveal watershed divides. In the Southern Piedmont or the rolling plains of Texas and Oklahoma it may mean a system of crop and range land treatment supplemented by floodwater-retarding structures to prevent excessive flood damages. In most sections of the country people think of watershed management as including all the lands of the watershed, the flood plains or valleys, as well as the sloping uplands or mountains.

Several Department programs either are watershed management, or contribute materially to watershed management. These programs fall in two categories: (1) the action programs, and (2) the supporting programs. Supporting programs include research into many aspects of watershed management by the Agricultural Research Service and by the Forest Service. These research programs, we are happy to report, have been generously supported and greatly strengthened in the past 5 years. They are giving us progressively better tools with which to do an increasingly effective watershed management job. Another supporting program is the Federal-State Extension Service work which shows private landowners the need and value of watershed management, thus paving the way for action to apply the knowledge gained from research.

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Action Programs

The action programs of the Department that directly provide or support watershed management may be catalogued as:

- (1) The soil and water conservation assistance provided to individual landowners and operators or small groups of landowners by
 - (a) technical assistance from the Soil Conservation Service supplied through local soil conservation districts,
 - (b) cost sharing in the application practices provided through the Agricultural Conservation program,
 - (c) the Great Plains Conservation program operating in ten Great Plains States administered by the Soil Conservation Service, and
 - (d) loan assistance for application of soil and water conservation measures provided through the Farmers Home Administration;
- (2) The watershed management work of the Forest Service on the National Forests; and
- (3) The small watershed program providing technical and financial assistance to local organizations authorized by the Watershed Protection and Flood Prevention Act, Public Law 566, and administered by the Soil Conservation Service, with assistance of the Federal public land management agencies.

The programs of assistance to individual landowners and operators all contribute to watershed management. They are, in fact, an essential part of it. They are not in themselves watershed management, however, for their basic objective is the conservation and development of soil and water resources on the individual farm or range, the field or pasture, the acre or timber lot. The benefits that accrue to the watershed as a whole are the incidental dividends not the planned purpose of these programs.

If watershed management programs have a distinguishing characteristic-- and I believe that they do--it is that they are based on a watershed plan and a schedule for its accomplishment. They necessarily encompass and take full advantage of all of the other kinds of conservation programs that can contribute to the scheduled accomplishment of the plan. They add only the necessary additional inputs of technical, financial, or other resources needed to reach the planned goal. The goal itself nearly always includes objectives that are impossible to accomplish by separate action of individual landowners or through continuing annual programs on public lands. Such objectives, which generate the need for watershed management programs, include flood prevention, irrigation water supply and distribution, drainage systems, municipal and industrial water supply, fish and wildlife development and recreation, pollution abatement, etc.

There is a growing demand for complete multipurpose watershed programs. This is manifested in many ways. One is the recently enacted National Forest Multiple-Use Act, Public Law 86-517. Another is the increasing number of multipurpose objectives such as municipal water supply, fish and wildlife development, etc., being included in P.L. 566 applications for assistance.

Interest is being widely expressed in bringing into small watershed projects still other purposes such as pollution abatement, phreatophte control or mine waste disposal, in fact any and all purposes that are required to provide the complete solution of the land and water problems of upstream watersheds.

This trend makes it apparent that we must all broaden our concept of watershed management. We should no longer conceive of it as just the management of vegetative cover on the mountains above our irrigated valleys nor the construction of systems of floodwater-retarding reservoirs, or storage and conveyance systems for irrigation or drainage. We must increasingly conceive of watershed management as the total job of land and water development, conservation, and proper utilization in all the natural hydrologic sub-basins of our great rivers.

The two action programs of the Department for which funds are appropriated under the general heading of watershed management or watershed protection are (1) the public land program of the Forest Service and (2) the small watershed program administered by the Soil Conservation Service.

Watershed Management on National Forests

The Forest Service administers approximately 186 million acres of public lands including national forests and national grasslands. One-fifth of the eleven Western States is national-forest land. This land, because of its mountainous character and generally high elevation, receives one-third of the precipitation and furnishes over half the streamflow. Western national forests are major sources of water for hundreds of towns and cities, and for an intensely irrigated agriculture. Over 600 hydroelectric developments depend on national forests for water. Over one-third of all big game in the Nation is found on national forests, along with 81 thousand miles of fishing streams and over two million acres of natural lakes and impounded waters. About 11 percent of the lands in New Mexico--some 9 million acres--are administered by the Forest Service. These areas and intermingled ownerships produce approximately three-fourths of the total usable water of this State.

Watershed management on the public lands administered by the Forest Service consists of three principal phases. These are protection, restoration, and improvement. These phases may overlap and in all cases must be correlated with the management of other wildland resources as part of the multiple-use objectives for these lands.

Protection may be defined as management to maintain existing and acceptable watershed conditions. It includes the inventory and analysis of watershed conditions and requirements as they relate to soil and water resources.

Under multiple-use management full consideration is given to the perpetuation of all resources. In general, water is favored in applying this management. Uses for forage, big game, wildlife, recreation, timber and other resources are oriented toward soil conservation and maximum development of the water resource. In some cases values other than water may be dominant but the overall resource management will still be harmonized with proper watershed functioning to control erosion and retard runoff. Thus, the job of the forest land manager includes an appreciation and appraisal of the impacts of the combined uses of resource upon individual watersheds.

Restoration involves the correction of undesirable watershed conditions, many of which are of long standing and existed before the establishment of the national forests. Work in this activity includes such measures as contour terracing, pitting, water spreading, gully and channel stabilization and erosion control on roads, trails, and other disturbed areas. It also includes revegetation for watershed purposes--not ordinarily considered in regular tree planting and grass seeding operations primarily for increased timber and forage production.

Since 1956 restoration projects have been undertaken on some 80 national forests. Examples of those carried out in New Mexico may be found in the multiple-use project in Taos Canyon, and the restoration of abandoned roads on the Carson National Forest; and the Glorieta Mesa project on the Santa Fe National Forest.

Improvement is research and pilot plant trials on new methods of watershed management. The Forest Service is continuing studies concerning maintenance of soil stability, improvement of infiltration, retardation of rapid storm runoff, and prevention of siltation, all of which help to make more water usable. Work of this kind is well under way in New Mexico on the Rio Puerco watershed. Modification of management practices to improve water yields is also being studied in experimental watersheds in the Santa Fe National Forest. An outstanding illustration of this research work is the Salt River project in Arizona, the results of which may also apply to some New Mexico watersheds. Here dense thickets of young pine are being thinned by several methods. Heavy stands of low value juniper are being rooted out with tractors followed by grass seeding. Experiments in controlling chaparral with chemicals are being tried. Timber stands at high elevations are being cut patchwise to allow more snow and rain to get to the ground. From the standpoint of water supply and quality the results are being measured by stream gages and sediment basins. It is hoped that from these studies more progress will be made in watershed management practices which will increase the annual yield of usable water from national forests and other similar lands.

The Public Law 566 Program

On privately owned lands, the Department's principal watershed activities are those authorized by the Watershed Protection and Flood Prevention Act, Public Law 566. Work is continuing on eleven watershed projects comprising about 30 million acres authorized in the Flood Control Act of 1944, and is nearing completion on some 60 pilot watersheds provided for in the USDA Appropriation Act of 1954.

Few conservation Acts have created as much popular interest and activity in such a short time as has Public Law 566. Although the sixth anniversary of its enactment occurred only last August, local organizations have prepared applications for assistance under its provisions in some 1600 watersheds. As of October 1, 1,367 applications had been approved by designated State agencies in 47 States and Puerto Rico, and had been transmitted to the Department of Agriculture. These applications cover over 95 million acres. In order to enable more effective State and local participation in this program, the legislatures of 40 States had enacted more than 150 pieces of State legislation. Additional new legislation is being prepared for consideration

by the legislatures of several States next year.

As of October 1, the Soil Conservation Service had provided planning assistance to 593 watersheds containing over 41 million acres. Based on completed plans, approved administratively or by congressional committees, as required, 285 projects containing about 17 million acres had been authorized for operations and an additional 19 completed plans are in the process of approval.

New Mexico stands very high in taking advantage of this program. It ranks sixth in the Nation in number of applications, sixth in number of projects approved for operations, and fifth in acreage included in these projects.

The popularity and support of the P.L. 566 program throughout the Nation indicates that it truly meets a long-felt need for organized action to fill a gap in our national resource conservation and development. Prior legislation had provided, on the one hand, for programs of public land conservation and for technical, educational, cost-sharing and credit assistance to individual private landowners and operators. On the other hand, the Reclamation, Flood Control, TVA, and other Acts had authorized large programs of Federal development of downstream river resources, including vast irrigation schemes, hydro-power development, flood control, navigation and, secondarily, fish and wildlife development, recreation, and municipal or industrial water supply.

The gap left by these programs occurs in the small watersheds, generally those of less than 250,000 acres. The small watersheds have many of the same needs for land and water management that exist on the larger rivers. More than half of the flood damage in the Nation occurs in these upstream watersheds. A large percentage of the irrigated farmlands of the West are within or get their water supply from small watersheds. Most drainage needs in the East are confined to small watersheds. Thousands of towns and small cities use surface water supplies from such watersheds. Fish and wildlife and recreational development must be greatly accelerated on small watersheds if the need for such development is to be brought within reasonable distance and cost to the average citizen. Many of the problems of erosion, as along water courses, or of phreatophyte control can be effectively solved only by public action programs in small watersheds. In fact, of all water resource developments only navigation and hydro-power seem to be confined to, or even predominant on, our larger rivers.

Although the gap in resource development in the small watersheds was widely recognized for a long time, a crucial issue was how it was to be closed. Were Federal public works programs to be extended further and further upstream until they reached the individual farm? Or were local groups with little help from State government to be left to contend ineffectually with small watershed problems?

The Public Law 566 program was a response to this need hammered out in the Federal executive and legislative branches in the early 1950's. Its fundamental principles are (1) local initiative and responsibility, (2) Federal technical and financial aid, and (3) State review and approval of local proposals with the wide open opportunity for State financial and other assistance.

The P. L. 566 program already provides the opportunity for meeting a large part but not all of the land and water management needs of small watersheds. At present watershed projects may include all needed measures for land treatment and stabilization on public as well as private lands and additional structural measures for flood prevention, irrigation, drainage, fish and wildlife development, and municipal and industrial water supply. To the extent that any needed purposes are not presently included in the scope of the Act it seems more than likely that the legislation, already amended five times since its original enactment, will be still further improved during this decade. The kinds and amounts of Federal, State, and local cost sharing may be modified from time to time. Changes in emphasis and priority are likely. But in my judgment the basic pattern of local, State, Federal partnership will not change. It has appealed to farmers and city dwellers alike as being basically sound and fundamentally right in the framework of our American system of government.

The Conservation Needs Inventory - Watershed Phase

Other participants in your Conference will spell out some of the details of operation of the P. L. 566 program, and how it is progressing in New Mexico. In the few minutes remaining to me, I would like to outline the national scope of small watershed treatment needs as revealed by the Department's soil and water conservation needs inventory. Many of you here, I am sure, participated in this inventory over the past three years either as members of the State CNI committee or of County CNI committees. These committees included representatives not only of all the principal USDA agencies concerned with soil and water resource conservation, but also of other Federal, State, and County agencies having responsibility in this field. The inventory was made in two parts. The first part dealt with conservation needs on the land itself--adjustments of use within capability and treatment according to needs that can generally be accomplished by the landowner with appropriate forms of technical and financial assistance. The second part dealt with watershed needs that required group action through project-type undertakings by public agencies--local, State, and Federal.

My discussion here relates only to the second part of the inventory. The figures are still tentative as a few States have not yet been fully checked out, but they are close enough.

Except for a few large primarily arid areas in the West, the United States was divided into 12,717 watersheds, all less than 250,000 acres in size. The problems which would require project action for solution in each watershed were studied by the County CNI committees using various kinds of data compiled by participating agencies for the committees. Based on these studies and combining their multiple judgment, the County committees estimated the acreages and quantities of needs for flood prevention, irrigation improvement, drainage, and other water resource purposes. The County reports were reviewed and correlated by the State CNI committees and the State reports are now being reviewed and correlated by a national CNI committee.

The State reports show a need for project-type action on 8,288 watersheds or 65 percent of the total number in the Nation. These watersheds contain approximately one billion acres or 55 percent of the Nation's land area. The inventory shows an estimated 61 million acres needing project action for

flood protection in upstream watersheds, 15 million acres needing project action for irrigation, and 43 million acres needing project action for drainage.

In New Mexico 451 watersheds were delineated and 134 of them containing 18 million acres were considered by County committees to need project-type action programs. The problems delineated in these watersheds included 633,000 acres needing flood protection, 67,000 acres needing irrigation improvement, and 2,000 acres needing drainage improvement.

Dimensions of the Watershed Job Ahead

Against these and other related estimates it is possible to make some first approximations of the magnitude of the small watershed job ahead. In this inventory it was impossible to evaluate the economic feasibility of meeting the appraised physical needs by reference to existing standards of benefit-cost analysis. On the other hand, standards of benefit evaluation as well as costs change with time. They are more than likely to be quite different in the year 2000 than they are today if present population and economic projections are realized.

Applications have been received under P. L. 566 for Federal assistance on over 95 million acres. The total treatment costs, Federal and non-Federal, on the first 267 watersheds comprising 16½ million acres authorized for operations under the P. L. 566 programs, is \$21.69 per acre. Treatment costs on the 30 million acres in the 11 authorized watersheds are about the same. If it were assumed that average future treatment costs would be \$25 per acre, and that 80 percent of the one billion acres were within economically feasible watersheds, an ultimate aggregate outlay of \$20 billion of local, State, and Federal funds would be indicated. In the current fiscal year we estimate that the total local, State, and Federal outlay for watershed project programs will approximate \$95 million.

The relation of this estimate to projections of total water resource needs is of interest.

The Department of Commerce has published a report entitled, "Water Resources Developments, Capital Investment Values 1900-1975" (June 1959) which projects water resource needs to 1975. In this report the Department estimates for the period 1954-1975 a total capital investment need, expressed in constant 1958 dollars to meet existing deficiencies, supply the increasing population and overcome obsolescence of \$214 billion. This includes municipal and industrial water supply, sewage and waste collection and treatment, pollution abatement, power, irrigation, navigation, flood control, fish and wildlife development and recreation. Of this amount some \$53 billion, more or less, represents the estimated needs for Federal expenditures if Federal responsibilities or cost sharing under existing authorized programs is continued. These projections made by the Department of Commerce include part but not all of the watershed program needs as estimated independently from the Conservation Needs Inventory.

As large as the watershed program needs may seem when considered independently, the estimated \$20 billion constitutes only some 5 percent of the total needed capital investment in water resources.