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Saving Our Watersheds

NO SINGLE FACTOR has a more decisive influence on human beings than water, and every drop we use comes from our watersheds.

Limited comprehension about this has wasted millions of acres of land, caused sharp drops in crop yields, raised the crests of floods, starved cattle, spread deserts over the face of the earth, destroyed recreation beaches, lowered the quality of the water we drink and polluted it to the menace of our health.

"Man," said William Vogt in his dynamic book *Road to Survival*, "is the only organism known that lives by destroying the environment indispensable to his survival." Parasites tend to do this, but their destructive effectiveness is limited by their lack of intelligence. Man uses his brain to tear down; he glories in his relentless "conquest" of the wilderness as if it were an enemy; the emblem of his species is the bulldozer.

Only recently have our nature scientists started to make us realize that if we are to survive, much less improve our standard of living, we must create for ourselves a healthy, harmonious relationship with our total environment, animal, vegetable and mineral.

Hitherto, we have thought of conservation as something a farmer does to grow more and better crops; now we must start to think of it as part and parcel of our individual hold on life.

Sometimes we get excited about the short-run effects of lack of conservation practices, such as dirty drinking water, foul beaches, water shortages when lawn-sprinkling is forbidden, and the like. But these things would not plague us if former generations had known what we know and had done something about it.

It is fifty years since a United States Secretary of Agriculture issued a foresighted directive to the forest service: to pursue their duties "for the greatest good of the greatest number *in the long run*."

The history of dead civilizations tells tragically what our future will be if we continue to abuse our water resources. Throughout history, water has dominated human life. Nations reached great heights and toppled and were entombed by the drifting soil brought to their doorsteps because they had cut away the trees and shrubs and grass that gave it anchorage.

In the heart of the Arabian desert is buried a big town which may have been the home of the Queen of Sheba. It was abandoned hundreds of years ago because something went wrong with the watershed and the water supply failed. Erosion destroyed or sapped all the Mediterranean civilizations past and present, from Athens and Rome to the fertile plains of North Africa where once flourished great Carthage.

"But that was long ago and far away," some may say. "It can't happen here." Look, then, at the Prairie Provinces in the 'thirties, and the pictures they presented of abandoned farms, the skeletons of cattle, the sand-buried fences, and the blasted hopes of men and women who had sought to make their homes there. Merely to drive in the blowing dust through parts of Saskatchewan in mid-1937 was to make oneself physically ill, mentally depressed and spiritually sad.

We cannot be content to look back pityingly upon the mistakes of ancient civilizations which have become part of the dust created by their disregard of the laws of nature.

Today, we have more people on the earth, using water for more purposes and in beyond-measure greater quantity per capita. At the beginning of the Christian era this planet supported a population of about 250,000,000; when the Pilgrim Fathers stepped ashore in 1620, the figure had increased to about 500,000,000; it was announced in October 1963 that the world population was estimated at 3,180,000,000. By the year 2000, said Aldous Huxley in *The Politics of Ecology*, 6,000,000,000 of us will be sitting down to breakfast every morning.

In the past three centuries Canada has grown from a number of scattered settlements on the eastern

seaboard and the lower St. Lawrence, where 3,215 people lived under primitive pioneer conditions, to a continent-wide nation of great wealth and resources numbering nearly 20 million. This expansion has come about with almost total disregard for conservation of water, the resource most needed for life and agriculture and industry.

What about watersheds?

Solomon and the ancient philosophers explained that springs were fed from the sea by subterranean channels. It was not until around 1650 that we started to connect the amount of water in streams and wells with the rainfall on the watershed. We know today that rivers cannot be studied without examining the land through which they flow. It has dawned upon us that good forests, good soil and good water go hand in hand.

This brings us to the drainage basin or catchment area, now generally referred to as the watershed, the natural land unit which continuously receives and stores and delivers our water supply. It may be a few thousand or several hundred thousand acres in extent. By managing it properly we may expect it to produce a maximum regular flow of clear, clean, high-quality water.

A watershed that is well cared for will hold water throughout the year. Its tree and plant roots, its dead leaves and topsoil, hold a great deal of water in their spongelike mass. Some water stays in the subsoil, but much goes still farther down to form hidden rivers and lakes.

On a watershed where 24 inches of precipitation reaches the soil a plot only ten feet square receives and disposes of about 6.25 tons of water a year. An acre receives 2,718 tons. In the orderly disposition of this huge amount of water every piece of ground, a square foot, an acre, or a square mile, performs a vitally important function.

Yet water is the commodity most taken for granted, most abused, most wasted. Many a city and town that only a few years ago had adequate reservoir capacity always comfortably full of water now finds that its expansion is limited by shortage. Farmers have to dig deeper wells.

Breaking the cycle

Never before has the hydrologic cycle been badly dislocated in the presence of so many hundreds of millions of people. This is the most damaging impact of civilized man on his environment.

In the wilderness of Canada, before the coming of Europeans, there had been built up a mutual society of balance among the waters, soils, grasses, forests and all animal life.

How it operated is well told in *Canadian Restoration* by E. Newton-White: To this society each member contributed its powers of control and protection, and was in turn itself controlled and protected. As a result, the streams and rivers ran clear, cold and constant, and carried away, with little disturbance, the surplus water left after all the demands of the natural reservoirs and animal and vegetable life had been satisfied.

But we have broken off our contact with nature, hiding behind our mechanistic contraptions with a sense of security that is false. We harvest grain, grind flour, and bake bread by machinery and electric power, but disregard the fact that the materials of a pound loaf have used up almost two tons of water. We use square miles of corn either to eat on the cob or to feed our livestock, without remembering that an acre of corn in its growing season transpires 3,000 tons of water, equal to about 15 inches of rainfall.

It is legitimate to bake bread and to eat corn, and the change from a scattered population to the present day mass population consuming great quantities of these things could have been effected without damage or loss, if made wisely and carefully. Instead, we have removed natural barriers so that the precipitation does not reach the ground-water reservoir, but runs so fast down our hillsides and across our wheat and corn fields that it fails to penetrate to the roots. Instead of nourishing our crops it picks up soil and carries it away out of usable reach.

Delaying the runoff

The age old law of hydraulics is easy to understand. Man's job is to control, so far as lies in his power, a flow of energy emanating from the sun. This flow, or cycle, is seen concretely in the water chain: from cloud to rain to headwaters to river to sea to cloud, ad infinitum.

When rain falls upon a barren hillside it eats away channels for itself, racing to plunge itself into a watercourse headed directly for the sea. There is the first place to catch and retain it. The amount of water stored in the ground is dependent upon the condition of the soil and the grass and the forest cover of the watershed. When forested hills are denuded by burning or cutting, when upland ranges are overgrazed, when cropland becomes eroded, the rainfall runs off the hard surface of the ground without performing its proper function.

It is legitimate in this plight to think along the lines of the tank-building kings of ancient Ceylon. They resolved that none of the rain falling in the mountains should reach the sea without paying tribute to man on the way, so they built great tanks and passed the monsoon rains from one to another far out into the plains. The only way to get ample water is to intercept it in the run-off.

It seems ridiculous to think of Montreal harbour having to move somewhere else, but the prospect was mentioned by Jacques Simard at a conference of the Community Planning Association in October 1963. The majestic St. Lawrence can one day become feeble and sick, incapable of meeting navigation requirements, hydraulic power needs, and the mass of industrial and domestic demands of a corner of the continent in full economic development. In this drainage basin "we have two nations, eight states and two provinces," said André Gagnon, chairman of Cadres Professionnels Inc., "grouping myriad cities and enterprises for whom it is a question of life or death . . . we have hardly 40 years left to find new sources of water."

While remedial measures are being taken to build up the St. Lawrence watershed, it has been suggested that we might divert the Harricanaw River from Hudson Bay to Lake Huron, at an estimated cost of $200 million. This would feed the Great Lakes with 13,000 million gallons of water a day, six times more than the amount drained away by Chicago.

Where to start

A key factor in conserving water is our forest.

There are three stages of forest history in an industrial country. The first is marked by energetic and often ruthless exploitation of virgin forests. This is generally followed by a period of increasing dependence on foreign supplies, such as the United States is now suffering. Then comes the third chapter, in which an effort is made to rehabilitate or partially restore the forest resources.

In addition to the problems posed by this purely commercial cycle, we are now coming to realize the effect our treatment of the forest has on climate and stream flow. E. W. Zimmermann said bluntly in *World Resources and Industries:* "Forests exercise a decisive influence over the distribution of water and are a necessary means of safeguarding the national soil resources. Mountainsides denuded of their natural forest products are a national menace." In other words, forests not only offer an opportunity for private profit but they also vitally affect the life of society.

The violation of natural laws governing the extent of forest cover is one of the most tragic examples of human folly in the face of nature's wisely ordered system.

We have pushed back the forest with fire and axe and bulldozer; we have used the hoe and the plough where only trees should grow. We have ignored the fact that forests are living societies of trees, shrubs and other forms of plant cover, playing a necessary part in evolution, of which we think of ourselves as being the highest form.

Our destiny is wrapped up with that of the forest. We in Canada have been supplied by nature with the kinds of trees best suited to meet human needs. Because our climate provides growing conditions so satisfactory that in most regions, if fire is kept out, there need be no fear of not securing a second growth after cutting, we may have ample trees for all our needs if we prove ourselves to be good stewards.

Ninety per cent of Canada's forested land is owned by the Crown, and operating companies are required by law to prepare management plans for leased lands. This is important, because of the time element in the regrowth of trees. A man who cuts down a tree is limited in his outlook by his own lifetime, and may have no interest in whether another tree replaces it in fifty or a hundred years, but the outlook of governments is for the lifetime of the nation.

Governments are interested, too, in other functions of the forest besides providing commercial products. In their broad view the conflicting uses of forest land must be reconciled so that harvesting of wood for marketing shall not menace watershed protection. Their broad view enables them to plan so that excess forest, with its great capacity for storing water, shall not interfere with the summer flow of water necessary to irrigation and the development of electric power. Instead of forest, they may decide that part of the watersheds shall bear grass or shrubs, which have relatively low water requirements and disperse less into the atmosphere by evaporation, and at the same time protect the soil from erosion.

Watershed management

We must respect the basic principles and laws governing the whole living community if we are to be successful in maintaining human life. The trees, the grass, the shrubs, the soil and the living creatures that inhabit them are parts of one vast living organism. That is the principle on which watershed management rests.

Natural laws impose limitations and obligations on us. Whether it is convenient to us or not, whether it is politically expedient or not, water is going to run downhill, and its destructive force is going to increase with the rate of runoff; water is going to become impure if we pour impurities into it; water tables are going to sink if we pump water out of them and turn aside the replenishment that is their due.

To know about these things we need a norm, something against which to measure the state of the earth after we have changed some part of it. This is why nature and conservation associations and those who engage in the professions having to do with natural resources are urging the maintenance of certain parts of the country as "wilderness areas." These would preserve wild land in its primitive condition, without roads or other man-made installations not necessary

to their protection. They would exhibit the whole community of life at work. Study of them would provide the basic rules for watershed management.

Management is necessary if we do not wish to balance the supply of water by rationing it. Instead of putting meters on our taps to cut off our supply of water after we had drawn enough for two percolators of coffee a day and one bath and one washing per week, we would be wise to increase the supply by providing the proper water conservation environment in our watersheds.

This goes far beyond narrow emergency measures. It seeks to control and distribute the storage and distribution of water according to the needs of our increasing population. It becomes the sum of all the grass stems, tree roots, and the leaves of shrubs; it counts in all the trickles of water, the snow banks on the high peaks, summer storms and marsh drainage. It is total receptivity, adequate storage and elimination of waste. It takes account not only of present yield and profit, but also of inventory and deferred benefits.

In a well-managed watershed forests and grassland will be preserved or augmented according to need. Cutting of timber will be done in such a way as to cause the least possible damage to the forest floor and to keep ample timber growing. Farming will use methods that prevent erosion and increase the absorptive quality of the soil. Industrial use and sewage treatment will avoid pollution. Watchfulness will subdue fires started by natural causes and the law will prevent the setting of fires by human beings who are malevolent or careless. Grazing will be regulated so as to avoid destroying the plant cover or compacting the soil.

Whose job is it?

To protect our watersheds must be, because of the magnitude of the task, a job for governments working together. Quebec and Ontario need to act jointly on the Ottawa River Valley problems; interprovincial and national co-operation is necessary for such river basins as the Fraser, Columbia, Saskatchewan, Nelson and Saint John. The St. Lawrence watershed involves international as well as inter-provincial action.

Smaller watersheds, we might call them "local", require the co-operative action of individuals, of municipal and county councils. The concept of the local watershed approach to water resource conservation and development is just beginning to be effectively understood and applied. The farmer who plants a woodlot on a hillside and terraces or contours his fields is not only contributing to his own welfare but is discharging a duty to everyone between him and the ocean. When he bands together with neighbouring farmers to form an integrated plan he makes his neighbourhood a better place to live in, improves his social and economic conditions, and gives the higher authorities an example they will be ashamed not to follow.

Major works, such as large dams or levees or big reclamation projects are beyond the scope of local watershed management. Although the British North America Act retained for the federal authority jurisdiction over certain aspects of water use, responsibility for regulation and development rests largely with the provincial governments. This does not mean that political views should intervene. Only by shifting attention from the merely political to the basic biological aspects of the human situation regarding water supply can we mitigate and shorten the times of troubles into which our present course is leading us.

Huxley referred in his paper to two menaces under which we live: sudden destruction by scientific war and the more lingering destruction by biological agencies. He went on to say: "Only when we get it into our collective head that the basic problem confronting twentieth-century man is an ecological problem will our politics improve and become realistic." Then he added emphatically: "Or, preferring to be wantonly stupid, shall we choose to live like murderous and suicidal parasites that kill their host and so destroy themselves?"

Responsible individuals

Water is so important in life that its conservation and distribution must override the geographical boundaries of private property, counties and provinces; the political boundaries of federal and provincial jurisdictions, and the economic domains of agriculture, forestry and industry. If jurisdictional disputes prevent effective action, our heritage will be lost by default, because above all boundaries is the supreme natural law whose edicts are indisputable.

All that is to be done must start in the minds of citizens. "We may well ask," said John H. Storer, renowned lecturer on the natural world, in his book *The Web of Life*, "whether man will develop understanding before he destroys himself by destroying his environment." To which may be added what was written by Marya Mannes, United States writer and commentator, in her book *More in Anger* when she referred to "people who conserved their convenience at the expense of their heritage, and whose ephemeral prosperity was built on waste."

The least we can do as responsible individuals is to become informed about the problems and make our voices heard in demanding conservation of our most priceless material resource, water.

Perhaps it is right to say that we should approach this enterprise in the steps of the Taos Pueblo Indians, who wear soft soled shoes so that they may feel the earth.

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