Aldo Leopold, Selected Writings on Conservation

Coon Valley: An Adventure in Cooperative Conservation [1935]

Leopold's concern about soil erosion, developed while he was in the Southwest, found focus also in Wisconsin. With colleagues in the university's College of Agriculture, he helped persuade H. H. Bennett, chief of the newly established U.S. Soil Erosion Service (now the Soil Conservation Service), to establish the nation's first demonstration area for erosion control on the Coon Valley watershed in southwestern Wisconsin in 1933. The project was a cooperative effort among federal technicians, university specialists, and local farmers. It integrated erosion control with other land uses and land values. As such, it was one of the few New Deal efforts that Leopold could celebrate, as he does in this article published in *American Forests*.

There are two ways to apply conservation to land. One is to superimpose some particular practice upon the pre-existing system of land-use, without regard to how it fits or what it does to or for other interests involved.

The other is to reorganize and gear up the farming, forestry, game cropping, erosion control, scenery, or whatever values may be involved so that they collectively comprise a harmonious balanced system of land-use.

Each of our conservation factions has heretofore been so glad to get any action at all on its own special interest that it has been anything but solicitous about what happened to the others. This kind of progress is probably better than none, but it savors too much of the planless exploitation it is intended to supersede.

Lack of mutual cooperation among conservation groups is reflected in laws and appropriations. Whoever gets there first writes the legislative ticket to his own particular destination. We have somehow forgotten that all this unorganized avalanche of laws and dollars must be put in order before it can permanently benefit the land, and that this onerous job, which is evidently too difficult for legislators and propagandists, is being wished upon the

farmer and upon the administrator of public properties. The farmer is still trying to make out what it is that the many-voiced public wants him to do. The administrator, who is seldom trained in more than one of the dozen special fields of skill comprising conservation, is growing gray trying to shoulder his new and incredibly varied burdens. The stage, in short, is all set for somebody to show that each of the various public interests in land is better off when all cooperate than when all compete with each other. This principle of integration of land uses has been already carried out to some extent on public properties like the National Forests. But only a fraction of the land, and the poorest fraction at that, is or can ever become public property. The crux of the land problem is to show that integrated use is possible on private farms, and that such integration is mutually advantageous to both the owner and the public.

Such was the intellectual scenery when in 1933 there appeared upon the stage of public affairs a new federal bureau, the United States Soil Erosion Service. Erosion-control is one of those new professions whose personnel has been recruited by the fortuitous interplay of events. Previous to 1933 its work had been to define and propagate an idea, rather than to execute a task. Public responsibility had never laid its crushing weight on their collective shoulders. Hence the sudden creation of a bureau, with large sums of easy money at its disposal, presented the probability that some one group would prescribe its particular control technique as the panacea for all the ills of the soil. There was, for example, a group that would save land by building concrete check-dams in gullies, another by terracing fields, another by planting alfalfa or clover, another by planting slopes in alternating strips following the contour, another by curbing cows and sheep, another by planting trees.

It is to the lasting credit of the new bureau that it immediately decided to use not one, but all, of these remedial methods. It also perceived from the outset that sound soil conservation implied not merely erosion control, but also the integration of all land crops. Hence, after selecting certain demonstration areas on which to concentrate its work, it offered to each farmer on each area the cooperation of the government in installing on his farm a reorganized system of land-use, in which not only soil conservation and agriculture, but also forestry, game, fish, fur, flood-control, scenery, songbirds, or any other pertinent interest were to be duly integrated. It will probably take another decade before the public appreciates either the novelty of such an attitude by a bureau, or the courage needed to undertake so complex and difficult a task.

The first demonstration area to get under way was the Coon Valley watershed, near LaCrosse, in west-central Wisconsin. This paper attempts a thumbnail sketch of what is being done on the Coon Valley Erosion Project. Coon Valley is one of the innumerable little units of the Mississippi Valley

which collectively fill the national dinner pail. Its particular contribution is butterfat, tobacco, and scenery.

When the cows which make the butter were first turned out upon the hills which comprise the scenery, everything was all right because there were more hills than cows, and because the soil still retained the humus which the wilderness vegetation through the centuries had built up. The trout streams ran clear, deep, narrow, and full. They seldom overflowed. This is proven by the fact that the first settlers stacked their hay on the creekbanks, a procedure now quite unthinkable. The deep loam of even the steepest fields and pastures showed never a gully, being able to take on any rain as it came, and turn it either upward into crops, or downward into perennial springs. It was a land to please everyone, be he an empire-builder or a poet.

But pastoral poems had no place in the competitive industrialization of pre-war America, least of all in Coon Valley with its thrifty and ambitious Norse farmers. More cows, more silos to feed them, then machines to milk them, and then more pasture to graze them—this is the epic cycle which tells in one sentence the history of the modern Wisconsin dairy farm. More pasture was obtainable only on the steep upper slopes, which were timber to begin with, and should have remained so. But pasture they now are, and gone is the humus of the old prairie which until recently enabled the upland ridges to take on the rains as they came.

Result: Every rain pours off the ridges as from a roof. The ravines of the grazed slopes are the gutters. In their pastured condition they cannot resist the abrasion of the silt-laden torrents. Great gashing gullies are torn out of the hillside. Each gully dumps its load of hillside rocks upon the fields of the creek bottom, and its muddy waters into the already swollen streams. Coon Valley, in short, is one of the thousand farm communities which, through the abuse of its originally rich soil, has not only filled the national dinner pail, but has created the Mississippi flood problem, the navigation problem, the overproduction problem, and the problem of its own future continuity.

The Coon Valley Erosion Project is an attempt to combat these national evils at their source. The "nine-foot channel" and endless building of dykes, levees, dams and harbors on the lower river, are attempts to put a halter on the same bull after he has gone wild.

The Soil Erosion Service says to each individual farmer in Coon Valley: "The government wants to prove that your farm can be brought back. We will furnish you free labor, wire, seed, lime, and planting stock, if you will help us reorganize your cropping system. You are to give the new system a 5-year trial." A total of 315 farmers, or nearly half of all the farms in the watershed, have already formally accepted the offer. Hence we now see foregathered at Coon Valley a staff of technicians to figure out what should be done; a C.C.C. camp to perform labor; a nursery, a seed warehouse, a

lime quarry, and other needed equipments; a series of contracts with farmers, which, collectively, comprise a "regional plan" for the stabilization of the watershed and of the agricultural community which it supports.

The plan, in a nutshell, proposes to remove all cows and crops from steep slopes, and to use these slopes for timber and wildlife only. More intensive cultivation of the flat lands is to make up for the retirement of the eroding hillsides. Gently sloping fields are to be terraced or strip-cropped. These changes, plus contour farming, good crop rotations, and the repair of eroding gullies and stream banks, constitute the technique of soil restoration.

The steep slopes now to be used for timber and game have heretofore been largely in pasture. The first visible evidence of the new order on a Coon Valley farm is a C.C.C. crew stringing a new fence along the contour which marks the beginning of forty per cent gradients. This new fence commonly cuts off the upper half of the pasture. Part of this upper half still bears timber, the rest is open sod. The timbered part has been grazed clear of undergrowth, but with protection this will come back to brush and young timber and make range for ruffed grouse. The open part is being planted, largely to conifers—white pine, Norway pine, and Norway spruce for north slopes, Scotch pine for south slopes. The dry south slopes present a special problem. In pre-settlement days they carried hazel, sumac, and bluestem rather than timber, the grass furnishing the medium for quick hot fires. Will these hot dry soils, even under protection, allow the planted Scotch pine to thrive? I doubt it. Only the north slopes and coves will develop commercial timber, but all the fenced land can at least be counted upon to produce game and soil cover and cordwood.

Creek banks and gullies, as well as steep slopes, are being fenced and planted. Despite their much smaller aggregate area, these bank plantings will probably add more to the game carrying capacity of the average farm than will the larger solid blocks of plantings on slopes. This prediction is based on their superior dispersion, their higher proportion of deciduous species, and their richer soils.

The bank plantings have showed up a curious hiatus in our silvicultural knowledge. We have learned so much about the growth of the noble conifers that we employ higher mathematics to express the profundity of our information, but at Coon Valley there have arisen, unanswered, such sobering elementary questions as this: What species of willow grow from cuttings? When and how are cuttings made, stored, and planted? Under what conditions will sprouting willow logs take root? What shrubs combine thorns, shade tolerance, grazing resistance, capacity to grow from cuttings, and the production of fruits edible by wild life? What are the comparative soil-binding properties of various shrub and tree roots? What shrubs and trees

allow an understory of grass to grow, thus affording both shallow and deep rootage? How do native shrubs or grasses compare with cultivated grasses for rootbinding terrace outlets? What silvicultural treatment favors an ironwood understory to furnish buds for grouse? Can white birch for budding be planted on south slopes? Under what conditions do oak sprouts retain leaves for winter game cover?

Forestry and fencing are not the alpha and omega of Coon Valley technique. In odd spots of good land near each of the new game coverts, the observer will see a newly enclosed spot of a half-acre each. Each of these little enclosures is thickly planted to sorghum, kaffir, millet, proso, sunflower. These are the food patches to forestall winter starvation in wild life. The seed and fence were furnished by the government, the cultivation and care by the farmer. There were 337 such patches grown in 1934—the largest food-patch system in the United States, save only that found on the Georgia Quail Preserves. There is already friendly rivalry among many farmers as to who has the best food patch, or the most birds using it. This feeding system is, I think, accountable for the fact that the population of quail in 1934–35 was double that of 1933–34, and the pheasant population was quadrupled. Such a feeding system, extended over all the farms of Wisconsin, would, I think, double the crop of farm game in a single year.

This whole effort to rebuild and stabilize a countryside is not without its disappointments and mistakes. A December blizzard flattened out most of the food-patches and forced recourse to hopper feeders. The willow cuttings planted on stream banks proved to be the wrong species and refused to grow. Some farmers, by wrong plowing, mutilated the new terraces just built in their fields. The 1934 drouth killed a large part of the plantings of forest and game cover.

What matter, though, these temporary growing pains when one can cast his eyes upon the hills and see hard-boiled farmers who have spent their lives destroying land now carrying water by hand to their new plantations? American lumbermen may have become so steeped in economic determinism as actually to lack the personal desire to grow trees, but not Coon Valley farmers! Their solicitude for the little evergreens is sometimes almost touching. It is interesting to note, however, that no such pride or tenderness is evoked by their new plantings of native hardwoods. What explains this difference in attitude? Does it arise from a latent sentiment for the conifers of the Scandinavian homeland? Or does it merely reflect that universal urge to capture and domesticate the exotic which found its first American expression in the romance of Pocohontas, and its last in the Americanization of the ringnecked pheasant?

Most large undertakings display, even on casual inspection, certain policies or practices which are diagnostic of the mental attitude behind the

whole venture. From these one can often draw deeper inferences than from whole volumes of statistics. A diagnostic policy of the Coon Valley staff is its steadfast refusal to straighten streams. To those who know the speech of hills and rivers, straightening a stream is like shipping vagrants—a very successful method of passing trouble from one place to the next. It solves nothing in any collective sense.

Not all the sights of Coon Valley are to be seen by day. No less distinctive is the nightly "bull session" of the technical staff. One may hear a forester expounding to an engineer the basic theory of how organic matter in the soil decreases the per cent of run-off; an economist holds forth on tax rebates as a means to get farmers to install their own erosion control. Underneath the facetious conversation one detects a vein of thought—an attitude toward the common enterprise—which is strangely reminiscent of the early days of the Forest Service. Then, too, a staff of technicians, all under thirty, was faced by a common task so large and so long as to stir the imagination of all but dullards. I suspect that the Soil Erosion Service, perhaps unwittingly, has recreated a spiritual entity which many older conservationists have thought long since dead.

The Farmer as a Conservationist [1939]

In this masterpiece, originally a talk delivered at the University's Farm and Home Week in February 1939, Leopold distinguishes between conservation understood negatively as restraint and that understood positively as skill. Narrowly economic and utilitarian desiderata are contrasted with wider, less quantifiable human values. And the familiar refrain of conservation by government versus ecologically informed and esthetically and ethically motivated conservation by landowners is beautifully illustrated in a brief idyll of enlightened husbandry. After distribution as an extension circular, this essay was revised and published in *American Forests*.

Conservation means harmony between men and land.

When land does well for its owner, and the owner does well by his land; when both end up better by reason of their partnership, we have conservation. When one or the other grows poorer, we do not.

Few acres in North America have escaped impoverishment through human use. If someone were to map the continent for gains and losses in soil fertility, waterflow, flora, and fauna, it would be difficult to find spots where less than three of these four basic resources have retrograded; easy to find spots where all four are poorer than when we took them over from the Indians.

As for the owners, it would be a fair assertion to say that land depletion has broken as many as it has enriched.

It is customary to fudge the record by regarding the depletion of flora and fauna as inevitable, and hence leaving them out of the account. The fertile productive farm is regarded as a success, even though it has lost most of its native plants and animals. Conservation protests such a biased accounting. It was necessary, to be sure, to eliminate a few species, and to change radically the distribution of many. But it remains a fact that the average American township has lost a score of plants and animals through indifference for every one it has lost through necessity.

What is the nature of the process by which men destroy land? What

kind of events made it possible for that much-quoted old-timer to say: "You can't tell me about farming; I've worn out three farms already and this is my fourth"?

Most thinkers have pictured a process of gradual exhaustion. Land, they say, is like a bank account: if you draw more than the interest, the principal dwindles. When Van Hise said "Conservation is wise use," he meant, I think, restrained use.

Certainly conservation means restraint, but there is something else that needs to be said. It seems to me that many land resources, when they are used, get out of order and disappear or deteriorate before anyone has a chance to exhaust them.

Look, for example, at the eroding farms of the cornbelt. When our grandfathers first broke this land, did it melt away with every rain that happened to fall on a thawed frost-pan? Or in a furrow not exactly on contour? It did not; the newly broken soil was tough, resistant, elastic to strain. Soil treatments which were safe in 1840 would be suicidal in 1940. Fertility in 1840 did not go down river faster than up into crops. Something has got out of order. We might almost say that the soil bank is tottering, and this is more important than whether we have overdrawn or underdrawn our interest.

Look at the northern forests: did we build barns out of all the pineries which once covered the lake states? No. As soon as we had opened some big slashings we made a path for fires to invade the woods. Fires cut off growth and reproduction. They outran the lumberman and they mopped up behind him, destroying not only the timber but also the soil and the seed. If we could have kept the soil and the seed, we should be harvesting a new crop of pines now, regardless of whether the virgin crop was cut too fast or too slow. The real damage was not so much the overcutting, it was the run on the soil-timber bank.

A still clearer example is found in farm woodlots. By pasturing their woodlots, and thus preventing all new growth, cornbelt farmers are gradually eliminating woods from the farm landscape. The wildflowers and wildlife are of course lost long before the woodlot itself disappears. Overdrawing the interest from the woodlot bank is perhaps serious, but it is a bagatelle compared with destroying the capacity of the woodlot to yield interest. Here again we see awkward use, rather than over-use, disordering the resource.

In wildlife the losses from the disordering of natural mechanisms have, I suspect, far exceeded the losses from exhaustion. Consider the thing we call "the cycle," which deprives the northern states of all kinds of grouse and rabbits about seven years out of every ten. Were grouse and rabbits always and everywhere cyclic? I used to think so, but I now doubt it. I suspect that cycles are a disorder of animal populations, in some way spread by awkward

land-use. We don't know how, because we do not yet know what a cycle is. In the far north cycles are probably natural and inherent, for we find them in the untouched wilderness, but down here I suspect they are not inherent. I suspect they are spreading, both in geographic sweep and in number of species affected.

Consider the growing dependence of fishing waters on artificial restocking. A big part of this loss of toughness inheres in the disordering of waters by erosion and pollution. Hundreds of southerly trout streams which once produced natural brook trout are stepping down the ladder of productivity to artificial brown trout, and finally to carp. As the fish resource dwindles, the flood and erosion losses grow. Both are expressions of a single deterioration. Both are not so much the exhaustion of a resource as the sickening of a resource.

Consider deer. Here we have no exhaustion; perhaps there are too many deer. But every woodsman knows that deer in many places are exterminating the plants on which they depend for winter food. Some of these, such as white cedar, are important forest trees. Deer did not always destroy their range. Something is out of kilter. Perhaps it was a mistake to clean out the wolves; perhaps natural enemies acted as a kind of thermostat to close the "draft" on the deer supply. I know of deer herds in Mexico which never get out of kilter with their range; there are wolves and cougars there, and always plenty of deer but never too many. There is substantial balance between those deer and their range, just as there was substantial balance between the buffalo and the prairie.

Conservation, then, is keeping the resource in working order, as well as preventing over-use. Resources may get out of order before they are exhausted, sometimes while they are still abundant. Conservation, therefore, is a positive exercise of skill and insight, not merely a negative exercise of abstinence or caution.

What is meant by skill and insight?

This is the age of engineers. For proof of this I look not so much to Boulder Dams or China Clippers as to the farmer boy tending his tractor or building his own radio. In a surprising number of men there burns a curiosity about machines and a loving care in their construction, maintenance, and use. This bent for mechanisms, even though clothed in greasy overalls, is often the pure fire of intellect. It is the earmark of our times.

Everyone knows this, but what few realize is that an equal bent for the mechanisms of nature is a possible earmark of some future generation.

No one dreamed, a hundred years ago, that metal, air, petroleum, and electricity could coordinate as an engine. Few realize today that soil, water, plants, and animals are an engine, subject, like any other, to derangement. Our present skill in the care of mechanical engines did not arise from fear

lest they fail to do their work. Rather was it born of curiosity and pride of understanding. Prudence never kindled a fire in the human mind; I have no hope for conservation born of fear. The 4-H boy who becomes curious about why red pines need more acid than white is closer to conservation than he who writes a prize essay on the dangers of timber famine.

This necessity for skill, for a lively and vital curiosity about the workings of the biological engine, can teach us something about the probable success of farm conservation policies. We seem to be trying two policies, education and subsidy. The compulsory teaching of conservation in schools, the 4-H conservation projects, and school forests are examples of education. The woodlot tax law, state game and tree nurseries, the crop control program, and the soil conservation program are examples of subsidy.

I offer this opinion: these public aids to better private land use will accomplish their purpose only as the farmer matches them with this thing which I have called skill. Only he who has planted a pine grove with his own hands, or built a terrace, or tried to raise a better crop of birds can appreciate how easy it is to fail; how futile it is passively to follow a recipe without understanding the mechanisms behind it. Subsidies and propaganda may evoke the farmer's acquiescence, but only enthusiasm and affection will evoke his skill. It takes something more than a little "bait" to succeed in conservation. Can our schools, by teaching, create this something? I hope so, but I doubt it, unless the child brings also something he gets at home. That is to say, the vicarious teaching of conservation is just one more kind of intellectual orphanage; a stop-gap at best.

Thus we have traversed a circle. We want this new thing, we have asked the schools and the government to help us catch it, but we have tracked it back to its den under the farmer's doorstep.

I feel sure that there is truth in these conclusions about the human qualities requisite to better land use. I am less sure about many puzzling questions of conservation economics.

Can a farmer afford to devote land to woods, marsh, pond, windbreaks? These are semi-economic land uses—that is, they have utility but they also yield non-economic benefits.

Can a farmer afford to devote land to fencerows for the birds, to snag-trees for the coons and flying squirrels? Here the utility shrinks to what the chemist calls "a trace."

Can a farmer afford to devote land to fencerows for a patch of ladyslippers, a remnant of prairie, or just scenery? Here the utility shrinks to zero.

Yet conservation is any or all of these things.

Many labored arguments are in print proving that conservation pays economic dividends. I can add nothing to these arguments. It seems to me, though, that something has gone unsaid. It seems to me that the pattern of

the rural landscape, like the configuration of our own bodies, has in it (or should have in it) a certain wholeness. No one censures a man who loses his leg in an accident, or who was born with only four fingers, but we should look askance at a man who amputated a natural part on the grounds that some other is more profitable. The comparison is exaggerated; we had to amputate many marshes, ponds and woods to make the land habitable, but to remove any natural feature from representation in the rural landscape seems to me a defacement which the calm verdict of history will not approve, either as good conservation, good taste, or good farming.

Consider a single natural feature: the farm pond. Our godfather the Iceking, who was in on the christening of Wisconsin, dug hundreds of them for us. We have drained ninety and nine. If you don't believe it, look on the original surveyor's plot of your township; in 1840 he probably mapped water in dozens of spots where in 1940 you may be praying for rain. I have an undrained pond on my farm. You should see the farm families flock to it of a Sunday, everybody from old grandfather to the new pup, each bent on the particular aquatic sport, from water lilies to bluegills, suited to his (or her) age and waistline. Many of these farm families once had ponds of their own. If some drainage promoter had not sold them tiles, or a share in a steam shovel, or some other dream of sudden affluence, many of them would still have their own water lilies, their own bluegills, their own swimming hole, their own redwings to hover over a buttonbush and proclaim the spring.

If this were Germany, or Denmark, with many people and little land, it might be idle to dream about land-use luxuries for every farm family that needs them. But we have excess plowland; our conviction of this is so unanimous that we spend a billion out of the public chest to retire the surplus from cultivation. In the face of such an excess, can any reasonable man claim that economics prevents us from getting a life, as well as a livelihood, from our acres?

Sometimes I think that ideas, like men, can become dictators. We Americans have so far escaped regimentation by our rulers, but have we escaped regimentation by our own ideas? I doubt if there exists today a more complete regimentation of the human mind than that accomplished by our self-imposed doctrine of ruthless utilitarianism. The saving grace of democracy is that we fastened this yoke on our own necks, and we can cast it off when we want to, without severing the neck. Conservation is perhaps one of the many squirmings which foreshadow this act of self-liberation.

The principle of wholeness in the farm landscape involves, I think, something more than indulgence in land-use luxuries. Try to send your mind up in an airplane; try to see the *trend* of our tinkerings with fields and forests, waters and soils. We have gone in for governmental conservation on a

huge scale. Government is slowly but surely pushing the cutovers back into forest; the peat and sand districts back into marsh and scrub. This, I think, is as it should be. But the cow in the woodlot, ably assisted by the ax, the depression, the June beetle, and the drouth, is just as surely making southern Wisconsin a treeless agricultural steppe. There was a time when the cessation of prairie fires added trees to southern Wisconsin faster than the settlers subtracted them. That time is now past. In another generation many southern counties will look, as far as trees are concerned, like the Ukraine, or the Canadian wheatlands. A similar tendency to create *monotypes*, to block up huge regions to a single land-use, is visible in many other states. It is the result of delegating conservation to government. Government cannot own and operate small parcels of land, and it cannot own and operate good land at all.

Stated in acres or in board feet, the crowding of all the timber into one place may be a forestry program, but is it conservation? How shall we use forests to protect vulnerable hillsides and riverbanks from erosion when the bulk of the timber is up north on the sands where there is no erosion? To shelter wildlife when all the food is in one county and all the cover in another? To break the wind when the forest country has no wind, the farm country nothing but wind? For recreation when it takes a week, rather than an hour, to get under a pine tree? Doesn't conservation imply a certain interspersion of land-uses, a certain pepper-and-salt pattern in the warp and woof of the land-use fabric? If so, can government alone do the weaving? I think not.

It is the individual farmer who must weave the greater part of the rug on which America stands. Shall he weave into it only the sober yarns which warm the feet, or also some of the colors which warm the eye and the heart? Granted that there may be a question which returns him the most profit as an individual, can there be *any* question which is best for his community? This raises the question: is the individual farmer capable of dedicating private land to uses which profit the community, even though they may not so clearly profit him? We may be over-hasty in assuming that he is not.

I am thinking, for example, of the windbreaks, the evergreen snowfences, hundreds of which are peeping up this winter out of the drifted snows of the sandy counties. Part of these plantings are subsidized by highway funds, but in many others the only subsidy is the nursery stock. Here then is a dedication of private land to a community purpose, a private labor for a public gain. These windbreaks do little good until many land-owners install them; much good after they dot the whole countryside. But this "much good" is an undivided surplus, payable not in dollars, but rather in fertility, peace, comfort, in the sense of something alive and growing. It pleases me that farmers should do this new thing. It foreshadows conservation. It may be remarked, in passing, that this planting of windbreaks is a direct reversal of the attitude which uprooted the hedges, and thus the wildlife, from the entire cornbelt. Both moves were fathered by the agricultural colleges. Have the colleges changed their mind? Or is an Osage windbreak governed by a different kind of economics than a red pine windbreak?

There is still another kind of community planting where the thing to be planted is not trees but thoughts. To describe it, I want to plant some thoughts about a bush. It is called bog-birch.

I select it because it is such a mousy, unobtrusive, inconspicuous, uninteresting little bush. You may have it in your marsh but have never noticed it. It bears no flower that you would recognize as such, no fruit which bird or beast could eat. It doesn't grow into a tree which you could use. It does no harm, no good, it doesn't even turn color in fall. Altogether it is the perfect nonentity in bushes; the complete biological bore.

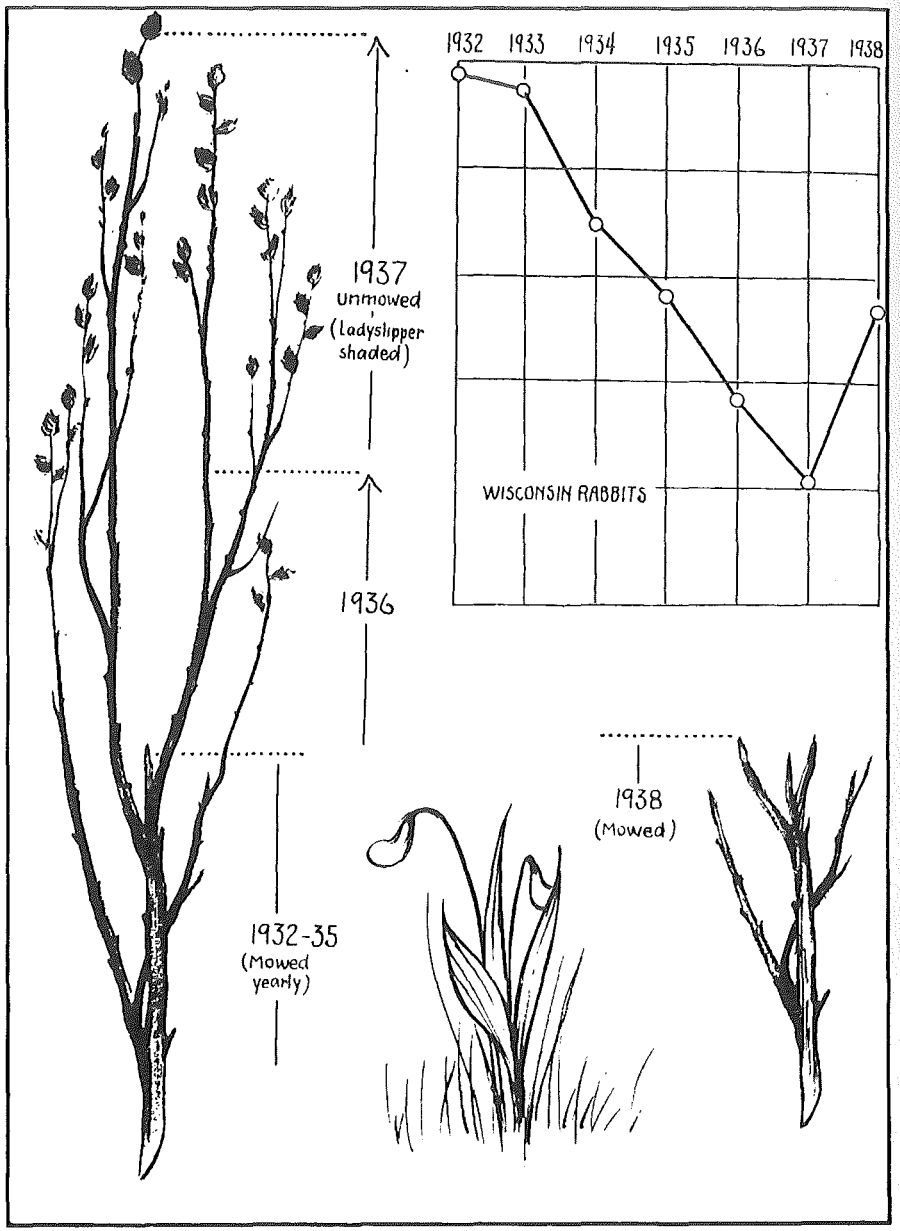
But is it? Once I was following the tracks of some starving deer. The tracks led from one bog-birch to another; the browsed tips showed that the deer were living on it, to the exclusion of scores of other kinds of bushes. Once in a blizzard I saw a flock of sharptail grouse, unable to find their usual grain or weed seeds, eating bog-birch buds. They were fat.

Last summer the botanists of the University Arboretum came to me in alarm. The brush, they said, was shading out the white ladyslippers in the Arboretum marsh. Would I ask the CCC crews to clear it? When I examined the ground, I found the offending brush was bog-birch. I cut the sample shown on the left of the drawing. Notice that up to two years ago rabbits had mowed it down each year. In 1936 and 1937 the rabbits had spared it, hence it grew up and shaded the ladyslippers. Why? Because of the cycle; there were no rabbits in 1936 and 1937. This past winter of 1938 the rabbits mowed off the bog-birch, as shown on the right of the drawing.

It appears, then, that our little nonentity, the bog-birch, is important after all. It spells life or death to deer, grouse, rabbits, ladyslippers. If, as some think, cycles are caused by sunspots, the bog-birch might even be regarded a sort of envoy for the solar system, dealing out appeasement to the rabbit, in the course of which a suppressed orchid finds its place in the sun.

The bog-birch is one of hundreds of creatures which the farmer looks at, or steps on, every day. There are 350 birds, ninety mammals, 150 fishes, seventy reptiles and amphibians, and a vastly greater number of plants and insects native to Wisconsin. Each state has a similar diversity of wild things.

Disregarding all those species too small or too obscure to be visible to the layman, there are still perhaps 500 whose lives we might know, but don't. I have translated one little scene out of the life-drama of one species. Each of the 500 has its own drama. The stage is the farm. The farmer walks



THE STORY OF A CYCLE

A mousy, unobtrusive, inconspicuous little bush, the bog-birch, plays an important role in the ups and downs of plant and animal life. Here is illustrated how it spells life or death to deer, grouse, rabbits, and ladyslippers in Wisconsin.

In 1932 to 1935 rabbits were abundant and ate down the bog-birches each winter, giving the ladyslippers the sun. During 1936 and 1937 the cycle decimated the rabbits and the bog-birches grew high and shaded out the ladyslippers. In 1938 the rabbits recovered, mowed down the birches and the ladyslippers regained their place in the sun.

Leopold's drawing as it appeared with his essay in *American Forests*, June, 1939.

among the players in all his daily tasks, but he seldom sees any drama, because he does not understand their language. Neither do I, save for a few lines here and there. Would it add anything to farm life if the farmer learned more of that language?

One of the self-imposed yokes we are casting off is the false idea that farm life is dull. What is the meaning of John Steuart Curry, Grant Wood, Thomas Benton? They are showing us drama in the red barn, the stark silo, the team heaving over the hill, the country store, black against the sunset. All I am saying is that there is also drama in every bush, if you can see it. When enough men know this, we need fear no indifference to the welfare of bushes, or birds, or soil, or trees. We shall then have no need of the word conservation, for we shall have the thing itself.

The landscape of any farm is the owner's portrait of himself.

Conservation implies self-expression in that landscape, rather than blind compliance with economic dogma. What kinds of self-expression will one day be possible in the landscape of a cornbelt farm? What will conservation look like when transplanted from the convention hall to the fields and woods?

Begin with the creek: it will be unstraightened. The future farmer would no more mutilate his creek than his own face. If he has inherited a straightened creek, it will be "explained" to visitors, like a pock-mark or a wooden leg.

The creek banks are wooded and ungrazed. In the woods, young straight timber-bearing trees predominate, but there is also a sprinkling of hollow-limbed veterans left for the owls and squirrels, and of down logs left for the coons and fur-bearers. On the edge of the woods are a few wide-spreading hickories and walnuts for nutting. Many things are expected of this creek and its woods: cordwood, posts, and sawlogs; flood-control, fishing and swimming; nuts and wildflowers; fur and feather. Should it fail to yield an owl-hoot or a mess of quail on demand, or a bunch of sweet william or a coon-hunt in season, the matter will be cause for injured pride and family scrutiny, like a check marked "no funds."

Visitors when taken to the woods often ask, "Don't the owls eat your chickens?" Our farmer knows this is coming. For answer, he walks over to a leafy white oak and picks up one of the pellets dropped by the roosting owls. He shows the visitor how to tear apart the matted felt of mouse and rabbit fur, how to find inside the whitened skulls and teeth of the bird's prey. "See any chickens?" he asks. Then he explains that his owls are valuable to him, not only for killing mice, but for excluding other owls which *might* eat chickens. His owls get a few quail and many rabbits, but these, he thinks, can be spared.

The fields and pastures of this farm, like its sons and daughters, are a

mixture of wild and tame attributes, all built on a foundation of good health. The health of the fields is their fertility. On the parlor wall, where the embroidered "God Bless Our Home" used to hang in exploitation days, hangs a chart of the farm's soil analyses. The farmer is proud that all his soil graphs point upward, that he has no check dams or terraces, and needs none. He speaks sympathetically of his neighbor who has the misfortune of harboring a gully, and who was forced to call in the CCC. The neighbor's check dams are a regrettable badge of awkward conduct, like a crutch.

Separating the fields are fencerows which represent a happy balance between gain in wildlife and loss in plowland. The fencerows are not cleaned yearly, neither are they allowed to grow indefinitely. In addition to bird song and scenery, quail and pheasants, they yield prairie flowers, wild grapes, raspberries, plums, hazelnuts, and here and there a hickory beyond the reach of the woodlot squirrels. It is a point of pride to use electric fences only for temporary enclosures.

Around the farmstead are historic oaks which are cherished with both pride and skill. That the June beetles did get one is remembered as a slip in pasture management not to be repeated. The farmer has opinions about the age of his oaks, and their relation to local history. It is a matter of neighborhood debate whose oaks are most clearly relics of oak-opening days, whether the healed scar on the base of one tree is the result of a prairie fire or a pioneer's trash pile.

Martin house and feeding station, wildflower bed and old orchard go with the farmstead as a matter of course. The old orchard yields some apples but mostly birds. The bird list for the farm is 161 species. One neighbor claims 165, but there is reason to suspect he is fudging. He drained his pond; how could he possibly have 165?

His pond is our farmer's special badge of distinction. Stock is allowed to water at one end only; the rest of the shore is fenced off for the ducks, rails, redwings, gallinules, and muskrats. Last spring, by judicious baiting and decoys, two hundred ducks were induced to rest there a full month. In August, yellow-legs use the bare mud of the water-gap. In September the pond yields an armful of waterlilies. In the winter there is skating for the youngsters, and a neat dozen of rat-pelts for the boys' pin-money. The farmer remembers a contractor who once tried to talk drainage. Pondless farms, he says, were the fashion in those days; even the Agricultural College fell for the idea of making land by wasting water. But in the drouths of the thirties, when the wells went dry, everybody learned that water, like roads and schools, is community property. You can't hurry water down the creek without hurting the creek, the neighbors, and yourself.

The roadside fronting the farm is regarded as a refuge for the prairie flora: the educational museum where the soils and plants of pre-settlement

days are preserved. When the professors from the college want a sample of virgin prairie soil, they know they can get it here. To keep this roadside in prairie, it is cleaned annually, always by burning, never by mowing or cutting. The farmer tells a funny story of a highway engineer who once started to grade the cutbanks all the way back to the fence. It developed that the poor engineer, despite his college education, had never learned the difference between a silphium and a sunflower. He knew his sines and cosines, but he had never heard of the plant succession. He couldn't understand that to tear out all the prairie sod would convert the whole roadside into an eyesore of quack and thistle.

In the clover field fronting the road is a huge glacial erratic of pink granite. Every year, when the geology teacher brings her class out to look at it, our farmer tells how once, on a vacation trip, he matched a chip of the boulder to its parent ledge, two hundred miles to the north. This starts him on a little oration on glaciers; how the ice gave him not only the rock, but also the pond, and the gravel pit where the kingfisher and the bank swallows nest. He tells how a powder salesman once asked for permission to blow up the old rock "as a demonstration in modern methods." He does not have to explain his little joke to the children.

He is a reminiscent fellow, this farmer. Get him wound up and you will hear many a curious tidbit of rural history. He will tell you of the mad decade when they taught economics in the local kindergarten, but the college president couldn't tell a bluebird from a blue cohosh. Everybody worried about getting his share; nobody worried about doing his bit. One farm washed down the river, to be dredged out of the Mississippi at another farmer's expense. Tame crops were over-produced, but nobody had room for wild crops. "It's a wonder this farm came out of it without a concrete creek and a Chinese elm on the lawn." This is his whimsical way of describing the early fumblings for "conservation."

Conservation: In Whole or in Part? [1944]

Leopold wrote this report, dated November 1, 1944, for a University of Wisconsin committee on postwar agricultural policies. The typescript, labeled "rough draft," is virtually clean. As its title suggests, the report is a direct and comprehensive statement of a holistic conception of land and a correspondingly integrative approach to conservation. It contains Leopold's most sustained analysis of land health, a concept that figures prominently in "The Land Ethic."

There are two kinds of conservationists, and two systems of thought on the subject.

One kind feels a primary interest in some one aspect of land (such as soil, forestry, game, or fish) with an incidental interest in the land as a whole.

The other feels a primary interest in the land as a whole, with incidental interest in its component resources.

The two approaches lead to quite different conclusions as to what constitutes conservative land-use, and how such use is to be achieved.

The first approach is overwhelmingly prevalent. The second approach has not, to my knowledge, been clearly described. This paper aims to sketch the concept of land-as-a-whole.

Land-Health

Conservation is a state of health in the land.

The land consists of soil, water, plants, and animals, but health is more than a sufficiency of these components. It is a state of vigorous self-renewal in each of them, and in all collectively. Such collective functioning of interdependent parts for the maintenance of the whole is characteristic of an organism. In this sense land is an organism, and conservation deals with its functional integrity, or health.

This is almost, but not quite, the same as the familiar "renewable resource" concept. The latter tells us that a particular resource may be healthy or sick, but not that the sickness of one may undermine the health of all.

Conservation is usually thought of as dealing with the *supply* of resources. This "famine concept" is inadequate, for a deficit in the supply in any given resource does not necessarily denote lack of health, while a failure of function always does, no matter how ample the supply. Thus erosion, a malfunction of soil and water, is more serious than "timber famine," because it deteriorates the entire land community permanently, rather than one resource temporarily.

Attitudes

Mass man is unconscious of land-health for three reasons.

First he was, until recently, unable to injure it. He lacked the tools.

Secondly, European civilization developed on a landscape extraordinarily resistant to disorganization, i.e, one which endures very rough usage and severe modification without derangement of function. Thus the oak forests of England became closely grazed sheep downs without losing their soil. The fauna and flora shifted, but did not disintegrate.[1]

Thirdly, science could not, until recently, distinguish fact from fancy in the reaction of land to human use. Thus the Mediterranean countries were permanently deteriorated by overgrazing and erosion before their inhabitants knew what was happening, or why.

As a result of these three historical accidents, the European races acquired machines for dominating land before they had evolved the social inhibitions requisite for their safe use.

In short, the power to injure land-health grew faster than the consciousness that it can be injured.

Land, to the average citizen, is still something to be tamed, rather than something to be understood, loved, and lived with. Resources are still regarded as separate entities, indeed, as commodities, rather than as our cohabitants in the land-community.

Diversity and Stability up to 1840

The Wisconsin land was stable, i.e., it retained its health, for a long period before 1840. The pollens imbedded in peat bogs show that the native plants comprising the prairie, the hardwood forest, and the coniferous forest are

1. E. P. Farrow, *Plant Life on East Anglian Heaths* (Cambridge University Press, 1925).

about the same now as they were at the end of the glacial period, 20,000 years ago. Since that time these major plant communities were pushed alternately northward and southward several times by long climatic cycles, but their membership and organization remained intact. Thus, in one northward push the prairie once reached nearly to Lake Superior; in one southward push the Canadian forest reached to Indiana.

The bones of animals show that the fauna shifted with the flora, but its composition or membership likewise remained intact. The soils not only remained intact, but actually gained in depth and fertility with wind-deposits of loessial soils. With this came a gain in the volume of plant and animal life.

The native Wisconsin community which thus proved its ability to renew itself for 200 centuries was very diverse. It included 350 species of birds, 90 mammals, 174 fishes, 72 amphibians and reptiles, roughly 20,000 insects, about 1500 higher plants, and an unknown but very great number of lower plants and lower animals.

All these creatures were functional members of the land, and their collective activities constituted its inner workings from the glacial epoch to 1840.

These "inner workings" of the community included, as everyone knows, a high proportion of tooth and claw competition, varying in degree from mere jostling to murder. It is hard for the layman, who sees plants and animals in perpetual conflict with each other, to conceive of them as cooperating parts of an organism. Yet the fact remains that throughout geological time up to 1840, the extinction of one species by another occurred more rarely than the creation of new species by evolution, and that occurred very rarely indeed, for we have little evidence of new species appearing during the period of recorded history. The net trend of the original community was thus toward more and more diversity of native forms, and more and more complex relations between them. Stability or health was associated with, and perhaps caused by, this diversity and complexity.

Diversity and Stability since 1840

Since 1840 some members of the native community have been removed. Familiar examples include the buffalo, wild turkey, passenger pigeon, Carolina paroquet, wolverene, marten, and fisher.

Others have been added. These include not only imported birds and mammals like English sparrow, starling, pheasant, Norway rat, and house mouse, but also many wild plants (most weeds are European or Asiatic), many insects good and bad, and many diseases. Domesticated plants, mammals and birds have also been added, and constitute the bulk of the new

community. In one measured sample in Columbia County the domestic plus imported wild birds and mammals constitute 99 per cent of the weight of the total present bird and mammal community.[2]

Most of the native species which persist have undergone changes in numerical status or distribution, or both, since 1840. The prairie flora and fauna occupied the best soils, and hence were supplanted early. Later pressures severely curtailed and modified the marsh, bog, forest, and aquatic floras and faunas. Everybody knows of these changes, hence they need not be described.

Losses and Gains

It is necessary to state at this point that this paper is not a nostalgic rehearsal of the glories of primeval Wisconsin. It is an attempt to approach objectively a case of land-illness which nobody understands. The changes we have made in the Wisconsin land are not all inherently or necessarily wasteful. Many of them have enriched and expanded certain elements in the native fauna and flora whilst shrinking others. There is no doubt at all that the introduction of agriculture has increased the numbers, if not the diversity, of many native animals and some native plants. A sketch of these changes has been published.[3]

Symptoms of Illness

Coincident with this period of man-made change in the land community, many symptoms of impaired land-health have become apparent. Most of these are familiar individually, but they are seldom viewed collectively, or as possibly related to each other and to the land as a whole.

Of the various symptoms of illness, soil erosion and abnormal floods are by far the most important. Most critical observers agree that both are getting worse. Much is known of the superficial causes of both, but little of the underlying "physiology" of soil and water.

Less familiar are some of the qualitative deteriorations in land crops. In farm crops, it appears that better varieties and better cultural methods have just about offset the decline in the productivity of the soil. The reason seems

2. Aldo Leopold and Paul L. Errington, "Limits of Summer Gain and Winter Loss in Bobwhite Populations at Prairie du Sac, Wisconsin, 1923–1945," unpublished manuscript, 32 pp. [Later emended to "Prairie du Sac Area, Columbia County, unpublished manuscript."]

3. Committee on Wildlife Conservation (Aldo Leopold, Chmn.; L. J. Cole, N. C. Fassett, C. A. Herrick, Chancey Juday, and George Wagner), *The University and Conservation of Wisconsin Wildlife,* Bulletin of the University of Wisconsin Science Inquiry Publication no. 3 (Madison, Feb 1937), 39 pp.

to be plain loss of fertility. It has been discovered recently that decline in soil fertility reduces not only the gross yields of crops, but the nutritional value of the crops, and the welfare of animals which eat them.[4]

The qualitative deterioration of crops applies to trees as well as to agronomic plants. We used to grow 4-log pines; now we do well to grow 2-log pines on the same sites. What, besides fire, has happened to soil? Similar deteriorations have occurred in Europe,[5] and are by no means understood.

All too familiar are those symptoms of land-illness caused by the importation of exotic diseases and pests. There is no mystery about such pains and ailments as the white pine blister rust, chestnut blight, gypsy moth, Dutch elm disease, the corn borer, the Norway rat, the starling, the house mouse, the Canada thistle, and the creeping jenny or German carp. Their ultimate effect on the land, however, presents many unsolved problems, including the damage done by control operations.

Less familiar are the many instances in which native plants and animals, heretofore presumably "well-behaved" citizens of the land community, have assumed all the attributes of pests. The white grub, the cankerworm, the meadowmouse, the fire blight of oaks, and the spruce bud-worm are cases in point.

One of the very recent instances of pest behavior by a heretofore "well-behaved" member of the native community is the irruption of deer in Wisconsin and many other states.[6] While the superficial "causes" of this phenomenon are well known to be a coincidence of lumbering, law enforcement, fire-control, predator-control, and selective harvesting through buck laws, nevertheless it remains a deep mystery why equivalent coincidences never (as far as we know) produced irruptions of hoofed mammals previous to human interference. In all probability some as yet unknown causes lie behind the more superficial ones; possibly fluctuations in the vitamin content of foods.

New plant and animal diseases are now appearing so rapidly that we do not yet know whether they represent some native organism "gone outlaw," or some newly imported pest. Thus the new pine disease, now obliterating plantations of Norway and Jack pine in Oconto and nearby counties, has an unclassified causative agent of unknown origin.

Native members of the community sometimes simply disappear without visible cause, and often despite protective efforts. Prairie chickens, spruce grouse, and certain wildflowers probably belong in this class. Imported species may likewise disappear: the Hungarian partridge seems to be on the decline in Wisconsin, after an initial success, without visible cause.

4. W. A. Albrecht, "Soil and Livestock," *The Land* 2:4 (1943), 298–305, and other papers by the same author.

5. Aldo Leopold, "Deer and *Dauerwald* in Germany," *Journal of Forestry* 34:4–5 (1936), 366–375, 460–466.

6. Aldo Leopold, "Deer Irruptions," *Wisconsin Conservation Bulletin* 8:8 (1943), 1–11.

Finally we have unexplained changes in the population behavior of plants and animals; these behaviors are often of considerable economic importance. Thus there is more than a presumption that population cycles have tended to become more violent in all hares and rabbits, in all grouse, and in foxes. Cyclic population behavior has perhaps spread to pheasants and bobwhite quail.

The conservationist who is interested in land as a whole is compelled to view these symptoms collectively, and as probable maladjustments of the land community. Some of them are understood superficially, but hardly any are understood deeply enough to warrant the assertion that they are separate phenomena, unrelated to each other and to the whole. In point of time, nearly all of them are probably new, and fall within the post-1840 period of violent change in the land community. Are they causally related to the period of change, or did the two coincide by accident?

To assert a causal relation would imply that we understand the mechanism. As a matter of fact, the land mechanism is too complex to be understood, and probably always will be. We are forced to make the best guess we can from circumstantial evidence. The circumstantial evidence is that stability and diversity in the native community were associated for 20,000 years, and presumably depended on each other. Both are now partly lost, presumably because the original community has been partly lost and greatly altered. Presumably the greater the losses and alterations, the greater the risk of impairments and disorganizations.

This leads to the "rule of thumb" which is the basic premise of ecological conservation: the land should retain as much of its original membership as is compatible with human land-use. The land must of course be modified, but it should be modified as gently and as little as possible.

This difference between gentle and restrained, as compared with violent and unrestrained, modification of the land is the difference between organic and mustard-plaster therapeutics in the field of land-health.

There are reasons for gentle land-use over and above the presumed risk to the health of the land. Sauer[7] has pointed out that the domesticated plants and animals which we use now are not necessarily those we will need a century hence. To the extent that the native community is extinguished, the genetical source of new domesticated plants and animals is destroyed.

This general concept of land-health as an attribute of the original native community as a whole, and of land-illness as probably related to violent

7. Carl O. Sauer, "Theme of Plant and Animal Destruction in Economic History," *Journal of Farm Economics* 20:4 (1938), 765–775.

changes and consequent disorganization, may be called, for short, the "unity concept."

Unity and Land-Use

If the components of land have a collective as well as a separate welfare, then conservation must deal with them collectively as well as separately. Land-use cannot be good if it conserves one component and injures another. Thus a farmer who conserves his soil but drains his marsh, grazes his woodlot, and extinguishes the native fauna and flora is not practicing conservation in the ecological sense. He is merely conserving one component of land at the expense of another.

The conservation department which seeks to build up game birds by extinguishing non-game predators, or to retain excessive deer populations at the expense of the forest, is doing the same thing.

The engineer who constructs dams to conserve water, develop power, or control floods is not practicing conservation if the actual regimen of water which results, either above or below the dam, destroys more values than it creates. I know of no single impoundment of water in which all of the land values affected were weighed in advance. (Unfortunately it must be stated in the same breath, that ecologists competent to weigh all of them do not yet exist.)

Lop-sided conservation is encouraged by the fact that most Bureaus and Departments are charged with the custody of a single resource, rather than with the custody of the land as a whole. Even when their official titles denote a broader mandate, their actual interests and skills are commonly much narrower. The term "land" now brackets a larger span of knowledge than one human mind can compass.

Ironically enough it is the farmer who is, by implication at least, left to unify, as best he can, the conflicts and overlaps of bureaudom. Separatism in bureaus is probably a necessary evil, but this is not the case in agricultural colleges. If the arguments of this paper are valid, the agricultural colleges have a far deeper responsibility for unification of land-use practice than they, or the public, have so far realized.

I will sketch later some of the practical applications of the land-unity concept to land-use and land-users.

Unity and Economics

Some components of the land community are inherently of economic importance (soil, forests, water) while others cannot possibly be, except in a very indirect sense (wildflowers, songbirds, scenery, wilderness areas).

Some components are of economic importance to the community, but of dubious profit to the individual owner (most marshes, most cover on streambanks and steep slopes, most windbreaks).

Some are profitable for the individual to retain if they are still in a productive state, but of dubious profit if they have to be created *de novo*, or if they have to be rebuilt after being damaged (woodlots).

It follows that if conservation on private lands is to be motivated solely by profit, no unified conservation is even remotely possible. Community welfare, a sense of unity in the land, and a sense of personal pride in such unity, must in some degree move the private owner, as well as the public. Conservation cannot possibly "pay" except when the meaning is restricted to components that happen to be profitable. Conservation often pays in the sense that the profitable components can carry the unprofitable ones, just as in any industrial enterprise, a unified purpose involves carrying profitable and unprofitable component enterprises, each necessary to the functioning of the whole.

The fallacious assumption that each separate act of conservation can or must be profitable before its practice can be recommended to farmers is possibly responsible for the meagre fruits of forty years of education, extension, and public demonstration in the conservation field. It is undoubtedly responsible for many dubious claims of profit which are commonly made, or implied, in presenting the subject to the public. It is presumably axiomatic that any "program" saddled with over-claims will backfire in the long run.

Sound conservation propaganda must present land health, as well as land products, as the objective of "good" land-use. It must present good land-use primarily as an obligation to the community. Many constituent parts of it are indeed profitable, and where this is the case, the fact can and should be emphasized. But many constituent parts of it are not, and failure to assert this at once subverts legitimate education to the intellectual level of a cheap "sales" campaign in which only virtues are mentioned.

No one need harbor any illusion that the farmer will immediately undertake the unprofitable components of "good" land-use. But it is probably not illusory to assume that fractional truth is no truth, and that one-resource conservation programs are inherently fractional.

Acts vs. Skills; Law vs. Education

Conservative land-use consists of a system of acts, motivated by a desire, and executed with skill.

Laws and policies must deal almost exclusively with acts, because desires and skills are intangible, and cannot be defined in law, nor created by

law. Acts without desire or skill are likely to be futile. Thus, during the CCC epoch many Wisconsin farmers were induced, by subsidy, to perform the acts of soil conservation, but those who lacked desire and skill dropped the acts as soon as the subsidy was withdrawn.

This limitation of conservation law and policy is inherent and unavoidable. It can be offset only by education, which is not precluded from dealing with desires and skills.

Whether education can create these desires and skills is an open question. Certainly it can not do so in time to avoid a much further disorganization of land health than now exists. This paper does not claim to assess the chances for success of the unity concept. It claims only to assess the basic logic of the conservation program.

Farm Practice

Some of the attitudes toward farm land implied in the unity concept have already been set forth in popular form.[8] Summarized in terms of causation, these implications add up rather simply to this: the farmer should know the original as well as the introduced components of his land, and take a pride in retaining at least a sample of all of them. In addition to healthy soil, crops, and livestock, he should know and feel a pride in a healthy sample of marsh, woodlot, pond, stream, bog, or roadside prairie. In addition to being a conscious citizen of his political, social, and economic community, he should be a conscious citizen of his watershed, his migratory bird flyway, his biotic zone. Wild crops as well as tame crops should be a part of his scheme of farm management. He should hate no native animal or plant, but only excess or extinction in any one of them.

Cash outlays for unprofitable components of land are of course not to be expected, but outlays of thought, and to a reasonable extent of spare time, should be given with pride, just as they are now given to equivalent enterprises in human health and civic welfare.

Summary

Conservation means land-health as well as resource-supply. Land-health is the capacity for self-renewal in the soils, waters, plants, and animals that collectively comprise the land.

Stable health was associated geologically with the full native community which existed up to 1840. Impairments are coincident with subsequent

8. Aldo Leopold, *Wildlife Conservation on the Farm* (Racine, Wis.: Wisconsin Agriculturist and Farmer, 1941), 24 pp.

changes in membership and distribution. The "inner workings" of land are not understood, but a causal relation between impairments and degree of change is probable. This leads to the rule-of-thumb that changes should be as gentle and as restrained as compatible with human needs.

Land-use is good only when it considers all of the components of land, but its human organization often tends to conserve one at the expense of others.

Some components of land can be conserved profitably, but others not. All are profitable to the community in the long run. Unified conservation must therefore be activated primarily as an obligation to the community, rather than as an opportunity for profit.

Acts of conservation without the requisite desires and skills are futile. To create these desires and skills, and the community motive, is the task of education.

Aldo Leopold, 1928. (Leopold Collection, UW Archives)

The River of the Mother of God

AND OTHER ESSAYS BY ALDO LEOPOLD

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