

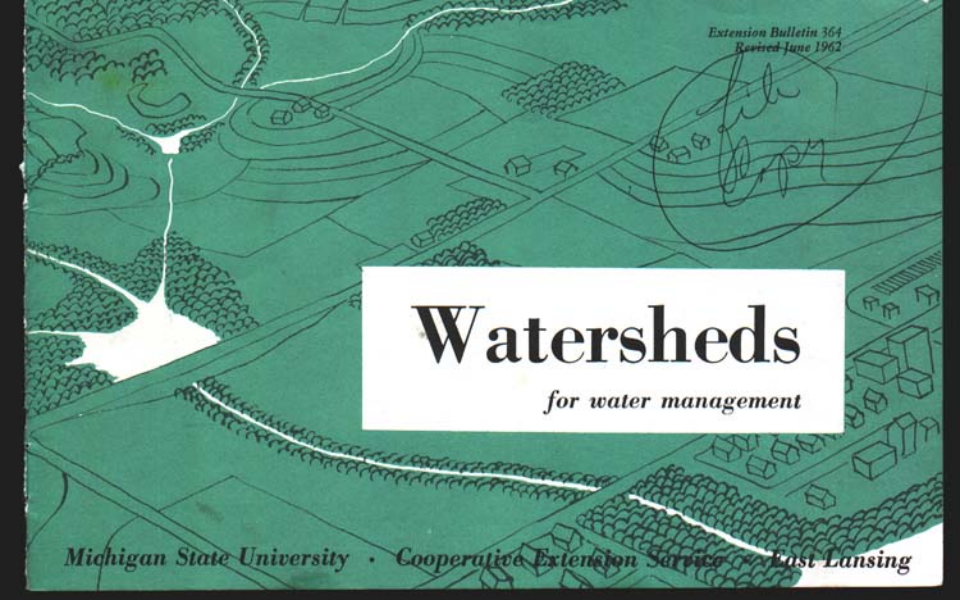
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Extension Bulletin 364

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# Watersheds

*for water management*

Michigan State University • Cooperative Extension Service • East Lansing



# watersheds

## for water management

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# the problem

## *surface water management begins when the raindrop first hits the ground*

A WATER WONDERLAND is nature's gift to the people of Michigan. The state has abundant fresh water in underground reservoirs, lakes, and streams. The supply can meet immediate foreseeable needs.

Future generations may not be as lucky. Population will grow; per capita consumption of water will increase; industry will expand. Acute problems will arise in providing water to all who need it.

Running water knows no property line or political boundary. No one segment of the population or any one industry could ever solve its own water problems completely and satisfactorily. Even if that were possible, the solution would create new problems for others.

This bulletin discusses some of the problems of surface water use and management, and suggests how Michigan people can band together to solve them on a "watershed basis."



Ground work is already laid to meet some of Michigan's surface water problems:

- Statutes provide for organizing water management districts.
- Soil Conservation Districts help with land treatment to reduce surface runoff and assist in applying for federal aid.
- The Fish Division of the Department of Conservation is also active in watersheds to improve the quality of water for fish.
- Drainage Districts are in operation.
- Some farmers pool their efforts informally to meet a local problem.

All these plans have one thing in common. Each is a coordinated "watershed" program of water use and management. In each, management should begin where the raindrop first hits the ground.

# a watershed

## *what and why*

Everyone lives in a watershed. It includes all the land and water area having common drainage into a stream, a lake, or an ocean. It may cover only a few acres draining into a brook. It may include thousands of square miles draining into a large river and then into a lake or ocean.

In its largest sense, it is a regional river basin with a wide range of farm land, forests, many streams, lakes, towns, cities, and other subdivisions — all draining into an ocean.

As a geographical unit, it is suited to maximum water management in a specific area. It is a management unit around which people with varied economic and social interests can work together on a common problem. It provides a workable unit with which public agencies can coordinate their water management activities.

Uses of water in any area are obvious:

- Farmers use it both to irrigate and to protect crops, to water their livestock, as well as for home protection and use.
- Industry uses it in factories, power plants, transportation, air-conditioning, and waste disposal.
- Cities use it for public water service and sewage disposal.
- The public uses it for recreation.

In serving all these needs, water is not always found at the right place at the right time in the right amount at the right quality and at the right price for everybody.

In many places, more water is needed than a lake or stream can provide. Few streams or inland lakes have enough for all uses on a year-around basis. This is especially true in summer when the surface water supply is limited. Then there may not be enough water for one use, let alone the needs of many groups.

In late winter and spring the picture is entirely different. Snow melt and heavy rainfall provide more water than is needed. There is considerable run-off, erosion damage, silting of channels and flooding, and a need for drainage.

## *water runs downhill*

Often water damage in a downstream area may have its beginning many miles upstream. This fact is not often appreciated when property owners in the upper parts of a watershed are asked to help reduce water damage downstream.



Lowland floods often result from large volumes of surface run-off from uplands. Erosion from fields, and the silting of streams, impounded water, highways, and other property can be severe when uncontrolled surface water accumulating from many acres concentrates in a single swift flowing channel and overflows adjacent land.

Equally important is the fact that such uncontrolled water is usually lost to the land owner or other users. Such loss may limit expansion of agriculture, industry, recreation, or subdivisions in that watershed.

Managing surface water to reduce flooding, siltation, and excessive run-off and to achieve the best utilization of water for many purposes requires that we approach the job on a watershed basis.

### *too much or too little*

With water, it is often the case of too much or too little, and both situations may exist in the same area during a single season. Thousands of acres have become productive

for agriculture and other uses by tile drainage. Such drainage is dependent upon outlet channels that can transport large volumes of water. Some areas have no adequate channels or ditches.

There are other problems too. Home owners, business establishments and industry may so pollute the streams or lakes with sewage and wastes that the water has little value for other uses. Home builders often use sites on flood plains adjacent to rivers and lakes. Such sites are frequently flooded. When damage occurs, property owners look for relief. Public action on such problem areas must occur prior to unwise development. Industrial and municipal developments adjacent to water channels may also result in additional flooding hazard.



## *more, More, MORE*

An increasing population is aggravating the water use problems. Pavements and roofs encourage rapid run-off. More people, more industry, intensive agriculture, all mean greater domestic water uses, more recreational water needs, increased irrigation water demands, more waste and sewage disposal and larger volumes of high quality water for manufacturing. When these demands are made on a limited supply, competition results in many social and economic conflicts, and insufficient water for any one user.

It becomes necessary and logical to attack the problem on a coordinated watershed basis.

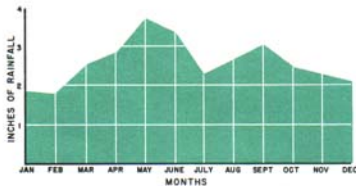
## some water facts

The water that becomes surface run-off and ground water recharge comes from rain and snow fall. It averages 31 inches annually in Michigan. About two-thirds of the rainfall is lost in evaporation or used up by plants. This leaves about one-third of our rainfall to percolate to underground reservoirs or run off.

Rainfall is not evenly distributed throughout the year. The graph shows the monthly average rainfall at the Lansing U.S. Weather Bureau station.

The conclusion is obvious. The most water is available in spring when demands are not great; there is less rainfall in the summer when demands are greatest.

Flooding hazard is most serious when snow on frozen ground is melted by rain. However, localized flooding may occur even during summer. Rainfall in thunderstorms during this season is usually very intense over a short period in a limited area. Run-off and erosion may be very severe in such localities.



# watershed objectives



Basically, watershed objectives are:

- Reduce the loss of surface water run-off from uplands to a minimum.
- Reduce damage caused by erosion, flooding, inadequate drainage, and pollution.
- Manage surface water so that it provides for its maximum use from the time it drops on the earth's surface until it reaches the ocean.

## *management techniques*

Specific techniques are used to reach these objectives:

- (1) Land treatment practices that will enable land to soak up large volumes of water, reduce rapid run-off and improve drainage.
- (2) Impoundment or storage of water upstream in the watershed during periods of heavy run-off.
- (3) Improved water channels to speed run-off or improve drainage and to help reduce flooding.
- (4) Regulation of private and public development adjacent to water channels and in flood plains.
- (5) Pollution control to maintain water quality and to provide for its re-use.



# starting a project

## who starts it?

Many groups may provide local initiative to start a watershed project. Such projects have been started by Soil Conservation Districts, township boards, county boards of supervisors, municipalities, Chambers of Commerce, civic clubs, planning commissions, and local watershed associations.

The local "spark plug" should be a group with ability and facilities to initially bring together community leaders, representatives of water use interests and public agencies having facilities for watershed assistance. Out of this organization should come a general attitude that this is "our" watershed project.

## what to do

First, a watershed project begins with recognizing a problem or problems. Then come: *acceptance of the idea, desire for problem solution, a plan of action, inventory of the problems, evaluation of the inventory, alternate solutions, acceptance of a work plan, and finally, action.*

Problem-to-action-and-solution requires time and patience. Local people should conceive, develop, organize, and administer the projects. Public agencies may have re-

search, educational, technical and financial assistance; but it should be made available to local people through local organization. Such a partnership requires that all local groups affected by the water problems should be represented in starting and carrying out the project.

It requires widespread and continuous educational programs for all people in the watersheds. Such programs must begin with the general recognition of the problem and continue through the action program. There is no substitute for an informed public.

As many people as possible should know about the extent and significance of the problems, the possible solutions, local responsibility, public assistance and organization necessary for watershed accomplishment.

## how large a project?

The nature of the water problems and the desire of people to correct them will determine the size. Problems involving gully erosion, limited flooding or drainage may affect only a few farms or a few hundred acres and a small surface water channel. However, some erosion damage or flooding may be caused by land use and other factors existing several miles away. To correct such problems,

both the damaged area and the area contributing to the damage must be a part of the watershed project. This may involve several thousands of acres, many farms, and even towns or cities. In other instances, several counties, cities, subdivisions and small streams must be included in the watershed project to handle the water problems effectively. The Grand, Huron, Au Sable, and Muskegon are examples of large watersheds.

In a few instances the total watershed of a large river basin involving the complex problems of several states is necessary. The Ohio or the Mississippi River Basins are examples. An inventory of the water use problems and the cost of the project in relation to probable benefits to be received and interest shown by local people in solving their water problems will often provide an early answer concerning the size of a watershed project.

## kinds of watershed projects

- *pooling agreements*
- *drainage districts*
- *improvement projects*
- *small watersheds*
- *water management districts*

## *Pooling Agreements*

Occasionally a few farmers with a common water problem may decide to work together to solve it. This requires no formal organization and they may not need outside help. In other instances farmers may pool their Agriculture Conservation cost-sharing payments under a pooling agreement to help defray the costs. The County Agricultural Stabilization and Conservation Committee, County Extension Director, or Soil Conservation Service Conservationist can provide more details about such projects.

## *Drainage Districts*

Agriculture drainage may be a principal problem. New or improved outlets may be necessary before field tiling or surface drainage of flood water can be installed. Residents should also look to land treatment and structural measures to reduce erosion, encourage water infiltration, and retain moisture for summer use.

Drainage districts established under Michigan drain laws may provide a legal organization for doing the chan-

nel work and other flood prevention and control measures, and for levying assessments for their cost and maintenance. Information on drainage districts is available from the County Drain Commissioner, County Extension Director or the local Soil Conservation District.

## *Watershed Improvement Projects*

The Fish Division of the State Department of Conservation is working on several watersheds in which fishing streams are important. Rapid water run-off into streams causes siltation, changes water temperature, and accelerates stream bank cutting. These conditions harm the fish populations.

Correction involves soil conservation practices, protection of stream banks, and stream channel improvement. Major costs for water retention structures, planting materials, and stream bank protective fencing are borne by the Conservation Department from fishing license funds. Other aid can come from the local Soil Conservation District and cost sharing for certain practices from the County A.S.C. Committee.

Further information on these projects may be obtained from State Conservation Department field offices or from the Fish Division, Michigan Department of Conservation, Mason Building, Lansing.

## *Small Watershed Projects*

*Under Congressional Act 566, 1954, as amended*

The federal government through Congressional Act 566 will provide extensive aid to communities carrying on watershed projects. The problems may be flood prevention and control, agricultural drainage and irrigation, fish and wildlife habitat improvement, recreational area development or municipal and industrial water needs. Aid with making inventories, project planning, engineering, and construction financing is available. Size of any one project is limited to 250,000 acres.



Assistance is provided to local people who must have a legal organization sponsor with authority and ability to issue contracts, obtain easements and rights-of-way, levy assessments for local share of costs and operate and maintain the project after completion. Since soil conservation treatment on land is an important part of these watershed projects the local soil conservation district should also be a sponsor of the watershed.

### **who has authority?**

At the present time it has been determined that township boards, certain cities, county drainage districts, inter-county drainage districts and water management districts have authority and ability to construct, operate and maintain works of improvement. Any one of these units would make satisfactory sponsors, or co-sponsors with Soil Conservation Districts for "566" watershed assistance.

### **how to apply**

Applications for watershed assistance must be submitted to the State Soil Conservation Committee. The committee was designated by the governor to act for him in accordance with the watershed act in approving or disapproving the application before its submission to the federal government.

## Small Watershed Projects

*continued*

### state policies

The State Soil Conservation Committee has adopted the following policy concerning applications for Federal watershed assistance under Congressional Act No. 566.

- 1 Sponsors should discuss watershed problems and possible solutions with community or special interest leaders and with interested agency representatives before proceeding with watershed development planning.
- 2 Local sponsoring agencies should obtain advice and counsel from a technical watershed management committee prior to submitting an application for USDA watershed assistance under P.A. 566. This technical review should take place prior to an information and education program in the watershed.
- 3 Sponsors should organize a committee of local leaders to advise and counsel with them on the watershed project.
- 4 A series of watershed-wide information meetings and related education activities should be locally conducted on Public Law 566 and the proposed watershed project.
- 5 A sponsor and at least one co-sponsor with legal authority and ability to construct, operate and maintain works of improvements make applica-

This committee, to be arranged by the State Soil Conservation Committee, will consider:

- The eligibility and feasibility of the proposed project under Act 566.
- Possible alternate solutions to the water management problems of the area.

It will report its findings through the State Committee to the sponsoring groups. If favorable, these findings must accompany the application.

tion to the United States Secretary of Agriculture for watershed assistance (use authorized application form as provided by the State Soil Conservation Committee). The completed application must be submitted to the State Soil Conservation Committee, Unit E, Wells Hall, Michigan State University, East Lansing.

- 6 State Soil Conservation Committee will conduct a public hearing on necessity of project.
- 7 State Soil Conservation Committee makes determination and assigns priority to project.
- 8 State Soil Conservation Committee forwards approved application to State office of the U.S. Soil Conservation Service.

Further information on this type of watershed help is available from your local Soil Conservation District, local U.S. Soil Conservation Service office, County Extension Director, or from the State Soil Conservation Committee, Michigan State University, Unit E, Wells Hall, East Lansing, Michigan.

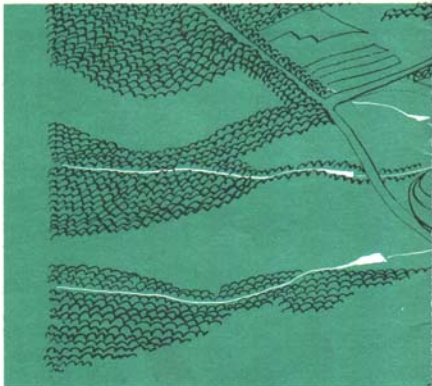
## *Water Management Districts*

Michigan statutes provide for the organization of water management districts. The minimum size of such a district is all or parts of three or more adjacent counties. This organization is adapted for large watersheds or river basins. It has sufficient powers to assist projects involving farm land, subdivisions, cities and industries. It is locally administered and its powers include issuing contracts and agreements, obtaining rights-of-way and easements, constructing, operating and maintaining water management structures and levying assessments for the costs.

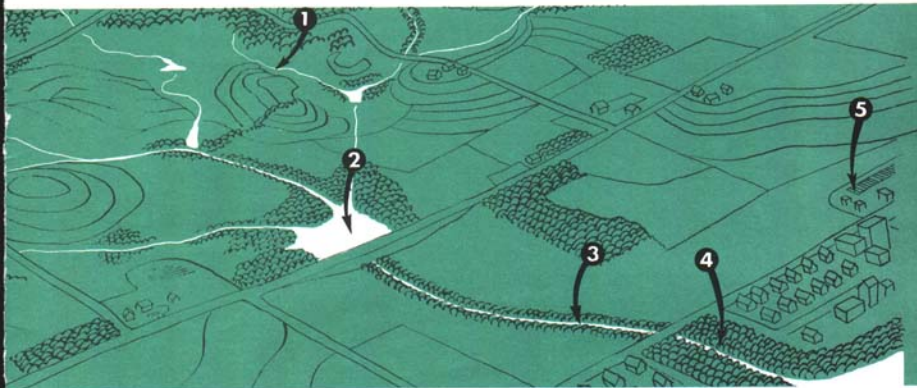
Information about these organizations may be obtained from your County Drain Commissioner, County Extension Director, or by writing the Michigan Department of Agriculture, Lewis Cass Building, Lansing.

## “Our” Watersheds

Watershed management becomes a task of cooperative action by all water use interests in a geographical area to solve a common natural resource problem. Local people who want to accomplish this objective should utilize their own leadership, initiative, facilities, and organizations. They may bring into the problem area the combined resources of public agencies – federal, state and local – to aid them with the job. This is indeed democracy in action.



1 Land Treatment Practices



2 Water Storage

3 Channel Improvement

4 Flood Plain Protection

5 Pollution Control and Water Purification





