THE ROYAL BANK OF CANADA
MONTHLY LETTER

VOL. 41, No. 4 HEAD OFFICE, MONTREAL, MAY 1960

The Relationship of Man and Nature

TO subdue nature, to bend its forces to our will, has been the acknowledged purpose of mankind since human life began, but the time has come for a revision of our conception of the benefits and responsibilities of holding dominion over all other created things. A new spirit is abroad as scientists and laymen realize that man and the rest of nature are united and indivisible.

At a time when great elemental forces are clamouring at the bars of our civilization we need to discard our ideas of "attacking" the forest, "bringing under subjection" the mighty rivers, "conquering" the mountains, and "subduing" the prairie. Instead, we need to make the most of all nature as an ally.

Mankind is welcome to dominate the other forms of life, provided he can maintain order among the relentless energies whose balanced operation he has disturbed. This is a hard condition. Our past is full of sombre warnings of what happens when we fail to meet it. The evidence is in the remnants of great civilizations buried beneath mud and sand.

Only when we recognize that the study of all living things is a profoundly necessary part of human thought do we reach the moment of truth. Then we realize that we are part of a complex stretching back to the beginning of time and reaching out on every hand to the boundaries of the universe. Every one of us is an actor in a great drama in which each plays his part as both cause and effect.

The forces set in motion by every act of every animal and bacterium, by every inch added to the growth of plant or tree, affect the lives of other creatures. The principles which govern these interrelationships are embraced in the science called ecology, a word coming from the Greek for "home" or "estate". Ecology is the study of how the household of nature is kept in order.

This *Monthly Letter* has to do with renewable resources, the essentials of life. Our primitive ancestors made their way for millions of years before they discovered how to use iron, copper, coal, oil and gold. But never has man been able to get along without food and water. This is why the relationship of all living things has urgent meaning for us.

The state of affairs today

In a subject so old, so vast, and so continually new, it seems to be impossible to keep science and social life apart. In fact, we should not try to do so. Continuance of our human society depends upon our ability to heed the science of the rest of nature, and live within its bounds.

There are at least three good reasons for surveying the present state of affairs and learning about our natural environment: (1) our advancing technology uses up resources in increasing quantity; (2) our increasing population puts annually greater pressure upon our living space; (3) our continued existence depends upon our keeping our natural environment productive of the essentials of life.

Over and above the slow changes by natural causes such as climate, the earth has suffered measureless destruction of animals and plants by the uncalculating actions of both savage and civilized men.

It was destruction of their environment that caused salmon to disappear from Lake Ontario, and the bison to die off our Western plains, and the passenger pigeon to vanish from North America. Forests have been burnt up, soil has been washed away, deserts have been produced, and rivers have been polluted. "We have," said Professor A. F. Coventry to the Toronto Field Naturalists' Club, "for a long time been breaking the little laws, and the big laws are beginning to catch up with us."

The balance of nature

Nature has its laws designed to maintain balance. If the number of any living species tends to increase out of proportion, some force will arise to control it. There is an equilibrium in undisturbed nature between food and feeder, hunter and prey, so that the resources of

the earth are never idle. Some animals or plants may seem to dominate the rest, but they do so only so long as the general balance exists.

These laws cannot be disregarded without disaster. Nature — which is our word for the total of the conditions and principles which influence the existence of living things — will not accept ignorance of her laws as an excuse for breaking them.

Nature's law does not command us to do, or to refrain from doing, anything. It merely states that if a living being does so-and-so, then the result will be such-and-such. If we wish to avoid disability, pain and dissolution, we must pay attention to the warning.

Every balance requires checks. Living things are dynamic, always trying to expand. When population grows in an area so as to menace the food supply, predators move in; when their prey is reduced, the predators are driven to other areas in search of food.

Before shying away from the "cruelty" of nature, let us look at the necessity which prompts it. Let us suppose there were no control over soil bacteria, the smallest and simplest of all living things. Then, says John H. Storer in his delightful book on ecology *The Web of Life*, under favourable conditions each individual would divide into two about twice every hour. Even if it happened only once in an hour, the offspring from a single individual would number 17 million in a day, and by the end of six days the cells would have increased to a bulk larger than the earth. Or consider the oyster, which may discharge 500 million ripe eggs in one spawning. If all these matured and all subsequent progeny survived, after only four generations there would be a pile of oysters eight times the size of the earth. The balance preserved by nature prevents calamities of this sort.

About soil and water

Good soil is a living thing, and its health is a matter of life and death to plants and animals. What folly it is to call silver, gold and gems "precious" and dirt "base". If there were as great a scarcity of soil as there is of jewels and precious metals, we should gladly give a heap of diamonds to purchase only so much earth as would hold a small violet in a tiny pot.

The soil is constantly changing. In the soil we find one of the oldest laws of life known to us: birth, growth, death, decay and rebirth.

Nothing is wasted in nature. Everything nourishes something else until the bacteria finally get hold of it and return it to the soil after breaking it down once more into inorganic compounds which plants can again transform into protein. The roots of man's physical and mental health spring from the soil.

Soil is first of all rock particles, then the organic matter from dead plants and animals, and finally a community of living plant and animal organisms. Roots, insects, worms and bacteria build fertility into it, while small mammals plow it and let in the air. The soil becomes filled with organic matter containing packaged energy from the sun.

The hive of living things existing in and on the soil is vitally important. At Rothamsted in England, the oldest agricultural research station in the world, it has been found that the population of invertebrate fauna per acre of fertilized land is fifteen million, of which eight million are insects.

Water is essential to soil development, as it is, indeed, to all living things.

Movement is of the essence of water, and the most damaging impact of civilized man on his environment is the shattering of this cycle of movement. The break is caused by the destruction of plant cover, removing the sponge-like texture of the complex topsoil — topsoil which, it is estimated, took five hundred years per inch to build.

Breaking the water cycle has wiped out civilizations in Mesopotamia and North Africa and elsewhere, but because of soaring world population we have reached a new crisis. "Never before," says William Vogt in his soul-searching book *Road to Survival*, "has the hydrologic cycle been badly dislocated in the presence of so many hundreds of millions of people."

Waste of water, including unnecessary run-off, or excessive use from any one place for industrial and domestic purposes, or for irrigation, can lower the underground water table, sometimes far away, and deplete or temporarily exhaust the supply.

The primary means of increasing and maintaining water reserves is to protect and improve the plant cover on our watersheds. From these areas of drainage the water is fed by run-off and seepage to surface and underground streams.

The watershed problem is one of the red-letter problems of the day. Almost everything that has to do with renewable natural resources, with forestry, farming, hunting, fishing, and the economics of production, is tied up with the watershed.

Plants and trees

It is quite correct to say that all flesh is grass. Animals lack the ability to subsist on the simple elements in air, water, sunshine and soil. To perpetuate themselves, they must eat grass or one another. The plant can turn inorganic chemicals into living tissue.

No one can deny, then, the importance of plant life to continuance of the human race. Without that silent,

endless manufacturing process which goes on in the green leaf under the influence of chlorophyll, sunshine, air, and moisture — the world's primal industry — we should surely die.

Every spring, nature's factory starts again to produce food, harnessing the sun's energy and combining it with elements from air, water and rock, into living tissue. From the roots, through the fibres, the sap runs up, carrying water and nourishment to every part of the plant, and in the inside part of the bark it flows down, bringing the foodstuffs which the leaves have manufactured.

Forests are living societies of trees, shrubs and other forms of plant cover. Although more than forty per cent of Canada's surface is covered by trees, our people are becoming conscious of the need to conserve and expand our forest resources.

Most industrial countries pass through the same three stages of forest history. 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. Then the third chapter begins: the effort to rehabilitate or partially restore the domestic forest resources.

Violation of the laws governing the extent of necessary forest cover is one of the most tragic examples of human folly in the face of nature's well-ordered system. But it does us no good to place all the blame upon the pioneers. They did the thing that seemed right to them under their circumstances. If they denuded our watersheds with axe and fire, if they used the hoe and the plough where only trees could grow, they paid the price in their own lives through blasted hopes and abandoned farms and niggardly living. It is our part, knowing more of the interrelationships of all nature, to repair the damage where we can, and to make sure that such things do not occur again.

Importance of environment

What is environment, in the sense of "natural environment"? It includes all factors, natural and artificial, which affect the development of living things.

Life is correspondence with environment. Different creatures seek different environments, but everything exists at a specific place under specific circumstances. As human beings, our greatest psychological asset is a sense of confidence in our environment.

The carrying capacity, which is the measure of the amount of life any area of land or water will support under given circumstances, may be altered from time to time by changes in conditions caused by nature or by man's use of the area.

It sometimes happens that these changes lead to a precarious existence. The creatures in the area may seem to be leading a static life, but our environment is not a museum display case in which petrified groups are forever removed from contact with nature. Something is always happening, and just a little change, a little more severity, a little more depletion, may bring to an end the existence of groups or all the population.

No one knows how many species during the ages failed to meet the challenge of their environment. George L. Clarke, of Harvard University and Woods Hole Oceanographic Institution, says in his textbook *Elements of Ecology* that about 21,000 species of extinct vertebrates and an even larger number of extinct higher plants have been described.

Today it is necessary for mankind to adjust its usage and to manage earth's remaining resources more creatively if it is to survive. We see the warning in the life history of every forest. Trees such as oaks grow so big that their own seedlings cannot survive in their shade; the oak forest perishes, and is replaced by shade-tolerant trees like the beech, the maple and the hemlock. Then, as long as the present climate continues, this will remain a beech, maple or hemlock forest — a climax forest — because these trees have the ability to reproduce under their own shade.

Effects of human acts

It is a curious commentary on our sense of values that though we think of mankind as being the highest form of life the other forms of life almost invariably go into decline wherever we take possession of a piece of the earth.

Civilized man has been more ruthlessly wasteful in his attitude toward the natural world than has served his material interests. The practical utility of land, water and forest has been diminished seriously by our determination to allow them to serve no purposes but our own. This exploitation led Maurice Maeterlinck, the Belgian dramatist and writer, to say: "Everything seems to foretell that man, the last comer to this earth, will be the first to leave it."

Through the use of his intellect, man has to some extent escaped from the controls of nature. He has meddled with small parts of a machine of whose total design and purpose he was ignorant. He now faces the hard task of encouraging natural forces to work in restoration of the damage he has done.

Because of the danger attending ignorance, we need much more information about nature than we have yet gathered. Even well-meant efforts may bring disaster, as witness the experience with deer at Kaibab Forest, on the north rim of Grand Canyon. When, in an effort to increase the population of deer, the authorities killed

off great numbers of mountain lions, coyotes, wolves and other predators, the deer population increased from 4,000 to 100,000 in fourteen years. The land did not have the carrying capacity for that huge number, and consumption of all the food was followed, in two years, by a sixty per cent reduction in the herd through starvation.

Hunting and fishing, formerly practised for the food they yielded, are valued today chiefly for their recreational use. Once in a while we encounter something that is very far from sport, and we see the wilderness in its sourest mood. It is the rampage of a killer who wastes wildlife for what he calls a bag. He gets no satisfaction except that of saying "Something which wanted to live is dead."

The true sportsman knows the spirit of the outdoor world. He follows the rules of the game. He believes in and obeys laws which protect wildlife.

One of the most repulsive of the destructive results of human expansion is the poisoning of rivers, with consequent extinction of fish and of well-nigh every living thing except mould and putrefactive bacteria.

The fisheries of the lakes, ponds and streams are among our most important recreational resources. But our rivers are choked with the refuse of civilization. Our lakes are poisoned by industrial and sewage pollution. The water is dangerous to drink and risky to swim in; the plants are killed which should help to purify the water. Here and there across the continent municipalities are trying to stop the process of pollution. Several shipping companies have been prosecuted for dumping oil in our inland waterways, and a 50-mile zone off Newfoundland's east coast has been declared a region in which oil may not be dumped.

And now we are exercised about nuclear fallout. Its effect upon living things is a matter of debate, but there seems to be reason to believe that fallout will be like another influence superimposed upon all natural things.

It is because of growing awareness of the vital need for knowledge and action that the first national Canadian conference on conservation is to be held next year. Its title is "Resources for Tomorrow."

How is one to learn?

It is a great loss to travel the countryside and not see it, since contact with nature is a vital part of man's enjoyment of life.

Facts about nature may be read in books (like *The Ladder of Life* by A. Gowans Whyte and *The Great Chain of Life* by Joseph Wood Krutch, both introductory books) and seen on television (as in Dr. Ian McTaggart Cowan's *Web of Life*, the Sunday CBC programme from Vancouver.) But after sampling in this way we will want to go into the woods and sit down.

The centuries of dead leaves that have fluttered to the ground have provided a rich layer of mould, soft as any carpet, with an embroidery of wild flowers to make it beautiful. The drama being played among the trees is without end. In the tree tops the robins are singing their absurd but delicious little four-noted songs; saucy squirrels are gamboling in the branches; ants are scurrying among last year's leaves on their mysterious errands.

These children of nature are all straightforward creatures with very simple intentions, and every one is supplied with beauties of one kind or another. Watching them, we realize that the mystery of life is not a problem to be solved, but a reality to be experienced and preserved.

Biologists are aware of the need to preserve nature's balance, and of the techniques, but only public opinion nurtured amid such scenes can make the application of these procedures effective. There is no automatic force in nature which will carry human beings forward irrespective of their own efforts. We need a new creed — to be stubbornly faithful to the facts of life; and a new determination — to contribute our effort in doing the right things.

Our hope is in education. The problem is not as simple as two plus two, quickly answered and as readily disposed of. This is a problem for statesmanlike people who take a long view, who look not at the next vacation or the next balance sheet or the next election, but at the future of mankind.

Since the beginning, the world has presented challenges to living creatures: to crawl out of the sea to live on dry land, to climb trees and mountains, to change in keeping with changing environment. Every creature is to itself the centre of its own universe, but it must have contact with all surrounding creatures. The challenge to us is nothing less than preservation of our species by restoring and maintaining its essential environment.

We are surrounded by, and we are part of, the eternal flux of life in an environment of natural forces. An Eastern proverb puts it: "To survive, all men must hold hands." And living things of all sorts are our kin in the wholeness of nature.

If we wish to preserve our present way of life we must come to terms with what is left of natural forest, soil, water and wildlife, and it will be on terms laid down by nature, not imposed by us. Any wrong which nature may for centuries commit, she has centuries to repair, but we, whose days are short, must walk warily lest we become the victims of the wasteland we make.

Authorized as second class mail,
Post Office Department, Ottawa

PRINTED IN CANADA
by The Royal Bank of Canada