

Proper Land-Use Management for Iowa Through Public Education

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THE typical Iowa citizen is proud of his state and of its position as one of the most productive agricultural areas of the world. Our production record seems enviable, but before we become too enthusiastic let us measure the cost of production against our cash returns.

From the monetary standpoint it appears that we generally reap a reasonable profit from our agricultural enterprises. If we assume that present practices carried into the future will produce the same favorable results we immediately classify ourselves as supreme optimists and may procede to stumble blindly along leading our agricultural program into an economic chasm from which it may never be able to return.

Many of us, in the past, have balanced our ledgers to our personal satisfaction by neatly placing cost of overhead opposite cash return. Too often have we failed to list in these ledgers the most important factor on which continued production and cash return hinges—the item of **depreciation**. If we choose to further ignore this controlling factor we will, without fail, reduce the productive capacity of our resources beyond the carrying capacity upon which the economic welfare of our country is dependent. This is not a state problem alone; it is national in its scope.

The citizens of Iowa and of our nation may believe that our agricultural blessings have been so favorably bestowed that we do not have a problem in land-use management, or if one does exist, it is only of slight and unimportant nature. The application of a “mining” attitude to all major land uses in our country has led to a serious depletion of natural resources without provision for edequate management and protection in the future.

IF WE look to the southern part of Iowa we find a considerable amount of non-tillable land, including woodland not pastured, woodland pastured, and pasture. The average per cent of non-tillable land for 22 southern Iowa counties is 26.6, with such representation of 34.3 per cent in Lee County, 32.7 per cent in Union County, and 42.6 per cent in Van Buren County (8).

It might be inferred from the classification of these areas above that the land is protected by forest and pasture cover, but lack of proper management on these areas has led to site deterioration and an inadequate economic return as compared to the protection and increased production possibilities if correct management were applied.

Soil erosion is one of the major results of the "mining" system of general farm practices. The aspect of this problem is tremendous and is especially important in southern Iowa. Only 13 per cent of all Iowa land shows little or no erosion. Some 31 per cent is seriously eroded, and 50 to 70 per cent of the original soil surface in this area has been washed away and the land is moderately to excessively gullied. It has been estimated that 137,000 tons of fertile surface soil per 160-acre farm or approximately 35 per cent of the original soil surface has been swept away since cultivation began (11). There has also been a tremendous loss of plant nutrients and organic content of the soils which aided in keeping the soil friable to permit the absorption of rainfall, thereby lowering run-off.

As long as there is plenty of surface soil, even heavy soil losses from erosion will not directly affect the crop yields, but the surface soil becomes continually shallower until the sub-soil is exposed. This is the stage when productivity of the soil breaks down rapidly. Erosion goes on at an increasing rate because of the soil deficiency in organic matter, its reduced infiltration capacity, and its decline in fertility which results in small crop yields.

MISMANAGEMENT of our natural resources should not, in every case, be interpreted as an unwillingness on the part of the practicing agriculturalist to employ what has been suggested as correct land management. The lack of application may be due to several important reasons. Those of us who criticize past and present practices should realize that

there has not been sufficient data as to the best policy for founding a sound program. Recent unfavorable economic conditions have also forced the agriculturalists, in many cases, to practice unfavorable methods of land-use in order that they may secure a living for the present. In either case we cannot expect application of land-use methods which consider the future unless we can formulate a substitute that is physically and economically sound.

Committees within the Iowa Agricultural Experiment Station have been investigating actual field conditions and have endeavored to formulate integrated policies of correct land-use. They have approached the problem of correct land-use management from the study of influencing factors such as farm size, type of farming, land tenure, and financing or debt-adjustment on heavy mortgages.

These committees have concentrated most of their effort on the Bigcreek Watershed of 152,000 acres in Ringgold and Decatur counties of Iowa and Harrison County, Missouri, which is one of the Soil Erosion Service and United States Department of Agriculture demonstrational and experimental projects.

They have found that the size of a farm is directly influential upon the type of management practiced upon it. About 66 per cent of the land on farms below 100 acres is growing high-value crops (10). These smaller farms are consequently pushed harder to meet the overhead, and this concentration of land in crops often means the clearing of wooded or pasture slopes which, when cleared of their protective covering, soon are subject to severe erosion. It was found that the deal crop system for soil erosion control on farms of 141 to 180 acres may need a corn reduction of over 30 per cent, but farmers are unwilling or economically unable to go further than 27 per cent.

On such small farms where further corn reduction cannot be practiced, there is the alternative of erosion control through proper management of the soil cover. On land near Bethany, Missouri, 30.3 inches of rain fell on April 3, 1934 at an average of 2.36 inches per hour on a plot which had grown corn previously but was bare at the time. The soil washed away was 46 tons per acre which was nearly as great as the entire loss of 56 tons per acre caused by 76 rains that fell on the same plot in 1933 (11). This soil loss can be re-



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A typical farm woodland showing absence of reproduction due to grazing.

duced far below this extent if such practices as contour ploughing, strip cropping, terracing, and crop rotation are put into affect.

SIMILAR land near Bethany, Missouri, which lost more than 63 tons of soil per acre under continuous cropping to corn, showed a loss of only 12 tons per acre under a three-year rotation with one corn year. The return from these protected lands will increase as soon as their mismanagement has been corrected and normal conditions are once again present. The increased economic returns from them will give an ample operating margin necessary to keep the crop acreage as low as possible.

It has been recommended that 5 to 10 per cent of the land in the Bigcreek Watershed of southern Iowa now in crops or pasture should be put into timber, and between 12 and 15 per cent now in crops should be seeded down to permanent pasture to check erosion (10).

A change in the type of farming by reduction of corn acreage and replacement by grasses and legumes implies the replacement of hogs by dairy and beef cattle and sheep. It was found, however, that the beef cattle farms average 307 acres in size while the hog and dairy cattle farms are 160 and 142 acres in size, respectively. It seems evident from these figures that the small farmer cannot adapt his acreage to this type of farming because of large roughage and pasture acreage is needed besides crop production for feeding the stock.

THE only alternative left to the small farmer would be to put his rough land in pasture and buy concentrates and small grains or else increase the size of the farm by rental or purchase of additional land. Since 1900 farms have actually increased about 20 per cent in size. Dairy production has also increased, and indications are that this increase was made on the small farms.

An increase of acreage in pasture also necessitates the development of proper grazing management to utilize the area to its best productive capacity and yet maintain a protective covering which will prevent soil erosion and site deterioration to inferior successional weed species which are liable to become established if the area is used beyond its carrying capacity.

THE introduction of type farming has created an important and perplexing problem as to the classification of areas best adapted to a particular type of farm cover. Men working in research have suggested that sites of certain slope, exposure, and soil characteristics are best adapted to crop production, pasture, or timber, as the case may be, but they have gone no further than that. No one has set up a classification system in Iowa that gives comparative values of the monetary return between certain cover crops on various farm sites. Once that we can show the agriculturalist that one site and its adapted cover can produce a high return than any other cover type and yet be managed to thoroughly protect the area more efficiently at all times we will be able to sell land-use management.

There has been much debate over the comparative value of upland covered with pasture or by tree growth. It should be pointed out that since each cover type differs in its site requirements we should use the type which is best adapted to the site. This application requires that we initiate an extensive program of site classification which will aid us in establishing the proper cover types on the sites best adapted to them and on which they will effectively continue to protect the area and have the greatest productive capacity under proper utilization. This program requires that we determine which type will best meet the physical conditions and also be practical economically.

The tendency has been in the past to utilize our areas so heavily that they became practically worthless in producing a monetary return. We then proceed to discredit the ability of the particular cover type to protect the area, and we build up a prejudice against the idea that it is the best type adapted for the site.

STUDIES by Ralph H. Hughes (5) on a gently-rolling and moderately eroded pasture in Union County indicated a grazing use in previous years of 1 animal unit per 2 surface acres of pasture. The decadence of the bluegrass and the invasion of weed species, particularly three-awn grass, brought the necessity of reduced stocking. Numerous bluegrass seedlings now indicate that the pasture is again reverting to its normal bluegrass density. This study makes it evident that the cover type can only be kept in its best condition for pro-



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Favorable woodland condition as a result of controlled cutting and grazing practices.

tection and cash return by keeping a reserve through control of use.

Proper utilization to control overstocking requires that we set up a pasture-management plan to provide and maintain periodic pasture surveys which show the grazing resource, its physical condition, its relation to other resources, and how it may best be utilized, developed, and improved.

In considering proper utilization of land areas we are often prone to overlook one of our most important cover types—the farm woodland. The occurrence of these small farm woodlands and even windbreaks does not seem to have an influential part in land management since we think of them as comprising only a small portion of the vast area devoted to crops. It is also probable that the remote and vast forests often attract so much attention that these little forests are completely overlooked.

These small forests are found on 4,500,000 farms of the nation and they occupy 185,000,000 acres, or an area equal to one-half of the cultivated land or one-third of the total forest land (2). Some 6.7 per cent of the total farm land in Iowa is woodland, and 97.8 per cent of the forest land in the state is farm woodland (3). Most of the timber is found on the steep slopes or on stream overflow land not adapted to intensive

farming. It is on such sites that this cover is especially adapted and has the greatest value in supplying protection against erosion.

Farmers of the nation obtained a cash income of \$62,783,000 from the sale of woodland products in 1934 according to the Bureau of Agricultural Economics (12). In addition they extracted \$53,956,000 of products for home use for a total of \$116,738,000—this represented 3.8 per cent of the total farm income in 1934. Had proper management been applied to these woodlands the return would have been much higher.

The general attitude of ignoring their importance and the resultant mismanagement has left this cover type in a deplorable condition for protection and production. Most of our woodlands yield less than 50 per cent of their potential capacity due to mismanagement and errors in marketing methods, ie., selling forest products by the "lump sum", giving estimated instead of measured volume.

WOOD production, however, is only a small part of the farm forestry program. Our state needs not only trees on idle lands to put them to work but also to halt erosion; heal gullies; maintain streams and lakes in their natural condition and help prevent floods; harbor migratory, insectivorous birds; and to improve hunting grounds, preserve animal life and recreational areas. There are about 2,500,000 acres of eroded land, overflow land along streams, bluff and island land along the Mississippi and Missouri rivers, and wet drainage ditches which can be put into forest cover and thereby correct the damage now existent on some soils and make former waste areas productive in dollars and cents in the future (6).

Climatic conditions and a soil much higher in productive capacity than the average are both favorable to tree growth if proper management of the forest lands by the individual farmer can be practiced.

There are 1,800,000 acres of natural forest in Iowa. This is made up of "native woodlot", by which it is distinguished from planted woodlots. These natural areas have been culled of their most valuable species—white oak, black walnut, white ash, and hickory. The less desirable species—soft maple, elm, sycamore, honey locust, hawthorn and many others now predominate.

Practically all of the natural forest land has been so

heavily grazed that nearly all natural reproduction, except the inferior species mentioned above, has been destroyed. The forest soils have been compacted, the humus has been destroyed, and even the roots of the older trees have been injured and exposed by trampling. The combination of heavy grazing and cutting has caused the formation of heavy sod where erosion is not serious and has caused the prevention of seedling establishment. Such an area furnishes inferior forage compared to the open pasture and is not being managed profitably from either a forage or timber standpoint.

Study of a farm woodlot 95 per cent covered by trees, which is located north of the Ledges State Park at Boone, Iowa, by Ralph H. Hughes (5) indicates that the present rate of stocking of 1 animal unit to 20 acres is prohibiting normal timber development. On a similar timber pasture along the Des Moines River, overstocking previous to 1938 brought about severe sheet and gully erosion on the steeper timbered slopes. A good stand of seedling reproduction became established on the eroded areas during the 1938 season due to proper stocking. The carrying capacity for grazing purposes on this area, however, required 30 acres per cow for a six-months grazing period. Surely these figures give evidence that woodlots have a low grazing value.

THOSE areas which are best adapted to a forest cover should be managed to that end, and at no time should grazing be permitted. If it is desirable to utilize portions of woodland for shade protection to cattle, these areas should be adequately fenced off from the main woodland in order that the timber may retain its normal form, protect the site, and produce the material of which it is capable under proper management. As has been shown, the combined use of the woodlot will be a disadvantage to the pasturage and will prove disastrous to the woodland.

If we are to develop a forest crop which will turn idle waste lands into productive and protected lands which can be properly managed to produce a cash income and also prevent excessive physical damage we must prevent grazing on these forested areas, utilize the defective trees, and protect and manage the more valuable species to improve the stand form and condition.

The subject of pasture versus woodland use has been a

prominent controversial subject for some time in this and adjacent agricultural states, and I believe can only be definitely settled when we have learned to classify our sites and then proceed to establish the cover which is best adapted to the site and manage it in order that there will be the greatest protection and productive value attainable.

TOO often have we taken material products such as fuelwood and fenceposts from the farm woodland and then failed to credit the area with the production. Comparative production with other cover types is not on an equal basis when we fail to consider and credit such use. Our success in proper land utilization will only come when we draw up a management plan which recognizes and practices the distribution of cover types as to the sites best adapted, proceeds to control their utilization in order that the maximum production can be realized without destroying the protective value, and crediting each cover type with the tangible and intangible values which result from its presence.

A program for the land is not in itself sufficient for the development of proper land-use management to all of our resources. "We need to understand the people, their needs, their hopes and what they want to do themselves, by themselves" (1).

The committees of the Iowa Agricultural Experiment Station have realized that this understanding is vital to the establishment of an extensive program which endeavors to initiate land-use management. Surveys of land tenure and debt-adjustment on heavy mortgages have been made for the purpose of determining the economic status of the Iowa farmer and to establish methods for the coordination of efforts in a cooperative, state-wide management program.

The approach to a program of public education isn't by telling the people what is best for them but to indirectly induce into their ideas the desire for an objective because they can see the direct benefit it produces upon their lives. Indiana is now working on a program of woods management to determine the income-producing capacity of the farm woodlands (4). Records of income from farm woodlands comparable to those of other agricultural cover crops is essential in order to show that farm woodlands should be included in a farm management program. This should also apply to proper pasture management.

WE CANNOT expect these people who are now practicing poor management to accept suggestions for using certain cover types upon given areas unless we can show that the application of proper management will give greater returns than methods presently employed.

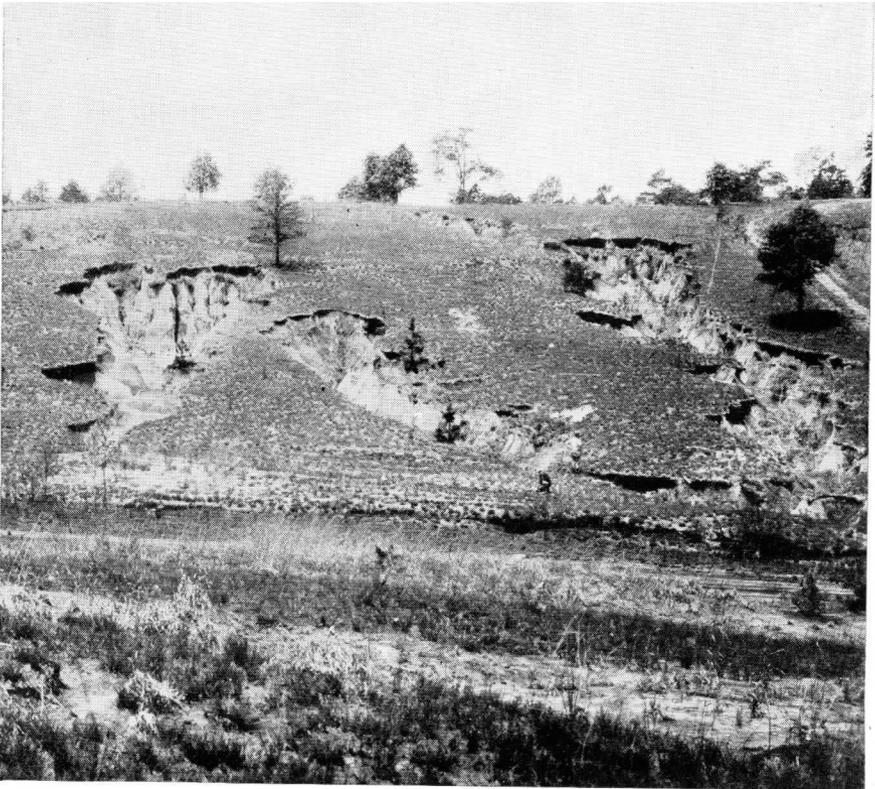
We do not, as yet, have sufficient field data to meet this demand, but the problem is challenging the educational leaders of our state. Detailed studies of the various cover types will give us a background to the cover best adapted to the sites and the production capacity of each site. Once we have assembled this data we have the selling points with which to push for better land management.

The development of a trained personnel in land management has also been pitifully neglected. Only until the last three years has there been more than one extension forester employed in any state of the Central States group (9). He had to carry on a sound program for the entire state, dealing both with adults and children.

In carrying out programs extension foresters are supposed to work through county agents who, as representatives of the extension service, the colleges, and the farmer organizations, are charged with the task of being local leaders of the programs being carried on in their counties. That procedure is excellent in theory, but in practice it has many shortcomings. Mr. L. E. Sawyer states that during the six years he served as extension forester of Illinois there was only one county agent who had included a forestry course in his education. Coupled with the necessity of educating the county agent was the task of selling the program to him in direct competition with all the other activities that were making demands on his time.

The attitudes of the county agents and teachers of vocational agriculture play an important part in determining whether farm forestry education shall be influential in informing the agriculturalist of present conditions and create enthusiasm to correct present methods and set up a working land-use program through cooperation.

A survey of 27 states was made to determine the attitudes of county agents in forestry education. The results showed that only 24 per cent had taken a course in farm forestry. There were 66 per cent of the vocational agricultural teachers who had not taken a farm forestry course but had expressed



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Even grass cover becoming established after the clearing of forests has been seriously overgrazed. Severe soil erosion has rapidly followed with resultant site deterioration.

a belief that such a course would be an asset to them. Many of the county agents and teachers who did not favor having farm forestry required in the curriculum made the comment that in their locality farm forestry was not sufficiently important to be made a requirement for graduation, but they evidently overlooked the fact that they might not always remain in the same locality and might someday be in a section where farm woodlands are important (3).

ONLY 8 of the hundreds of agricultural students of Iowa State College, who are potential leaders, are now taking a course in farm forestry. We may also reflect on the fact that the forestry schools have been lax in opening their curricula to farm forestry courses. There are only 8 out of 17 professional forestry schools that offer a farm forestry course, and less than 20 per cent require such a course for all agricultural students (3). A considerable number are also in-

adequately prepared to lead such programs as pasture management.

Mr. M. C. Wilson of the United States Department of Agriculture has found that certain educational methods have been the most effective in bringing out changes in farm practices. These methods are listed as follows: method demonstrations and leader training, 20 per cent; general meetings, 18 per cent; farm and home visits, 15 per cent; new service, 12 per cent; bulletins, 9 per cent; result demonstrations, 8 per cent; and all others 17 per cent. He also found that the printed word gives the largest return per cost (4).

Present public conservation education work in Iowa hinges about the cooperation between one extension forester and his four temporary assistants, the State Extension Service, and agents of the Iowa Conservation Commission. The county agents, as representatives of the State Extension Service, the college, and the farmer organizations, are charged with the task of being local leaders of the programs being carried out in their counties. The procedure of extension work is usually carried out as follows: A study of facts and conditions is made, the problem is determined and a solution is developed, and demonstrations with definite follow-up work are planned.

It seems to me that the inefficiency and lack of interest in some phases of farm management as shown by a great number of the contact men such as county agents is the key-point between success or failure to establish all that research and leadership have set up to build a state-wide land-management program. These men should be capable of the duties charged to them.

I believe the work is so important that the positions should be attainable only through the process of passing rigid examinations which cover every phase of practical land management. College curricula which pertain to these fields of study should be made a pre-requisite to graduation. The potential leadership of these contact men is of vast importance, and it should become the privilege of those who are adequately trained and enthusiastically progressive to meet the social challenge of this problem.

THE demand for farm forestry as well as general crop management will increase due to existing opportunities such as benefit payments available through the Agricultural Con-

ervation Program; the use of low-cost trees made available by the Clark-McNary Act; and assistance from the Soil Conservation Service. In 1936 there was an increase of 4.6 per cent of farm woodland in Iowa (7). The Norris-Doxey Farm Forestry Act, which provides for an enlarged extension and research program in farm forestry is bound to have a marked influence in expanding the establishment of farm woodlands.

Our objective must be the development of a competent staff of men to guide a newly-awakened public in the building of a sound farm-management program which will produce the best protection and utilization of our natural resources.

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