CONSERVATION IN THE SCHOOLS OF BRITISH COLUMBIA

by

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CHAPTER I.

THE MEANING OF CONSERVATION

Unity in Nature: Interdependence in Resources

In the last one hundred and fifty years this continent has become the richest and one of the most populous areas in the world. Through that time the prosperous lands of North America yielded harvests the like of which had never been seen before. Resources, it seemed, were unlimited. Giant forest trees, tremendous open areas of rich grasses, game animals and birds in numbers beyond belief, waters both fresh and salt that teemed with food fishes, plains and valleys of wide agricultural potentialities, hills and mountains containing valuable and varied mineral wealth, this was a land to satisfy every need of man, physical or cultural. And so it proved.

But of late years, and particularly since the beginning of the present century, there have been transformations. Here and there, areas transformed by wastage and misuse into regions of poverty and scanty population began to appear. In the past fifty years, the signs have been multiplied many times and many an area that was once regarded as prosperous land, shows marked evidence of degradation, may, indeed, have progressed to what might be termed its death. What is called "sick land" is common now on this continent, ranging from the vast areas on the Great Plains to thousands of parcels of farm acreage found from Maine to British Columbia, from Saskatchewan to Texas. These soils

that supported us can no longer produce even weeds. The living resources in these soils were destroyed for immediate gain.

The loss of fertility of the soil was accompanied by lowering of the purity of many waters, decrease in the abundance of many species of game, depletion of a large part of the magnificent forests, denudation of great areas of nutritious grasses, and scarring of many sites of recreational and scenic wonder. By virtue of his power to bring about immediate and violent changes in nature and life, man has greatly impaired, and often destroyed, some of the great heritage of resources with which this continent was so richly endowed. In many cases this destruction was carried out unthinkingly or even through need, as in the clearing of forests by fire in pioneer days so that crops could be raised for food. In many other cases, however, greed for profit was the motive that led to destruction. There was little place, it seemed, in the earlier days of plenty, for wisdom and unselfishness, for planning the wise uses of resources that is conservation.

This century has brought a growing realization among the people, that we are dangerously exploiting our natural resources. That realization has led to the establishment, both privately and by government, of agences whose concern it is to safeguard our resources by planning carefully the disposition of these resources, following careful study of their extent, most economic use and their renewability. The object behind such planning is that the fullest benefits may derive to the greatest number of people. Outstanding among the agencies

carrying on this work are the Soil Conservation Service of the United States and the Canadian federal organization familiarly known as the P.F.R.A. (Prairie Farm Rehabilitation Act). Other groups are rendering no less splendid service. On the other hand it should be noted that some organizations masquerading under the guise of conservation are pursuing campaigns guided by immediate, selfish motives.

The S.C.S. and the P.F.R.A. have similar programmes, though the title of the former would lead to the belief that it was concerned only with the physical and chemical state of the soil, the problems of erosion. These two organizations have tremendous responsibility, the establishment of security for the land and for the people on the land. Thus to the original idea of conserving the soil have been added the grave problems of reclamation and rehabilitation.

To carry out such a complex assignment, to correlate and integrate successfully the many interdependent factors involved in man's needs and their satisfactions, demands a thorough comprehension of what is termed "The Unity of Nature", that vast interlocking interdependence and interrelation of the factors in nature. "All things and conditions in the world about us serve as natural resources and constitute the means by which life is controlled. Any other view of nature is partial and imperfect."[1]

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1. Ward, Henry B.
Foundations of Conservation Education
National Wildlife Federation
Washington, D.C., 1941, page 147.

The S.C.S. and the P.F.R.A. programmes are built upon the fundamental principle that Nature operates as a whole, and that adjustments of the intimate connections within it produce unlooked for changes. Trying to estimate the changes that may be brought about is one of the large functions of a true conservation agency. The calculations involved demand a thorough knowledge of facts derived from research, an understanding that, while of necessity particular parts of the system of nature must be set aside for special study under special names, it must be kept in mind that planning can be properly carried out only when interdependence and its consequences are pictured clearly in the blueprints of the future. Even then, it must ever be remembered that the projected picture cannot be considered as permanent or final, for nature is not only unified but full of constantly altering relations, brought about by the constant shifting of minute features. Nature is never static but is indeed a balance, a relation not a record, a process rather than a result, a never-ending series of fluctuations brought about by tiny disturbances in single features. If left alone, nature will offset fluctuations and disturbances through repairs, will provide new cover for denuded areas, will increase the populations of depleted areas, will restore vigor to exhausted forms. There is nothing of the supernatural about this, of inscrutability that screens from human eyes wonders that are performed in mysterious ways. On the contrary, these are normal workings of nature, open to the sight of those who would look. It is true that there are many occurrences in nature that baffle us, but it is likewise true that there were many more

before the days of such men as Koch, Pasteur, Harvey, and Mendel. The unity of nature is nothing more or less than the operation of natural laws, a tendency towards a balance among living organisms on the earth.

The student of conservation recognizes the unity of Nature as the most important principle upon which human welfare advances. Exposition of this basic principle is, therefore, the first teaching in the study of conservation. When this has been done, study can be directed towards a broad conception of the basic resources, the materials of which supply the elements of protoplasm, which provides the earth with continuing life. The basic resources are earth, water and air. Living things, both plant and animal, are natural resources, and depend for their existence on the basic resources.

The basic resources are the foundations of life. The natural resources, which in this paper are limited to the living or renewable resources, are built upon the basic resources. If basic resources are not guarded the living resources decline and ultimately disappear. With them, as part of them, goes man. Nineveh and Tyre and Carthage, once flourishing centres of the world, declined, in pace with their natural resources, to insignificance and obscurity. Through the centuries, this experience has repeated itself many times, and must continue to do so until man acquires the comprehensive picture of the unity in nature and the interdependence among resources. Until he does so he is unequipped to plan the use of the heritage he possesses.

The large comprehension of the unity in nature and the interdependence among resources, is, though fundamental, not very difficult. The water tears up the earth and carries off masses of soil in its floods. The air in its clouds distributes water as rain over the earth for the use of living things. The water and the air reduce the broken rock and help to decompose the bodies of living forms to build up soils. The soil and the air and the water provide raw materials of protoplasm. The interdependencies between the soil and the air and the water are many, intimate, and constant. Nature is a unity, and must be considered as such, just as, to us, the home is a unity, also with multitudinous interdependencies.

If nature, for the moment, can be conceived of as being restricted to the basic resources, that is, air, soil, and water, we can see that that unity is generally referred to as the environment. Life apart from the environment is inconceivable. This helps to make clear the meaning of interdependencies. There is a rigid relation between life and a particular resource. For example, air is not a thing apart, its precise makeup is determined by materials it receives from land and water and life and which in turn, it gives up to them. The same is true of land and water. Unity is marked by interdependence, and interdependencies bring about unity.

This thought must be taught emphatically and learned thoroughly for the whole conception of conservation is founded upon it. This thought of nature as a unity is prerequisite to the study of conservation as a philosophy, or way of living.

Once it is assimilated, the student is conservation-minded, and requires little further teaching other than elaboration of principles deriving from the conception he has gained. One of the great advances in conservation thinking has been growing realization of the interdependence and interrelationships of all outdoor resources. We cannot manage any single resource alone. What we do to our woodlands inevitably affects soils and waters. What we do to soil and water inevitably affects our wildlife, our woodlands, and our fields. They are all inextricably part of each other. Perhaps a few illustrations of interdependence will make its meaning clear.

William R. Van Dersal[2] of the United States Soil Conservation service, discusses the idea that wildlife in general is of value to the environment in which it lives. Insect-eating birds, he notes, have considerable and repressive action on insect pest populations. Hawks and owls spend their lives in ceaseless pursuit of rodents, carnivorous and insectivorous. Mammals assist birds in the reduction of crop pests. The values of these forms of wildlife are not intangible but real. They are interdependent with the farmer, though the latter often fails to recognize this, not having given thought to the cooperation he obtains from wildlife. When more fully aware of wildlife values and their interrelations with his welfare, he will accord due credit to his animal neighbours

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2. Van Dersal, William R. "Environmental Improvement for Valuable Non-Game Animals"
Transactions 5th N.A. Wildlife Conference
American Wildlife Institute, Washington, D.C. 1941, p.200

when carrying out such farm-management techniques as:

1. Strip-cropping. Grain fields so treated harbour nearly three times as many birds as solid fields. Van Dersal quotes the findings of Dalmach and Good of Ohio to this effect.

2. Fencing of Woodlands. Good soil cover develops under such conditions. Here, Dalmach and Good showed 225 pairs of nesting birds in one hundred acres of fenced woodland, but only 111 pairs in one hundred acres of unfenced but similar woodland.

3. Farm Ponds. Although built as water-conserving devices for the watering of livestock, and the control of gullies in floods, their completion brings rapid and spectacular increase in wild-life, in and about the ponds.

4. Hedges. Van Dersal mentions the findings of Edminster that, while hedges were grown for the prevention of soil washing, 60% more pheasants were supported than in fields unprotected by hedges.

5. Contour-cultivation and Terracing. These are erosion control practices, but one of the important results is clear water for the streams, and an increased fish population.

6. Planting and Protection. Trees, shrubs, vines, and herbs grown on land unfit for cultivation, is soil conservation work, but it is also an excellent wildlife management practice.

Recognition of interaction of natural resources is fundamental to sound land use and correct agricultural practice. At the same time, there is no conflict with wildlife management. The farmer and the wildlife technician deal with inter-dependent problems, just as much as the farmer and the technic-

ians of the Soil Conservation Service do. The farmer knows that the experts of the S.C.S. can help him greatly in sound farm management. He is beginning to see that the wildlife expert is a partner too. If actual cash values could be appraised, recognition would be faster and more complete, and landowners would practise wildlife management as an integral part of the farming programme.

In a popular article, Lees[3] tells the story of a typical place in Montana. This place was a sportsman's idea of heaven, full of mountain lions and deer and elk, with clear streams yielding splendid trout. The mountain lions lived on the deer and the elk, the deer and the elk lived on the willow thickets along the banks of the stream, and the trout lived on the flies that hatched along the shady sides of the stream. Soon the sportsmen begrudged the mountain lions their share of deer and elk. A bounty was put on, the lions disappeared, and soon the woods were full of deer. The willow shoots were cleaned off by the greatly increased deer and elk population, and no willows meant no willow roots. Since it was the willow roots that were holding up the banks of the stream, the stream began to wash out and get shallow and muddy. The trout went elsewhere to catch their flies. The deer, in their turn, with forage gone, died out. The sportsmen, who thought they were being efficient and helpful, learned that the interdependent food cycles in nature are not to be tampered with lightly, for the

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3. Lees, Hannah, "Balancing Act"
Colliers Magazine, August 20, 1938, p.30

balance in nature is so complex and interwoven that is requires the best efforts of all our natural resource scientists, working together, to discover and evaluate the intricacies of interdependence, and to make fundamental recommendations as to treatment and utilization of our resources.

The history of the Western plains reveals the consequences of ill-considered planning of short-sightedness that ultimately resulted in what is called "The Dust Bowl". The Western plains were settled before man came. There were grass-eaters like the gophers and the buffalo, and there were meat-eaters like coyotes and wolves. The buffalo and gophers kept the prairies grass down, and the wolves and coyotes kept the buffalo down, and hard winters and lean pickings kept the wolves and coyotes down. The balance moved up and down but no factor could get out of control. When man settled the prairies, the buffalo were exterminated. The wolves, preying on the cattle, were next to go. The gophers, with fewer predators, got out of control. But the gophers had played a vital part in keeping down tough weeds which were a large part of their diet, but which were highly unpalatable, and some even poisonous, to cattle. With weed control gone, the sweet grasses were crowded out, rangeland dried out from denudation, and capacity was greatly reduced. Dry range lands favoured wind erosion. In this way, fertility gave way to aridity. The stage was being set, partly at least by the factors just mentioned, for the cataclysmic storms of the 1930's that impoverished so much of the Great Central Plain and brought so much suffering to hundreds of

thousands from Saskatchewan to Texas. This great debacle was a historical repetition of what happened in Asia Minor, the Mediterranean shores of North Africa, and over vast areas of the lands adjacent to the great rivers in China. In all cases, the interdependence between plants and animals and their environments was upset, and no provision was made, beyond the needs and greed of man, for the perpetuation of the living resources. There was no broad planning, in fact, little planning of any kind. The vision of immediate gain precluded the foresight that can obviate disaster.

The field mice and lemmings of Labrador have a three-to-four-year population cycle. Lagging one year behind comes the population cycle of the Arctic fox. The fox is not the only animal dependent upon the mice and lemmings. The year that mice are plentiful and easy to catch, the wolves live on mice instead of caribou. The caribou need not flee north from the wolves, and that means that the northern Indians, who depend on the caribou for food, have to be satisfied that year with ptarmigan. This works out well since the mice are plentiful in the north too, and the foxes do not prey so fiercely on ptarmigan. Thus the requirements of the Indians are met.

The food chain examples just given are a few of the many interdependencies worked out by naturalists. They constitute one kind of interdependence that contributes to the unity of nature. There are others, larger generalities of such great scope that little more than mention can be made of them at this time.

Sears[4] observes that the individual always notices first the changes which affect him personally. He will move to alter conditions to satisfy his needs. In other words, man is naturally selfish, and tries to protect his interests. The sportsman notices the scarcity of game. He demands stocking. If he is intelligent, he realizes that the shortage is due to the axe and the plow, perhaps more than to bullets and nets, and that it is not enough to produce game but that a place fit for the game to live must be furnished. The nature lover is distressed at the disappearance of many beautiful forms, once common. He has laws passed protecting the birds, or prohibiting the picking of flowers. If he is intelligent he knows that he is not correcting the real trouble, which is the loss of bird or plant habitat. The city dweller is not likely to realize that forestry is needed not only to supply us with wood, soil, and wildlife, but to keep our streams clear, store underground water, and prevent floods. But an intelligent urbanite, if these things were pointed out to him, would take immediate interest in forestry practices, for he needs pure water, and probably dreads floods. The farmers, with perhaps experience in the worn-out lands of some of the Great Plain, knows there is no more "West", knows that if he is to farm properly he must know how to arrest soil losses, how to rebuild his acres, how to cultivate less land with greater skill, how to turn marginal

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4. Sears, Paul B.
Foundations of Conservation Education
National Wildlife Federation, Washington, D.C.,1941,p.40.

land into grass and forest, how to reconstitute his surroundings so that ample plant growth is provided for the conservation of water and wildlife.

The special interests of the sportsman, the nature lover, the city dweller, and the farmer, are, if it is considered, parts of the same fundamental problem. Thus every special interest, working at some phase of the conservation problem, needs the co-operation of every other special group. Interdependence is so universal that there is no such thing as piece-meal conservation. Game, fish, other wildlife, forests, water, soil, all represent details of one central problem, a permanent and satisfying relation between man and nature. The needs of man and the balance of living nature must be coordinated, and this calls for intelligence and sound planning. The various programmes for the conservation of soil, water, forests, and wildlife are so closely interwoven that each vitally affects one or more of the others. All are phases of a single problem, that concerned with the wise use of our renewable natural resources. When this is fully understood by the everyday citizen, there are no limits to the progress that can be made in safeguarding our resources and maintaining them indefinitely as the sources of our well-being, year by year, and generation by generation. As Gabrielson[5] points out, when outling the basis of present wildlife and forest conservation programmes, and

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5. Gabrielson, Ira N.
"Wildlife Conservation",
The Macmillan Co. 1941, preface, p.1.

indirectly of all others:

"Three concepts are considered to form the bases of the Conservation Movement:

1. Soil, water, forest, and wildlife are only parts of our inseparable program.

2. Wildlife must have an environment suited to its needs if it is going to survive.

3. Any use that is made of any living resource must be limited to not more than the annual increase if the essential seed stock is to be continually available."

Gabrielson believes that no amount of research and study will change these three basic concepts.

Although man's relation to man is outside the scope of this paper, there are sociological and philosophical implications in the consideration of interdependence that cannot be overlooked if the full meaning of the word is to be revealed. The philosophy of unity covers all living resources and so man is included. Fosdick[6] has shown that the nations are biologically interdependent whether they like it or not, even in war time.

"There is not an area of activity in which this cannot be illustrated" he states. "An American soldier wounded on a battlefield in the Far East owes his life to a Japanese scientist, Kitasato, who isolated the bacillus of tetanus. A Russian soldier saved by a blood transfusion is indebted to Landsteiner, an Austrian. A German soldier is shielded from typhoid fever

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6. Fosdick, Raymond B. "The Search for Unity" The Rockefeller Foundation Annual Report for 1941, New York, 1942, p.9.

with the help of a Russian, Metchnikoff. A Dutch Marine in the East Indies is protected from malaria because of the experiments of an Italian, Grassi, while a British navigator in North Africa escapes death from surgical infection because a Frenchman, Pasteur, and a German, Koch, elaborated a new technique...

"Our children are guarded from diphtheria by what a Japanese and a German did; they are protected from smallpox by an Englishman's work; they are saved from rabies because of a Frenchman; they are cured of pellagra through the researches of an Austrian. From birth to death they are surrounded by an invisible host--the spirits of men who never thought in terms of flags or boundary lines and who never served a lesser loyalty than the welfare of mankind."

Fosdick sums up by saying that, although wars may isolate nations and split them into separate units, the process is never complete because the intellectual life of the world, as far as science and learning are concerned, is internationalized and whether we wish it or not an indelible pattern of unity has been woven into the society of mankind.

This is the greatest example of interdependence in the world. That thought cannot be nationalized, that the fundamental unity of civilization is the unity of its intellectual life and that the things that unite us are the foundations of a co-operative world, these are the basic concepts of the greatest conservation problem in all history, the problem of planning for world unity in the post-war world.

Connotations of Conservation

The necessity for the teaching of conservation has been argued by discussion and example in the section above. Direct reference was made to the need for stressing, in the teaching of conservation, of the theme "The Unity in Nature". A full appreciation of this theme demands a clear conception of the meaning of the word "Conservation". This meaning, therefore, must be carefully taught.

The term "conservation" defies definition. That is not to say that there are no single-sentence explanations of its meaning. There are hundreds of such statements, and most of them are sound, working statements when applied to particular things or particular situations. As long as such definitions are limited to specific cases they are clear cut and meaningful, but when the effort is made to use them to cover a different part of a field or a new field, there is likely to be confusion. The reason for this is that attempts to define the word have narrowed its application, and the new situation cannot be squeezed within the border of the meaning as used.

On the radio, in the press and in public utterance, the term "conservation" has become firmly established in our vocabulary. So much impetus has been given to the use of the word lately, since "conservation" and "war" have inseparable associations, that to substitute another expression to mean conservation would only lead to further confusion without any appreciable gain. "Conservation" is much more than a word in the modern meaning. It is a concept in itself, a large thought, an entire philosophy or way of thinking.

In the beginning conservation meant wise use, and was applied to such resources as timber and soil. This was the interpretation in the days of Theodore Roosevelt. Gradually, the meaning of conservation became widened. A second meaning, that of sustained production, especially as applied to renewable or organic resources became associated with the word. This translation, it could be said, gathered force in this century, reached the crest of popularity in the early 1930's, and is still in great favor today, being constantly used in reference to the separate divisions of the renewable resources, such as forests and wildlife. During and since the depression of the later 1930's the concept of conservation has widened very rapidly, and has come to include, beside the earlier definitions just mentioned, the social relations implicit in man's utilization of resources.

No precise meaning, then, can be assigned to the word "Conservation" unless the situation or circumstance to which it is being applied is particular or circumscribed. Only then can a specific definition be given. Otherwise it is general in sense and may represent a great concept, a fundamental thought, a philosophy, or a way of living.

Statements concerning the meaning of conservations are, as has been said before, legion. From them can be secured ideas and thoughts that will aid towards appreciation of the fuller meaning of the conservation movement, and so have educational contribution of real value.

In a recent editorial comment,[7] we read:

"Conservation, reduced to elemental significance, is a policy or principle of controlled production designed to benefit the largest number of people over the longest period of time. This concept has been in the minds of conservationists for years."

H.L. Ickes, Secretary of the Interior for the United States, gives this definition:

"Conservation means the prudent use of our natural resources without waste or needless destruction, and having in mind always, that so far as not inconsistent with our own needs, they should be preserved for the use and enjoyment of future generations."

A mere controversial statement is the one, "Conservation is a policy of governmental regulation of the use and development of the natural resources of the country, so as to prevent waste, exhaustion, and destruction by private ownership."

Sears[8] has many paragraphs that seek to explain Conservation. Perhaps the best is:

"In order to live, human beings must obtain many things from land, air, and water. These things are called natural resources. They may be used wisely so that there will be enough for all, and plenty for the future. This is conservation. Or they may be used stupidly, which is waste."

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7. "Conservation as a Production Policy", American Biology Teacher, Vol.5, No. 4, January, 1943, p.84.
8. Sears, Paul B., op.cit., p.1.

Sears gives many examples of conservation programmes. He mentions the old English law that permits the use of the waters as long as the quality of the water is unimpaired for the next user. The careful use of water and sediment from the Nile, the custom in China of returning all sorts of sewage and wastage to the land, and the immediate replacement of the trees of definite size that are cut in Sweden, are a few of the conservation precedents established in the world.

The careful distinction that must be noted in the two prominent connections in which the term is used is emphasized by Ward[9]. He points out that in the original sense, conservation referred only to those natural resources man utilizes for his advantage. But in recent extensions of the implications of the term, conservation includes the field of social and political relations, of health and disease, of all that concerns human society in its development. In the narrower original meaning, conservation is applied ecology. In the broader significance, it could be referred to as human ecology.

Pack,[10] in an article on the pitfalls of conservation, properly points out that:

"True conservation seeks to find the proper balance between preservation and utilization without neglecting either aspect of the case. It is rightly undertaken only for the permanent

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9. Ward, Henry B., op.cit., p.175.
10. Pack, Arthur N.
Foundations of Conservation Education
National Wildlife Federation, Washington, D.C., 1941, p.55.

and lasting objective of the greatest good to the greatest number of human beings in the long run. Its methods are discovered only after careful expert analysis of conflicting factors and complicated interrelationships."

In speaking of fisheries, Huntsman[11] has this to say. "The aim in conservation is said to be wise use of our resources. He who really desires wise use will not blindly and confidingly accept the dictum of any enthusiast, but will wish to be impartial and to find out whether wise use means the restriction in use that the word 'conservation' implies, an expansion in present use, or some new use".

The most comprehensive and most up-to-date interpretation of conservation that the writer has seen is the sentence used by Gabrielson[12] in his consideration of the organic or renewable resources of this continent. "In its broadest social aspects", he states, "conservation of the organic resources means restoring to the highest possible level and maintaining in a state of high productivity those resources... that can be used on a crop basis to sustain human society."

The above sample statements form a criterion of what is generally found in books dealing with conservation, particularly those devoted to the field of renewable resources. Sufficient definitions have been given, it is felt, to convey

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11. Huntsman, A.G.
Transactions Canadian Conservation Association,
London, Ontario, 1941, p.106.
12. Gabrielson, Ira N.
"Wildlife Conservation"
The Macmillan Co., 1941, p.15.

a rough indication of the scope of the field of conservation. It will be seen that conservation is a project; not on one water, but of many waters, of precipitation in its many forms such as fog, dew, rain, snow or hail, of "run-off" water, of capillary water, of "ground-water", of the water in the streams and rivers, of that in ponds and lakes, and finally of that in oceans. Conservation is a project, not of one fishery, but of many fisheries. And not only of fisheries but also of game, of wild-flower, of soil, of forests, of mountains, of people. Conservation is a project for the rebuilding of nations based upon the principle of the greatest good for the greatest number of people. This project will be thought out and planned, not by one man, but by hundreds of technically trained experts. The implementing of the master plan, and of the many minute plans within the plan, will rest where it properly belongs, with the people, who own the resources, and are responsible for the policy in administering them.

Principles of Conservation

Life is governed by principles, physical, chemical, biological. Relatively few people are aware of them; fewer still pay any attention to them. Yet acknowledgment and understanding of their existence and operation are the measures of progress, of enlightenment, of education. Conservation, like any other study, is based upon them, and, like any other study, such as Biology, Chemistry or Physics, if advance is to be made, such principles must be taught early and well. Principles are not

acquired by intuition, they are assimilated when induction or injection and repetition are used. This is teaching.

There are many conservation agencies, in British Columbia, in Canada, in North America. Many are government organizations, some are private. Departments that manage public possessions such as lands, forests, and water, are in reality conservation agencies, though they may not use the name. Private groups that concern themselves with historic monuments and sites, protection of wild flowers or of birds, these also are conservation agencies. Organizations such as the Boy Scouts, Girl Guides, Farmers Institutes, Natural History Societies, and many others, are directly interested in safe-guarding natural resources and so are vitally concerned with Conservation problems and practices. All of these groups have set up standards and objects, and are busy achieving such standards and ends.

Though these ends are generally laudable in themselves, there is little uniformity in their pursuit. There is a lack of coordination that makes progress slow; there are points of disagreement at times that bring the groups into conflict with each other; selfishness very often crops up, and gains are made at the expense of the worthy objects of others; a common constitution of fundamental conservation purposes is absent, and this disorganizes effort. It is essential for guidance in conservation activities that common standards or basic principles be established or set up, principles or general truths by which conservation efforts of any kind and in any place, may be properly weighed and valued.

What, then, are the major principles to which all conservation agencies must subscribe? While realizing that they are not all-inclusive, the following basic principles are suggested for preliminary agreement.

1. The Unity of Nature and the Interdependence so interwoven in it must be clearly recognized and understood.

It is one of the great truths, that nature is a complex thing, and consists of a great many factors acting upon life and being acted upon by life. This fundamental, "The Unity of Nature", prevents us from considering a single resource, such as game or fish, or grass, as a problem that can be investigated and studied apart, but demands that any resource under discussion or investigation must be considered in the light of the many other resources which influence it, or which may even cause it to be.

Until this large thought of the Unity of Nature is incorporated into the individual philosophy it will be impossible to get the true picture of conservation.

2. There must be a deep, complete, and permanent conception of the philosophy and the true meaning of conservation.

In our province, blessed with abundant but quickly exhaustible resources, there is sufficient wealth to provide a bountiful existence, as far as material riches can contribute. Our forests, our soils, our waters, the grass, timber, game, minerals, the scenic beauty and the unrivalled recreational resources of parks, lakes, flowers, mineral springs, and beaches,

all these form a heritage probably unrivalled and should contribute to the good of everyone of our citizens. Constant care of these resources, intelligent planning, full utilization, and the co-operation that alone brings conservation, can secure this heritage for the present and the future.

3. Conservation of natural resources should be based on accurately determined knowledge.

Dymond[13] has said, "Much harm has been done to natural resources by uninformed or misinformed bodies who have cleared land, drained swamps and dammed streams without any thought of the consequences of these actions beyond the immediate object in view. Examples of the disastrous effects of ignorance in the handling of natural resources are too well known to require citing."

4. Every citizen must have as complete a knowledge as is possible of the resources we possess.

It is an old axiom that no government can be wiser than its information. Neither can the individual. Since the people are responsible for the election of its government, and since the government is responsible for the determination of policy with regard to the resources under its control, it is of the utmost necessity that the research findings with respect to these resources become available for the education of the public.

There can be no doubt that in recent years our

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13. Dymond, J.R.
Transactions Canadian Conservation Association,
London, Ontario, 1941, p.92.

civilization has expanded much faster than our knowledge. On every hand we are faced by problems to which we do not know the answers. There is never a final problem whose solving will close the chapter dealing with any single resource. There are wide gaps in our information even about such comparatively thoroughly investigated resources as the halibut fisheries. There are wider gaps in the knowledge concerning our salmon and herring and pilchard, and possible greater ignorance still about our forests and other resources. Yet, despite all that, what information is known is not wholly public possession. Our Provincial Departments gave gathered and analyzed much basic data concerning the physical resources of British Columbia. But much, too much, of the collected data, has been filed for reference in places where it never can serve the ordinary person directly. This forgotten information should be easily available to all. He should know the facts about his province as he knows the facts about his own home. In preparatory reading for this paper, there was found to be almost a complete absence of material about the resources of British Columbia presented in everyday language so that the non-technically trained citizen could appraise the resource values of the Province. How then, can we expect intelligent management of the natural wealth when four out of five persons know little more than that they live in a region called British Columbia, that it is a pretty big area, and that many people seek their living in the woods, on the land and on the sea! If ever the economy of an area was founded upon raw materials, it is here in British Columbia.

If ever an education in Conservation was required, surely it is in this Province and among its people.

5. The handling of our renewable resources should be coordinated.

Drainage attempts, uncoordinated in any way, and promoted largely or entirely by individuals or groups of individuals interested in exploiting definite areas of land, have given rise to a variety of problems. There are costly examples in British Columbia. Among the results are lowered water tables, accelerated run-off of precipitation, and the speeding up of destructive erosion which often in a few years undoes the work of centuries of soil-building. There are even unhappier results, economic ruin of farmers being among the saddest.

It must be recognized that agriculture can no longer be administered without reference to tree growth; that game, fish and fur are affected by methos of forest management; that water power development and the use of streams as handy places for the disposal of wastes from paper mills, mines, packing plants, distilleries and other chemical works, are likely to destroy one resource in order to develop others. In a conservation economy, individual enterprises cannot be considered in isolation. There must be co-ordination of activities affecting natural resources, and this co-ordination is one of the most important steps towards conservation. We cannot conserve our natural resources piece-meal.

It should be insisted upon that there exist a central conservation body in the government. In many of the States to the south of us, Departments of Conservation have been created,

and it is their function to collate the findings of all other departments, those findings that bear on the natural resources. Much of the work of these Conservation Departments is educational and planning. Researches as widely different as oyster investigations and geologic surveys are also centred in such bodies. As a consequence, in many of the States such as Louisiana, the Department of Conservation is the largest and most important branch of government. While it does not necessarily follow that such a Department must be created if conservation activities are to progress, it does seem apparent that such Departments have won for themselves a permanent and highly regarded position in the local governments of the States of the Union. That we need some such organization, similar to, these Departments of Conservation, is self-evident.

6. Scientific planning and management are the bases of perpetuation of resources.

There is no general plan of development for the resources of British Columbia, and since any expansion is haphazard and precarious, and with little regard to its permanency, the use that is made of our resources is not only partial but often unwise.

"It is amazing," says O'Neill, "that in spite of the fact that our governmental agencies have been engaged for many years in gathering information about our natural resources, each resource has been considered largely by itself and usually with regard only to its aggregate possibilities. No agency exists for the co-ordination of all the available information

into composite pictures of all the potential resources of each part of Canada, and no body is charged with the duty of trying to determine how and when any district can be made self supporting, and be consolidated into the general economic development of the country. All this has so far been left to chance, but we have reached a point where it is suicidal to continue such unscientific methods."[14]

Only through scientific planning and careful fostering of the orderly expansion and development of the resources of a region, can full advantage be taken of all natural assets. When men work without a plan, there is chaos and waste. When men work with a plan based on maximum information, thriving and thrifty exploitation of the natural wealth is assured.

7. Conservation Means Cooperation.

One of man's innate biological urges is the will to survive. Hence man is selfish. However, a manifestation of this survival urge is gregariousness, or co-operation, the habit of banding together for mutual protection.

Under the present economic system in force on this continent, great stress has been laid on that "hardy, rugged individualism" which probably kills off more people than wars can, and which has resulted in more and more emphasis on the advancement of the few at the expense of the many. But, as a result of the unremitting efforts of a relatively few sincere

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14. O'Neill, J.J. "The Role of Mining"
Papers from the Joint Session of Sections of the Royal Society of Canada, Ottawa, 1941, p.29.

and ardent conservationists, particularly since the turn of the century, there is a growing awareness that the poeple of this province, this country, this continent and this world, have not enjoyed the almost inexhaustible benefits that nature has conferred upon them, those gifts that are known as "natural resources". Perhaps this can be put down to the fact that, until very recent years there has been no educational effort to evoke loyalties to the general welfare, except in times of war. Yet people as such are receptive to such educational effort, since co-operation and unselfish effort are among the highest sources of human satisfactions, as witness the gratifications that community enterprises bring. Although these demonstrations of loyalty to the general welfare are very often local, limited in application, and temporary in their beneficial effect, there is no reason, as has been so amply demonstrated in current war efforts, why this extension of the individual selfishness can not expand until it is provincial, national, and international in its scope, Co-operation between all the people in all the communities of the land is essential to the successful promotion of conservation, for conservation is co-operation and co-operation is conservation.

8. Conservation must be Practised.

Many people in the Province of British Columbia are interested in conservation problems. Some, individually, in groups, or in government agencies, are studying the problems; many more are reading about, or listening to discussions of these problems, by way of newspaper lectures, or radio. But

not many are doing anything about them. Critical situations with respect to our natural resources are, it might be said, constantly with us since soil, water, forest, game, fisheries, grazing and other conditions are dynamic, ever-changing, requiring the utmost attention and vigilance in their ministration and administration. To be quite fair the public recognizes the importance of the difficult questions that arise. But it is another thing to find time to act. Consequently, crises come and go with but isolated protests, and further injury to the public welfare may be added to an already serious list. There was considerable, but scattered and unorganized, disapproval, even remonstrance, with the Provincial Government, when the beautiful Green Timber drive between New Westminster and Blaine was threatened with destruction, despite its incalculable value as a scenic asset. But agitation can never take the place of action. The trees came down. Lost for all time was the inspiring drive that created such a favorable impression upon visitors entering British Columbia from the South. On the contrary, the timber wonderland that guarded the approaches to Buttle Lake in Strathcona Park on Vancouver Island, was won for the pleasure of future generations, largely through the concerted effort and direct action of the B.C. Natural Resources League, a group of Conservation-minded citizens of British Columbia.

It is obvious, in the light of past and present experiences that no campaign of mere protest will avail, that mere complaints of misuse have corrected none of these abuses of natural resources or, in most cases, even delayed the pro-

cesses of destruction. Strong action, co-operative action, action based upon the decision of a well-informed public, is the only method that can be followed if the values of today are to be passed on in a healthy state to the citizens of tomorrow.

We mean well when we say that we must change in the way we do things. We mean so well sometimes that we pass laws, making people change their ways. This is never enough, however, for laws without strong public support quickly lose their effectiveness. The next thought is to teach better ways in the schools. Children, however, are like grown-ups; they understand what others do better than what others are saying. Unless the grown-up shows himself willing to practise conservation, that practice will be hard for the younger generation to adopt. It must be very clearly recognized that no amount of legislation or compulsion is as effective as enlightened Community action. When collection and direction of energy or influence for the general welfare becomes habitual action in the smallest to the largest communities in the land, then the era on conservation will truly have been ushered in. The heritage of renewable natural resources will have been made secure and perpetual. This will come about only when men understand the meaning, and practise the principles, of conservation.

CHAPTER II

CONSERVATION IN THE PRESENT PROGRAMME OF STUDIES

(For the Junior and Senior High Schools of British Columbia)

Introduction

Conservation is not a single subject. It is an area of learning and a way of living. It is a general, habitual attitude towards the use we make of the things we possess, those things we term our resources. Whatever we possess as a heritage, whether it be human, such as our physical and mental health, or part of the natural environment, such as forests, birds, water, fish, grass or flowers, these things are our resources. If the use that we make of these resources is wise and ensures their perpetuation, we have within us the philosophy of conservation, for we have planned for the optimum use of our possessions without impairing them for future generations. This is the idea in conservation, and it is likewise the ideal in citizenship. It follows that instruction which contributes most to citizenship will contribute most to conservation.

The teaching of conservation is appropriately a function of the Social Studies. But it is also part of every subject taught in school. Much of the factual material and experimental activities belong to the sphere of Science. It is from the science field that much of the appreciation and understand of national problems is derived, since it is the local experiences with the salmon in the river, the cannery wastes, the water purity, problems in the garden and the parks and the boulevards, that stimulates the development of the appreciations and understand-

ings. Teaching of conservation is also a function of any subject concerned with the teaching of citizenship. Conservation, it will be clear, is an integrating thread in all the courses. Its facts are chiefly in the realm of the sciences, in geography, in biology, in chemistry. Its social implications are implicit in the Social Studies. Its philosophy, that of planned abundance for the permanent good of all the people, is contained in every one of the range of school subjects that concern themselves with the citizen and the community. So the story and study of conservation finds a place, of varying scope and intensity, in the subjects of Art, and Arithmetic, and Guidance and Literature, and Science, and the Social Studies.

The teaching of conservation is the teaching of a view, the teaching of habits of social living, and so is comprehensive. The specific fields of conservation such as the utilization of land, the management of game, and fish culture, are special subjects beyond the secondary school level. These special aspects of conservation must be dealt with in a general way to teach the fundamental principles of conservation, but the emphasis in conservation teaching to youth of Junior High and Senior High levels is on the philosophy. If ideas can be stimulated, and ideals be formed, to the end that the student leaving Senior High School is aware of his rights, and his responsibilities, as a citizen of his community and his country, then that student is trained in the conservation philosophy and outlook. By the same token, he is trained as a worthwhile citizen.

Conservation, then, in the Course of Studies for Junior and Senior High School, should appear as a correlated and integrated subject. With this in mind, the Programme of Studies can be examined to see what provision is made for the teaching of Conservation in the schools of British Columbia. For continuity, the analysis will be made by subject, with emphasis on Social Studies and Science, since these subjects have the greatest scope and application in conservation teaching.

1. Social Studies

A. Junior High School[15]

In the objectives for Social Studies in the Junior High School, the following one is noted:

"4. Increasing the ability to observe and interpret environmental factors in their geographic, historical and civic relations."

Under "Right Ideals and Attitudes to be Observed", the following are noted:

"2. An appreciation of the necessity for government, the meaning of liberty, of citizenship, of co-operation."

"6. A recognition of civic responsibilities and a willingness to respond to them with the appropriate action."

These quotations might well have been taken from a textbook in Conservation, so well do they express main thoughts in the philosophy of Conservation. There are other related

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15. Programme of Studies for the Junior High Schools of British Columbia, Grades VII, VIII, IX, British Columbia, Department of Education, 1939, p.201.

statements under "Objectives", and "Right Ideals and Attitudes to be Observed" that are perhaps less direct in their conservation implications, yet suggest the importance of building up conservation-mindedness in the pupils, as a pre-requisite to good citizenship. In these latter statements, the real meaning might readily be overlooked unless the teacher dealing with them was familiar with the meaning and philosophy of conservation.

The definite assignments in conservation education, as outlined in the Programme of Studies, are listed as follows:

1. Social Studies I Grade VII

Unit I. Your Community . . . . . 4 weeks

Unit II. The Geographical Setting of British Columbia . . . . . 1 week

Unit XI. The Geography of Canada . . . . . 5 weeks

Unit I deals firstly with the geographical features of the local community, its extent, physical features, natural resources, occupations, and distribution of population. Among the activities recommended are:

(a) Locate on a map of the Province the location of your community and the routes (road, rail, water, or air) by which it may be reached.

(b) Make a map showing its chief physical features; towns and villages; transportation routes; mineral, forest, or mining areas.

(c) Make an animated map of the community, or a relief map.

(d) What does your community produce or manufacture for its own use? For sale elsewhere? What sort of things does

it buy from outside? Where are they obtained?

(e) How do most of the people in your community earn a living?

(f) What new industries might be developed? Where might the new products be sold?

Unit I deals secondly with the history of the community, and the suggested activities and investigations are:

(a) Find out who were the early explorers and pioneers of your community.

(b) Why did the early settlers choose your community?

(c) Of what races or nationalities were the early settlers composed? What races or nationalities have since come to it?

(d) What Indian tribe or tribes occupied or fought for this part of the Province? What noted Indian chiefs were connected with the area?

(e) What changes have occurred in your community since its early settling?

(f) Construct the model of a pioneer home; model or draw its furnishings.

(g) Make collections of pictures and newspaper articles describing the early days of your community. Leave these collections in the school for the benefit of those who come after you. Start a school museum of articles of local significance.

(h) Graph the growth of population of your community.

(i) As a group enterprise, prepare a history of your community.

(j) In what different ways could you improve your community?

Unit I deals thirdly with the public services operating in the community. The suggested activities and investigations are:

(a) How is your community provided with: schools, police-protection (Municipal, Provincial, Federal), fire-protection, water, parks, roads and sidewalks, light, health service, mail, hospital services.

(b) How are these services paid for?

(c) If you live in a large community make a general plan of the place: its main transportation routes; its business, industrial and residential districts; its recreational centres, schools, hospitals, and other public buildings; its power and water supply; its sewerage system; its town planning scheme, and the like. Make maps and models and collections of pictures and booklets.

Conservation begins in the home. It is there that the fundamental principles can be learned and, since the home is the most familiar unit, it is there that the illustrations of conservation in action can be seen and practised. The next larger unit is the community, and here again the principles of unity, interdependence, balance, planning, co-operation and coordination are readily illustrated.

Normal, everyday life is carried on in the community environment. Here, then, is the ideal situation for the teaching of conservation, and the framework for such teaching is drawn up in the suggested activities for this first unit in

the Grade VII Social Studies Program. In the period of four weeks set aside for this unit there is ample time to convey a clear conception of the true meaning of conservation. The opportunity is there, the teaching materials are there, the activities are most suitable, all conditions are present and the stage is set for the production, so to speak.

The play, however, to carry on the simile, is not judged, to any large extent, by the setting. Properties are of lesser importance than production. Unless the players, the citizens of the community, or the children of the school, can perform their parts dynamically, with enthusiasm, coordination, and co-operation, the acting will be mechanical and unprovocative. This type of performance is inevitable if the director, or teacher, is not infused with the ideas, the thoughts, the meaning of the philosophy of conservation.

Given interest, imagination, and understanding, the teacher can do a most valuable service to the cause of the community and to the cause of conservation at this particular time in the education of the child for social living. At the Junior High School level, impressions are deeply and permanently made. Here, at the very beginning of Junior High School experience, is a most significant opportunity to stress education in conservation.

Unit II in the Grade VII course provides for a one-week's survey of the geography of British Columbia. The theme of interdependence, while not specifically mentioned in the course, might very well be woven through the discussions. The

development of the philosophy of conservation requires that studies be extended from the home and community, through larger and larger geographical units until the thoughts are fully international and cosmopolitan. The study of the geography of British Columbia contributes to the larger appreciation.

Unit XI sets out a five-week course in the geography of Canada. "The study of the geography of Canada should centre upon the great natural regions", is the introductory sentence to this unit. The themes of unity and interdependence can again be brought to the fore, since stress is laid upon industries, interprovincial and foreign trade, and the means of transportation and communication. Conservation thoughts enter largely into such a study. All that is needed is the alertness of the teacher to their applicability throughout.

The Grade VII Social Studies Course provides ample opportunity for the introduction of what is basic in the study of conservation, that is, general ideas, discussions, and appreciations of the true meaning of conservation. These learning situations could not have been provided at a more valuable or more critical time in the education of youth.

2. Social Studies II, Grade VIII

Unit XII. The History and Geography of British Columbia . . . . . 5 weeks

The Grade VIII Social Studies Course deals primarily with the historical aspects of Canadian evolution. The conservation teacher would note the liberal illustrations of conservation principles in such studies as that of the "Industrial Revolution", "Social and Political Progress after the Napoleonic

Wars", and the like, but it is not to be expected, nor is it found, that the teacher without experience in conservation realizes the deeper implications that changes in the ways of social living can bring about between man and his environment. Being unaware of this relationship, the teacher does not emphasize the importance of resources. Yet it should be pointed out that this unit in particular, and others incidentally, offer possibilities for review and reiteration of the fundamental principles in conservation.

3. Social Studies III, Grade IX

Unit I. The Great War and its Aftermath . . . . . 4 weeks

Unit IX. Canadian Development . . . . . 4 weeks

Unit XI. Intellectual and Social Development . . . 1 week

Unit I reviews the Great War, and then passes to a discussion of the League of Nations. Here, apart from the machinery and the history, is a study in planning, synonymous with conservation. The need for planning, the ways of planning, the administration and results of a plan, may be studied here. That the plan was not successfully operated does not make this a poor study in conservation. On the other hand, it is replete with examples of the difficulties that may be encountered, of the selfishness found in individuals and nations, of unworkability of parts of a plan, of unwieldiness, of lack of integration, and of many other factors that may interfere with the successful operation of a plan. A study of the League of Nations presents both sides of the picture of planning. The high ideals in the philosophy of conservation, the recognition of world unity and world problems, the striving towards a better and a happier world,

are inherent in the conception of the plan. A teacher of wide sympathies and international outlook could, in this study, stimulate worthwhile thoughts as to the nobility in world unity, and at the same time point out the pitfalls that selfish men prepare in the path that the world is travelling in the search for collective security and unity.

Unit IX is a four-week study of "Canadian Development", and breaks down into:

1. Growth of National Unity in Canada.
2. The Settlement of the Canadian West and the Social and Economic Results of Settlement.
3. Post-war Problems in Canada.
4. Economic Relations with the United States.

"The Growth of National Unity in Canada" is a conservation problem of first magnitude. It is a problem of high priority on our own doorstep. It is a problem of social relations that have vast import for the welfare of all Canadians. It is a problem, then, that requires the attention of every citizen, and the Grade IX level is not too soon for a presentation of all the pertinent facts that have to do with the problem. The historical background must be pictured, and every aspect, past or present, bearing on the problem, must be outlined. Until such a comprehensive survey has been made, and observations verified and collated, it is impossible, in scientific or conservation thinking to arrive at fundamental conclusions. Without such conclusions, it is impossible to arrive at proposals for solution of the problem. The solution must be found if

Canada is to be united, and we are to be able to class ourselves as conservationists in action as well as in thought.

The Grade IX student should learn what is meant by a problem, what constitutes a problem, and why problems must be solved if there is to be social progress. This much, in a too-limited period of time, should be dealt with at this juncture.

Sections 2, 3 and 4 of this unit provide abundant opportunities for the introduction of conservation thoughts, particularly ideas concerned specifically with natural resources such as soil and water. The opportunity to give information about the factors that make up our environment does not occur as often in Social Studies courses as it does, say, in the Science field, and the possibilities for integration, when they are provided, should not be overlooked.

B. Senior High School[16]

In the introduction to the outline of Social Studies courses for the Senior High School, the Social Studies are defined and their function discussed. We read:

"The Social Studies are to be understood as those studies whose subject-matter relates directly to the organization and development of human socity and to man as a member of a social group. The Social Studies are designed to train the pupil as a member of society and to cultivate his social efficiency. Through them our youths should be brought to realize what it means to live in society, to appreciate how people have lived

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16. Programme of Studies for Senior High Schools of British Columbia, Bulletin I, British Columbia, Department of Education, 1941, p. 127.

and do live together and to understand the conditions essential to living together well. The Social Studies should provide the pupil with the tools and procedures which may be employed in the solution of the practical problems of our existing and developing society.

"The Social Studies embrace bodies of knowledge and thought pertaining to the relations of human beings, not only to one another, but also to the physical environment in which they live and work. Knowledge includes essential facts and such commonly accepted generalizations, based on facts, as are capable of verification by inquiry...The nature and influence of environment (both social and physical), public personalities and their actions, policies and their results, all must become subjects of thought and opinion in spite of inevitable diversity...

"History, geography, political science, economics, sociology, and psychology, all must contribute toward the subject-matter and methods of the Social Studies courses and toward the aim of developing in the pupil a social and civic personality which will be harmoniously adjusted to contemporary social life."

In the discussion of the importance of the Social Studies we read:

"In general terms the great objective of public education in British Columbia is to provide for our youth such training as not only will prepare them to play their part in a democratic state, but also will develop in them the ability to make new adjustments in an evolving and progressive social order so that

social stability may be united with social progress. Because the Social Studies are peculiarly adapted to this end, teachers of the Social Studies must assume a large share of the responsibility for the realization of these essentials of good citizenship. On the teacher of no other subject is a greater demand made for wide knowledge, broad human sympathies, and clear thinking amidst everchanging complexities."

In the general objectives for the Social Studies, the following are noted:

"3. To help the pupil to acquire a knowledge of the evolving economic, social, and political institutions of the world so that he may understand his contacts with his environment.

4. To lead the pupil to realize that social problems arise continually and to develop in him the desire and ability to participate effectively in solving them.

5. To develop in the pupil ability and skill to collect, organize, and use data for the purpose of forming conclusions and thinking critically.

6. To lead the pupil to form the habit of suspending judgment upon any question until all available data have been examined scientifically, to the end that the pupil may be able to arrive at valid and independent judgments....

7. To develop in the pupil a desire to contribute to the progress of civilization by seeking to make Canada a better place in which to live.

10. To help the pupil to understand the influence of man and his environment upon each other and the degree to which the physical environment has promoted or retarded progress.

11. To lead the pupil to an appreciation of the interdependence of the individual within the community and of the nations in the wider sphere, and to a recognition of the value of neighborliness and friendly co-operation.

12. To develop in the pupil ability to work both independently and in co-operation with others.

16. To lead the pupil to see that he has duties and responsibilities towards his family, his community, the Dominion of Canada, and the British Empire, correlative with the advantages from living within them."

The above excerpts from the Programme of Studies for the Senior High Schools constitute the larger part of the foreword to the introduction of the Social Studies Courses IV and V, the courses obligatory for Junior Matriculation or High School Graduation. These excerpts are full of conservation philosophy. Here is provided perhaps the finest opportunity in general education for the inculcation and development of conservation thought, and way of thinking. The presentation of data pertinent to conservation thought must be included in the courses if the objectives as laid down are to be achieved.

In definition, conservation has today an expanded meaning. Where in the original sense, it meant "wise use", and in a later, broader sense, "sustained production", it has come to mean since the later 1930's, all that it meant before plus the social relations implicit in man's utilization of resources. In other words, the study of conservation is greatly concerned, not only with the facts of such sciences as forestry, agriculture, mining, and fisheries, but with man's interdepend-

ence with the resources, and his proper administration of these resources for the welfare of all. This, in its essence, is social study, and so it is apparent that the Social Studies courses play a paramount part in conservation education. It is to these courses that we must look largely for the training in conservation attitudes, thoughts, and philosophy. This training can be given if the teachers of the Social Studies are themselves imbued with conservation philosophy. Otherwise, direction of thought along conservation lines will be missed entirely, and the units will become units of work rather than units of comprehension and understanding of man's relationship with his environment.

1. Social Studies IV. Grade X or Grade XI

Unit I. The Foundations of Society.

The object of the first problem of this unit is to gain some understanding of the origins and general development of social relationships (society).

The definition of Society contributed at the beginning of this problem by Henry C. Morrison of Chicago University furnishes much thought for conservation discussion. He says:

"Society is, in the first place, one of the three primary conditions of human existence. The other two are the physical and biological environments. Society is, further, sets of relationships between individuals which grow up out of the inevitable action and reaction between many individuals. Society is not the community, the state, the public, or the people. It is not self-conscious: it neither invents, prescribes, approves, rewards, or decrees."

The conservationist recognizes this statement as one of the first principles of conservation, the declaration of unity and of interdependence in the world in which we live. This statement is a topic sentence for the discussion of our measure of enlightenment and progress and education, our understanding of the physical, chemical, and biological principles which govern life. It would be difficult to select a problem better suited as an introduction to the understanding of the meaning of conservation.

Problem 2 in this unit seeks to develop the story of how certain geographical factors influenced the trend of civilization and to show how mankind developed from primitive, wandering tribes into great national states with a highly developed and complex civilization.

This is the story of natural resources, for the measure of civilization is as the state of exploitation of natural resources. As development of resources wax, cities and empires develop; as exhaustion of resources proceeds, civilizations wane. It is the story of Nineveh and Tyre and Babylon and Carthage, and the story of the Empires associated with the great cities of the old world. No area or nation, history shows, ever attained greatness unless it contained within the borders, or had under its control, large areas of fertile land to support its armies and its civil population. So long as the virgin fertility lasted or the soils were wisely managed, nations prospered and their cities flourished. But nation after nation fell, due largely to unplanned exploitation of the

soil and what grows upon it. Civilization never yet has saved a nation from calamity, where the balance of nature has been disturbed. Babylonia, Chaldea, and Persia, once garden spots, lands flowing with milk and honey and other agricultural products, are deserts now. The depopulated areas of today were the thriving empires of yesterday. Gibbon, the historian, states that as many as 500 cities once flourished on the present arid plains of Asia Minor.

While it is true that Problem 2 in this unit deals with the rise of civilization, the picture is only half-finished if the falling away from the crests to the troughs of history is not painted in. The successive surges in the history of mankind cannot be studies in isolation. The causes that promoted the surges often lie almost wholly in the dark, sterile periods between the crests. These dark periods, which might be called times of unproductiveness following times of despotic exhaustion of natural wealth, are the periods when plague and famine imperilled and ultimately destroyed the wealth and glory that marked the nation's greatness. These things must be told in the Social Studies, if the lessons of the past are to serve as guides for the future.

Unit II. The Dawn of History

The problem in this unit is to show how man emerged from a primitive state and acquired certain skills and knowledges; and how through a gradual mastery of natural forces, he began his start toward a higher civilization.

General Objectives 1 and 3 are noted at this point:

1. To develop in the pupil an appreciation of the continuity of human achievement. "The roots of the present lie deep in the past."

3. To help the pupil to acquire a knowledge of the evolving economic, social, and political institutions of the world so that he may understand his contacts with his environment.

Provision is made in this unit for a study of the early geological periods of the earth. The action of air, water, and sunshine in the formation of soils can be taken up at this point, and the slow process of soil-making stressed. The periods of evolution and development, beginning with the periods of Fundamental Gneiss and Sedimentary Rocks, and carrying through the Proterozoic, Paleozoic, Mesozoic, and Cenozoic Ages should be quickly outlined. Emphasis on details of the period should be avoided. What should be emphasized strongly is the fact that it is estimated that a space of about a billion years was required to bring the earth from a molten sphere whirling in space, to the form in which we know it today. A billion years to build up the soil on which we all depend! That staggering total of time should cause anyone to hesitate before undertaking a venture which is dependent on this soil, and which might, through improper practice or lack of consideration, result in harm to a medium which took so long in the making.

There are further facts of conservation that can be introduced in this unit, facts related to the beginnings of agriculture and early agricultural practices, but if the main thought as set out in the previous paragraph is well brought

out, a good service will have been rendered the cause of conservation.

Unit III. The Cradle of Civilization

(The Four Great River Valley Civilizations of the World)

The topics as listed in this unit are:

1. The Land of the Nile --- Egypt.
2. The Land of the Bible and the Hebrews.
3. The Valleys of the Ganges and the Indus.
4. The Valleys of the Hwangho and Yangtse.
5. What these early peoples contributed to civilization.

To the conservationist, the studies arising out of the above topics make fascinating history. Until recently, soil erosion has not been considered a factor in the making of history. Historians seldom, if ever, attributed the turn of historic events to the fertility of the soil or the management of agricultural resources. In the future, however, no complete history of certain world events can be written without taking into account the exploitation of the soil and the results which followed.

It is realized that much of the time to be devoted to this unit must be used for study of economic, social, cultural and other factors which contribute to our present civilization, but it is argued that the advances which peoples make are founded on man's use of the crust of the earth. This in itself merits that careful consideration must be given to the land upon which we live, the stuff called soil in which civilizations germinate, and out of which they grow.

Unit IV. The Age of Grecian Civilization

Unit V. The Roman World

Unit VI. The Birth of European States

Unit VII. The Mediaeval Civilization in Europe

Unit VIII. The Growth of National States in Western Europe

Unit IX. The Age of the Renaissance and the Reformation

Unit X. The Building of Colonial Empires

Unit XI. Our Social Inheritance - Our Debt to the Past

There is no excuse for forcing conservation thoughts into material which does not lend itself to a natural development of such thoughts. In a survey of Units IV to XI inclusive, it was found that the topics were properly limited to what might be termed "straight history", the study of events and peoples, of evolving society and the reasons for the evolution. The social, economic, and political aspects of a changing world are traced from their inceptions to their present state. There is little room in such study for intrusion of the ideas and principles of conservation, except in the incidental ways that a teacher versed in conservation philosophy would automatically introduce because of his particular viewpoint of history and its making. Such a teacher would not miss the opportunity, provided in Unit XI, "Our Social Inheritance - Our Debt to the Past", to review and recall the conservation aspects dealt with in Units I, II, and III, and to bring the Social Studies IV Course to an end on the high note that what we are is due in very large measure to the gifts of nature that are around us, and the uses to which we put them.

2. Social Studies V. Grade XI or Grade XII

Unit I. How to Investigate Social Problems - Some Useful Tools and Methods

General Objectives.

To assist pupils to be self-dependent in their own outlook upon modern life and to enable each one to make his contribution to intelligent public opinion upon which our democractic government is based.

The trained conservationist reaches the above objectives as laid down for this unit. There are relatively few such persons on this continent, and as a group they could be regarded as pioneers in thought and deed in the recent educational field of conservation. "Conservation Education" is an infant of this century, was born in the United States, and possesses the nature and is receiving the nurture that promises a very bright future indeed for this new member of the educational family. But, though lusty and thriving, it is still too young to have travelled very far or made its mark strongly in the educational circle. The guardians of conservation education, dealing with the large conceptions of conservation, have had to be self-dependent in their outlook on modern life. They have had to employ the scientific method with the greatest care, investigating and observing facts carefully, tabulating them, drawing conclusions, testing these conclusions, and applying these conclusions in further search for the truths of conservation.

Following this scientific procedure, much organization, collation, and interpretation has been required of the leaders

of conservation thought, so that specific and valid contributions might be made to intelligent public opinion. As with many pioneers, these contributions have been made, often in the face of ridicule, commonly in the face of concerted opposition of selfish groups. Yet these courageous pioneers have been, and are being, of immense value in the building of a democratic, co-operative world. Recognition by the teachers of the Social Studies that the general objectives of this unit are identical with those of the study of conservation will provide the enthusiasm and motives which can make the work in this unit most pleasant and profitable to the pupils and to themselves.

In the unit problems, provision is made to develop an understanding of certain elementary statistical procedures which can be applied to social data. The technique involved is commonly used in natural resources investigations, and is pre-requisite training for all who wish to carry on advanced work in conservation. It is also pre-requisite to the understanding of conservation problems, and so has the utmost value in the educational equipment of all citizens. When one can draw a graph or predict the result or outcome of a problem, then the claim to some understanding of the problem can be laid.

In the problems as outlined, some deal directly, others indirectly, with conservation. In Problem I, frequency distribution is dealt with. What could be more functional in the life of a pupil than to use the data from agriculture, forestry, mining, or fisheries, the basic industries of British Columbia? To the actual practice with statistics, the added value of

facts about the economy of the Province are brought to the attention of our future citizens. In Problem III, the prevalence of propaganda in advertising, in politics, and in education is suggested for treatment. Indirectly, such matters as disfigurement of scenic views along the highways, and misrepresentation in education that is conducted by those who would exploit resources to their own selfish ends, can be sharply indicated by the conservationist, alive to these very common pitfalls in conservation. The following, "(b) Conservation of natural resources (A general discussion with more detailed treatment of some particular one)" is noted in Problem IV. This question is a direct study in conservation, an immediate social problem, and one which preferably would be chosen with local significance.

In summary, it might be said that this unit offers splendid possibilities in introducting conservation philosophy and applications. But again it must be said that only the teacher well-versed in the conservation viewpoint will recognize the tremendous opportunities presented.

Unit II. How Man, as a Result of Invention and the Application of the Scientific Method, has been Revolutionizing his Mode of Life.

Specific Objectives.

1. To show how mediaeval society has been transformed gradually into modern society, as man has applied to his ways of making a living, new knowledge and new methods of investigation that were born of the Renaissance and of the great geographical discoveries.

2. To show that one of the chief characteristics of modern

society is that of change resulting from man's increasing control over his environment.

3. To develop an understanding of the environmental conditions that have aided or retarded progressive change.

4. To develop an understanding of the origin, growth and nature of the social and economic problems of our own day.

The major problem in this unit is to examine how man as a result of invention and the application of the scientific method has been revolutionizing his way of life.

Since the scientific method has been dealt with to a certain extent in the discussion on the statistical work involved in the previous unit, only its importance will be acknowledged here. Suffice to say in this unit, as it was in Unit I, the nature of the topics as outlined give practice in the use of the scientific method. Such studies as those dealing with the Industrial Revolution,(introduced by consideration of the social organization and methods of production in western Europe during the first quarter of the 18th Century, and a contrast to those of to-day), followed by investigation of the four main fields in which the Industrial Revolution has proceeded - namely, agriculture, manufacture, transportation and communication, open up a comprehensive view of world development. Entailed are large conservation thoughts, those of interdependence of resources and national planning, coordination and co-operation. Considerable use of the scientific method is mandatory if the conception of balance in nature and among nations is to be created. This conception can be built up clearly and logically by those trained

to view the world as a whole, The true conservationist is so trained, and has the general picture of geography and distribution of peoples and resources quite thoroughly in mind.

One of the admirable features of this unit is the provision to allow, or rather, encourage and demand, pupil participation in research. Assignments to ferret out information concerning, say, the open-field system of farming, the meaning of crop rotation, the live stock on the English farm at the beginning of the 18th Century, the farming implements before and since the Industrial Revolution, the kinds of power in the modern world, and the inventions in the modern world, are important in individual training, and pertinent to an appreciation of the world in which we live. Such student research stimulates the desire to do, and the "doing" is a conservation tenet of high order. Theory must stimulate practice, as in any other subject, if conservation teaching is to have permanent values.

Unit III. How the People Overthrew Despotisms in a Series of Political Revolutions.

Unit IV. How Nationalism has Changed Political Boundaries and Created Independent States Since the Days of The French Revolution.

Unit V. How Democracy Developed and Spread and How it is Opposed by Autocracy and Modern Dictatorships.

Unit VI. How Economic Imperialism and the Lust for Power have Bred Distrust, Suspicion, and Envy among The Governments of the Nations.

Unit VII. How Civilization was Shaken by the World War of 1914 - 1918.

Unit VIII. How the Troubles Arising from the World War and from the Peace Settlement have Kept the World in Political and Economic Turmoil in Spite of Determined Efforts to Establish Peace, Security and Social Justice.

Unit IX. How Our Cultural Heritage has been enlarged during the Last Two Hundred Years.

The teaching material in these Units III to IX inclusive is on the whole straightforward information about the evolution of democratic society. The use of this material is to provide a training in the intellectual processes which are indispensable to the functioning of a democratic society.

In the successful employment of methods which will give such a training lies the implications in conservation with which we are concerned here. If there is a thorough study of social needs, and if there is training in selecting and checking reliability of the material, and time is spent exploring all sides of a question, and in weighing the evidence, then the pupil has had exercise of his analytical, critical, and constructive powers, and will learn to formulate his own generalizations. The more this pupil ability is developed, the more reasoned will be his future thinking and conduct in other circumstances, and so in the problems of conservation which he will meet. He will the better be able to select the essential from the non-essential, select and evaluate materials, judge the validity of information, find solutions to social problems. In other words, and depending critically on the skill and attitude of the teacher, what the pupil learns as Units III to IX are taken up, can be most

important to him as a citizen, and as a person with the conservation outlook.

In planning the teaching of Units III to IX in turn, the teacher would be well advised to review the General Objectives for the Social Studies as stated on page 129 in Bulletin I of the Programme of Studies for the Senior High Schools. Each Unit has listed, in the Specific Objectives noted at the beginning, one or more of the General Objectives to whose attainment the Unit is to contribute. Because these General Objectives are, in general, ends of conservation training, it is worth noting them at this time in their associations with the appropriate Units.

Unit	Associated General Objectives
III	1. To develop in the pupil an appreciation of the community of human achievement. "The roots of the present lie deep in the past."
	2. To develop a sympathetic understanding and appreciation of the institutions and achievements alike of his own country and Empire and of all mankind.
	3. To help the pupil to acquire a knowledge of evolving economic, social, and political institutions of the world so that he may understand his contacts with his environment.
	9. To show the pupils that institutions are subject to change, inasmuch as they have been developed by man to serve his needs, and that in seeking to effect changes one should employ only lawful and constitutional methods of doing so.

IV 2. As above.

3. As above.

V 3. As above.

5. To develop in the pupil ability and skill to collect, organize, and use data for the purpose of forming conclusions and of thinking critically.

6. To lead the pupil to form the habit of suspending judgment until all available data have been examined scientifically, to the end that the pupil may be able to arrive at valid and independent judgments not only in matters of an historical nature, but also in those dealing with current problems, and thus to prepare him to recognize and properly evaluate the propaganda by which contemporary life is so constantly assailed.

7. To develop in the pupil a desire to contribute to the progress of civilization by seeking to make Canada a better place in which to live.

VI 1. As Above.

4. To lead the pupil to realize that social problems arise continually and to develop in him the desire and ability to participate effectively in solving them.

VII 11. To lead the pupil to an appreciation of the individuals within the community and of the nations in the wider sphere, and to a recognition of the value of neighborliness and friendly co-operation.

14. To promote the ideal of peace and to lead the pupil to realize that war has proved itself a barbarous and generally ineffective method of settling international

difficulties.

VIII 11. As above.

14. As above.

IX 2. As above.

The pursuit of the general objectives outlined above for Units III to IX inclusive leads to a thorough conception of the broad understandings in the study of conservation. If the thoughts are developed with the principles of conservation ever borne in mind, the influence of the study of these units in developing better citizens will be greatly enhanced.

Conclusion.

No other subject in the curriculum offers a better schooling in conservation philosophy than does the Social Studies. Until imbued with the attitudes and ways of conservation, the citizen is ill-equipped to contribute generously to the advancement of the welfare of mankind. Until familiar with the patterns of unity and interdependence that are woven into all life, whether that of the home, the community, or the nation, the large problems that must be solved if the general welfare of mankind is to be advanced can neither be clearly visioned nor logically solved. In the years that lie immediately ahead, tremendous problems await, and how these problems are handled and solved holds the key to the kind of life in store for the generations to come. If the philosophy is broad and sound, the world will be happier. A heavy responsibility rests on those charged with Social Studies teaching, since the philosophy they inculcate in the young of to-day, is going to govern the nature of our civilization of to-morrow.

GENERAL SCIENCE

A. Junior High School[17]

Introduction.

Nature Study as a subject never received the emphasis in the schools that Reading, Spelling, Arithmetic, Geography and other traditional subjects received. It was more or less neglected for two reasons perhaps; it was a vague subject, and it never reached examination status on a par with the three R's. Now that it is reorganized as Elementary Science for the first six grades, and as General Science for the next five, it is obligatory to teach Science with the same thoroughness as has always been applied to the teaching of the mainstay subjects.

General Science, as now outlined, is a more teachable subject than Nature Study was. The facts are quite well-marshalled, and the principles or generalizations are logical outcomes. Scope is also provided for the use of much visual material, and the course is loosely-enough set out to permit of considerable choice of material and method. There is, further, an insistence upon pupil experimentation and other participation such as science essays and science reading reports. Thus individuality and initiative are encouraged within the large boundaries of the units.

Command of the fundamental processes in science work is noted as a first aim in "Objectives of General Science in the Junior High School Grades".[18] These fundamentals, if insisted

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17. Op. cit. p. 297.
18. Ibid, p. 301.

upon, call for: realization and interpretation of the problem; careful preparation; reliance upon experimental fact; critical and honest evaluation; recognition of defects and errors; abstraction of the principle by careful, logical comparisons. This is scientific method, conservation method, to the end that the student will learn to stand on his own feet when faced with a problem, and to do the critical thinking that leads to permanent, wise solutions.

Many teachers lack training in the scientific method, rarely use it in their own lives, at school or elsewhere, and so naturally are quite unfitted to teach scientific procedure. There is an amazing lack of understanding of what such a common expression as "scientific method" means, and it is not alone the non-science teachers that display this ignorance. Yet it must be thoroughly mastered and steadily employed by the teacher of all subjects if the youngster is ever to learn the proper and tested method of solving problems. When a teacher gives careful instruction in scientific procedure, the results far outweigh the effort and a big step towards building up permanent mental pattern has been accomplished, a pattern that can be readily adjusted to the questions posed daily to the boy or girl, at home, at school, at play.

General Science I, Grade VII

Unit I. We are living in a changing world and some of the greatest changes in civilization have been the direct result of scientific research . 2 weeks

Unit II. Water plays an important part in human welfare . . . . . 7 weeks

Unit III. Life is influenced by the forces of nature which mould and change the surface of the earth . 7 weeks

Unit IV. Air is essential to living things . . . . . 7 weeks

Unit V. Living things are adapted to their environment, and by a study of these adaptations man has been able to domesticate certain plants and animals. . . . . 7 weeks

Unit I. We Are living in a changing world and some of the greatest changes in civilization have been the direct result of scientific research.

The principle of change is a fundamental law of the universe, and the story of the changes whether about the crust of our earth, or about the plants and animals that live upon this crust, is known as evolution. This is a story without an ending, for the process of change is not completed. It is going on today as it was yesterday, and will be tomorrow. Things are not made but are always in the process of making.

This theory is a dynamic concept, and if evolution is accepted as a fact, then the conservationist, who accepts this theory, sees life as a never-finished succession of problems to solve and new situations to face. In the teaching of such a unit as this, he would present the wonder and the beauty of nature from such a viewpoint, and try to picture for the pupils the everchanging aspects that makes nature alive and wonderful. In this way, he would rouse appreciation of the changes going on every hour of the day, and stimulate observation of the many evidences of change, in the soil, in the wind, in the water, in

the plants, and in the animals. Observations precede interest, and if made often enough, and attention paid to them, by pupil and teacher, a genuine enthusiasm for nature can be engendered. If this last can be accomplished, conservation-consciousness results and this is how the citizens of the future are trained to recognize and prevent despoilation of resources.

Although but a scant two weeks are suggested for the studies involved in Unit I, and although the above concept is not given direct play in the activities and discussions listed, if conservation ideas are to be brought into the teaching, the principle of change as a fundamental law of the Universe should be the thread of the treatment of this unit. Once learned, the pupil will understand how the solving of one problem inevitably provokes others. For example, the restoration of the halibut fisheries is not a finally concluded problem, although most people, including governments, think so. It is true that the efforts of the Halibut Commission have been most successful, but the scientists who have done the work are far from satisfied that the halibut fisheries are now on a basis of optimum production. That question can only be settled by further investigation, i.e., by solving further problems. Nature is ever-changing. If the highest values are to be obtained from the resources of the sea, investigation must be placed on a permanent basis to meet the problems which a changing Nature poses.

Unit II. Water plays an important part in human welfare.

"To-day, with the growth of large industrial and manufacturing centres and the consequent trend of population

to large cities, man must study the problems of water storage, purification, distribution, and control."[19]

In this unit, the community water supply is studied, to give pupils a basic knowledge for judging the best source of water for their community, the most efficient manner of distribution, and the methods which a community should use in ensuring the purity of its water supply.

An excellent outline for a general, comprehensive treatment of water is provided in this section. Water is discussed as a chemical substance with specific properties. The forms of water, such as rain, fog, and dew are studied. The hydrologic cycle, man's control of water throughout the cycle, and the application of water to man's welfare, involving such topics as reservoirs, dams, irrigation and power projects, flood control, water in the home, water supply systems, and pollution prevention, are all quite intensively dealt with. More important, there is full provision made for simple but key experiments to illustrate the relation of water to man. Moreover, the reports and discussions included in this study of the water of the community are highly correlated with Unit I of Grade VII Social Studies, "Your Community".

The materials of this "Water Unit" are ready-made for conservation teaching. It is doubtful, however, if more than a handful of teachers throughout the Province recognize the tremendous biological values of water. That is a fair assumption, since protests of the total disregard of such values by various

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19. Ibid, p. 305.

bureaus and industries, are rarely voiced by teachers, probably because they are rarely noticed or recognized. There is reason to believe that teachers, as a group, are ignorant of conservation, its meaning and implications. If this is so they would naturally fail to notice that to date, water has been neglected almost entirely in any rational scheme of management that would protect its real public values. "It has been dammed, diverted, drained, polluted, stolen and wasted for private profit and political expediency with utter disregard for its broad public value; yet no natural resource is more truly public in its nature than water."[20] Water remains the orphan step-child in the natural resources picture, though it is one of the basic three, land, water, and air; that produce everything we eat and everything we wear. It would seem that the biology of water as a source of food, and the right of the public to safeguard this enormous food supply and the many other values inherent in water, have no legal recognition.

It is all very well to teach the <u>facts</u> about water, and the important facts are given scope in this unit, but it is of greater importance to community living and to human welfare generally, that the <u>public values</u> and <u>public rights</u> of this great resource should be presented thoroughly and clearly. The properties of water remain the same, but its values to the community may alter violently, unless rigidly supervised for the welfare of all. This is the attitude of the conservationist and

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20. Reid, Kenneth A., Mimeograph, Izaak Walton League of America, Chicago, Illinois, 1940.

the teacher must be aware of it if he is to teach it.

Unit III. Life is influenced by the forces of nature which mould and change the surface of the earth.

In Unit I of Grade VII General Science, the theme was the changing constantly going on in the world. Discussion, it might be said, was the method of treatment. In this third unit, applications of this change and specific instances of change, are dealt with. The present surface features of the earth as phases in a great cycle of changes are presented, and so definite studies, dealing with such subjects as types of rocks, useful materials of the earth's crust, the formation of soil by such agents as water, glacial action, wind, plants, animals, chemical action, and temperature changes, the deposition of soils, the texture, composition, and kinds of soils, and treatment of soils with respect to the problem of fertility, compose the outline of the unit. The succession of studies is orderly and logical, and offers a very fine introduction to later study, in Agriculture, of the basic resource, soil.

This unit may be treated mechanically or dynamically. If the latter, the views of conservation are presented. Man's complete dependence on the soil cannot be over-emphasized. It is imperative that, in the close attention paid to objective topics such as types of rocks and the agencies of soil formation, the relation of soil to world history must never be forgotten. No child should have completed this unit without learning that "Soil" is history as well as science. He should have learned that the civilizations that preceded ours were founded on exploitation of the natural forces, that the first of these

forces in man's progress was the soil, and that civilizations prospered or perished according to how he subjugated and managed the soil. He should have learned that in every case civilized man's occupation and habitation of the land has been followed by accelerated erosion, and that there is no doubt that it has been instigated by his own unwise use of the soil. Serious soil erosion has been closely tied up with the fate of nations. The fate of North America is being determined at the present time, and to date we are following the traditional course of the older civilized countries in the exploitation and destruction of agricultural and forest lands. The farming life of the "Dust Bowl" was only about twenty years. In the Province of British Columbia we are felling trees at more than five times the rate at which we are planting them. The inevitable decline and ultimate disintegration of the population of North America can already be predicted unless conservation of the remaining natural resources is planned and enforced.

That is the picture against which the topics of study as outlined in this unit would be developed. The meanings of Soil Science can only be apprehended if the large conception of soil's importance to human welfare forms the background for individual studies. The specific studies then take on meaning, for their importance and place in living are recognized. That this must be done is implicit in the training of the child, whether he is to become scientist or just plain citizen. The responsibility of attending to this training rests with the teacher. The success of the training will vary with the

teacher's understanding of the philosophy of conservation.

Unit IV. Air is essential to living things.

This section deals with one of the basic resources, air, water, and soil, and completes the study of this trilogy for the Grade VII Course. The larger part of the work concerns the physical and chemical properties of air, and a thorough examination is made of these aspects. Section C deals with the control and use of fire, and in the r eports and discussions listed under this section, one is directly concerned with conservation. Activity 7(b) calls for report and discussion on the importance and methods of fire-protection, and it is mentioned that lessons should be drawn from the forest fires in British Columbia in the summer of 1938.

Forest fire seasons loom as the most menacing occurrences in terms of British Columbia welfare, since the rise and fall of forest production is our economic barometer. The lesson of the destruction of forests by fire, it follows, must be taught and taught well, to every resident in the province. This lesson cannot be taught well unless the teacher has at hand, and in mind, facts and figures of forest destruction by fire. Whether most teachers have the provincial picture in mind as a general background, and the date of the great Campbell River fire in their notes to re-create the story of devastation as a vivid illustration, is doubtful indeed. It is rare to hear a reference to that Vancouver Island disaster of but a few short years ago. This lack of knowledge shows the vital need for conservation education among teachers, for, unless they are carefully instructed, and supplied with the materials for instruction, the

invaluable lessons of conservation will not be embodied in general education. For our future citizens, there must be no tragic gaps in their knowledge of our most priceless outdoor possession, the forests, comparable to the tragic gaps caused by fire in our forest lands. The facts and figures of forest destruction by fire must be presented dynamically to the pupils, and no better opportunity occurs than at this stage in educational training.

While only one direct conservation reference is found in this unit, it offers the opportunity to make a dramatic appeal to the conservation impulses and intuitions latent in every child.

Unit V. Living things are adapted to their environment, and by a study of these adaptations man has been able to domesticate certain plan ts and animals.

The Grade VII Course finishes with another unit literally teeming with conservation topics. It might be interesting to review the sections one by one, and note the conservation implications in the headings.

A. The factors of water, temperature changes, light, soil (food supplies), and air (oxygen) in the environment of living things influence their development and spread.

The dynamic view of living things, and the subject of interdependence, suggest themselves as thoughts that merit development.

B. Life is a constant search and struggle for food. Animals are adapted for this.

The balance in nature, and the optimum use of resources by animals is illustrated here.

C. The structure of many animals has changed so that locomotion has been increased. This has helped them to escape from their enemies.

The conservation lessons that history and evolution teach may be brought out by discussion.

D. Some animals have adaptations for seeking food and protection.

The place of the individual animals in the complex pattern of nature can be used to teach what happens when man interferes with the pattern. The result of the relentless removal of predators might furnish a suitable example.

E. Most plants are mixed in relation to habitat, so that adaptations in plants occur more quickly than in most animals. Their great struggle is for water and sunlight.

Many illustrations of conservation stem from this section. Relations between vegetative types may be studied. The complete dependence of some plants, and the almost complete independence of others, could be readily illustrated. The devices of plants to ensure adequate light and reproduction make interesting studies in conservation, studies in optimum use and minimum waste.

F. Living things adapt themselves to seasonal changes.

In plants, the seeds of annuals, the food stores in bulbs, the habits of deciduous and evergreen trees, combine to tell a story of the wonders in nature which, if remarked upon by the teacher, can lead to a larger appreciation of the world of the outdoors. This is a prime object in conservation education,

fostering a love for the outdoors. To many people, this appeal can better be made through animal illustration. The stories of migration and hibernation can supply that, or the extraordinary color coat changes among the fur-bearers can be discussed.

G. Man's study of the above has made it possible for him to domesticate plants and animals, and by creating an optimum environment for them he has been able to increase the production of plants and animals.

Problems in conservation practice and technique arise in the lives of agriculturists who deal with irrigation and greenhouses. The intensive farmer is concerned very practically indeed with wise use of fertilizers. The ranch operator, to operate successfully, must understand the relations between stock and pasture, and the nice balance that must be maintained between them.

H. By a study of the air (oxygen) needs of plants and animals, man has been able to promote the growth of plants and animals.

Soil conservation practices have been learned by this study of the air. So also have fishery practices been developed.

I. Man has been able to protect wild life.

There is unlimited scope for conservation discussion in this section. Tourist attraction, preservation of food supply, preserving the balance of nature, preserving the pleasure we have in seeing our wild plants and animals, are direct and important conservation subjects. The methods of protection for wild life such as game and fish laws, reforestation, fish-hatcheries, fire regulations, and the use of fire-wardens, are

particularly pertinent conservation measures employed in British Columbia.

Conclusion

There is no finer opportunity in scope and in definiteness, anywhere in the Programme of Study for the Schools of British Columbia, for the teaching of conservation than is to be found in the Grade VII General Science. The whole course, General Science I, forms a broad, rational presentation of most of the facts of conservation. The basic resources, soil, water and air, are suitably explored for this age-level. The living resources that spring from them are also presented adequately so that, under proper direction, a unified impression of conservation can be made on the minds of the early teen-age students who are taking this work.

It is true that emphasis in the science in this grade is on facts, but the first class teacher, in dealing with these facts, can build up skilfully and simply at the same time, the basic philosophy that accounts for, and explains, the facts. This can be done, providing the teacher himself, is conservation-conscious.

General Science II, Grade VIII

Unit I. The earth is one of a number of planets, rotating about an ordinary star. This star, the sun, is but one of billions of stars rotating in a grand system of stars, which we call our universe. It is also called a galaxy. Beyond the confines of our universe there seem to be other universes or even systems of universes.

This Unit is an introduction to astronomy, the knowledge of the nature of the heavenly bodies. The value of this unit in conservation teaching lies chiefly in the acquisition by the student of a body of knowledge concerning a science that studies phenomena which affect man's life. Day and night, the seasons, the equinoxes, the solstices, phases of the moon, tides, and the practical applications of the knowledge of astronomy, such as navigation and surveying, enter into the study of conservation and constitute a body of information which contributes to a rounded conservation education.

Unit II. Man lives in an ocean of air called the atmosphere, which affects his daily existence and limits his habitat.

As a result of years of scientific research, man today can make full use of the properties of air. Study of the uses of air, and of the devices which permit application of such characteristics as air-pressure, take up a considerable part of the time allotted to this unit. Weather and climate are dealt with in the remainder of the unit, and close relation to the conservation activities of man is evident here. Pressure and

weather, temperature and weather, humidity and weather, and the factors involved in weather forecasting are themes of considerable latitude, entailing connection with operation of resources such as fishing, agriculture, and mining. Student research can be directed to acquiring useful conservation skills such as ability to read and understand weather maps. That "man's activities are limited by weather conditions and climate" is a problem that can be covered by student research and reports. This problem may be correlated with the Social Studies. This problem may also be used to provide training in the use of the Science Library facilities.

I Unit III. Heat is a form of energy that man can control to suit his needs.

There is little scope for association of conservation thoughts in this unit, nor should they be intruded unnecessarily. The unit is a compact study in Physics and should be left so.

Unit IV. The basis of life is cellular structure. The normal life cycles have been upset by outside forces of which man's influence has been a primary factor.

In unemotional, simple, scientific statements, the study of the cell is laid out as the first problem in this unit. And the study of the cell, as directed by the majority of the teachers, will follow the prescription as detailed, step by step, and fact by fact. The processes of assimilation, respiration, elimination, circulation, growth and reproduction, and irritability, will be calmly discussed as mechanical aspects of activity within the cell. This is not to say that objective,

detached study is not important in Science teaching. Nothing could be further from the truth. The progress of science is based upon examinations un-colored by the examiner's feelings or opinions. But the conservationist would recognize a greater duty, the duty of presenting the philosophic side of this study. Here is a rare occasion, the moment and the opportunity to catch and inspire the imaginations of impressionable youngsters with the wonder that is streaming protoplasm: "for here is stuff almost as simple in appearance as the white of an egg, yet exhibiting that most mysterious and baffling of all attributes - life."[21] Conservation is a dynamic subject, the study of life, and whoever is enthralled by the strangeness and wonder of life is infused with the spirit of conservation. A digression at this time from the cold scientific facts dealing with the nature and workings in the cell may turn the young enquiring mind into channels that will make for a better citizen.

The conservation principle of interdependence enters into the discussion of bacteria and other fungi outlined in section D of this unit. The important thought, that scientists serve no lesser loyalty than the loyalty to mankind, is made clear when the recommended references to such men as Jenner, Pasteur, Koch, and Lister, are made. At this same time, arising out of the discussions about these outstanding men, the thought that knowledge is not enough, that action must follow, may be

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21. Jean, Harrah, Herman, Powers; "Man and the Nature of the Biological World", New York, Ginn and Co.,1934, 2 Vols., p.24.

carried beyong the study of bacteria, to the whole realm of conservation activities. Lastly the importance of learning the rules of health may be stressed, and correlation established with the subjects of Health and Home Economics.

The condition of equilibrium which seems to prevail in a very complex manner among all living things is known as the balance in nature. The study of this balance is termed Ecology, the subject that explores the complicated associations of plants and animals. The explanation of how nature keeps up this balance, and how man has upset this balance constitutes the second half of this last unit in General Science Studies for Grade VIII. This is, of course, a conservation study of the first order, and of unchallenged importance in the relation between man and his environment.

The consequences of man's unthinking interference with nature are instanced in this section.

1. Results of cutting down of the forest.
   (a) reduction in the number of wild birds which increases the number of insects and insect pests;
   (b) killing of wild life, which has lessened the distribution of seeds;
   (c) increase of flood dangers;
   (d) decrease in numbers of fish in streams where the run-off is too rapid.
2. By ploughing up grass lands man has increased wind erosion.

There are dozens of dramatic examples in the short history of British Columbia to bring home to the pupils the truth of the above statements. There are literally hundreds, and

perhaps thousands, of examples of this ill-considered planning and its results, liberally sprinkled throughout the short history of the white man's occupancy of this continent. Whatever man has turned his hand to, agriculture, forestry, fisheries, and the other occupations based on natural resources, the record is black with conservation misconduct and malpractice. Not that man didn't plan, but there were faults in the planning, and much of the disaster that resulted can be charged up to planning for and by the individual rather than for public needs or the welfare of society.

Man is now trying to restore this balance so that he may be more in harmony with nature. He is trying to effect remedies, though the programs are far from adequate as yet, through such practices as game preserves, fish-hatcheries, game laws, and spraying. But he has yet to learn that conservation, as a successful program, must be planned and executed on a large scale. The advancement of single conservation programs, so characteristic with us, that is not in harmonious relationship with the masterplan for the region, indicates a weakness in planning, and inevitably brings costly consequences.

The Grade VIII term can end on a high conservation plane. The over-all importance of regional planning, planning for the welfare of all can be taught by a teacher, imbued with, interested in, and enthused about the ideas and ideals of conservation. These ideas and ideals can be inculcated in the minds and hearts of boys and girls to-day, and that is the best kind of insurance for tomorrow.

General Science III, Grade IX[22]

Unit I. Our Mastery of plants increases with our knowledge of their structure and habits.

In the first chapter of the prescribed text-book for this course, acknowledgment is made of the efforts of scientists and conservationists in changing man's attitude towards plants. Appreciation of the importance of plants, the need for preservation of those that still survive, and the need for renewal of the plant covering where it has been carelessly or ruthlessly destroyed, are mentioned in the first page of the first chapter of this text. Further on, it is mentioned that man is trying, by more complete utilization of crops, to eliminate waste and provide sufficient for all. The value of roots in lessening erosion, and the flood conditions that often follow appears in a paragraph towards the end of the chapter.

These conservation thoughts are admirable, but are quite likely to be lost among the lists of plants and their uses to man, which forms the bulk of the chapter. The chances to teach conservation are given but it is not probable that they are taken, to any degree.

The third section of this unit stresses the need for knowledge of the growth habits of plants, such knowledge to be used in the encouragement of growth in cultivated plants, provide for the conservation of valuable native species, or prevent the development of undesirable species such as weeds.

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22. Programme of Studies for the Junior High Schools of British Columbia, Supplement General Science III, 1942.

Chapter 3 of the text, however, does not enlarge on the intention of this third section, but confines itself to a study of the differences between plants.

The remainder of the unit, with sections on weeds, and vegetables and fruit in the dietary, does not permit much mention of conservation, since both studies are quite specific and factual. However, lessons in conservation of human health might well be drawn when the vitamins and mineral content of foods is under discussion, and the need for planning the production of essential foods can bring an important word in the conservation vocabulary to general notice.

Unit II. Man is able to utilize more completely the materials of the earth's crust when he understands the conditions under which they were formed.

There is a wealth of basic facts included in the Chapters of the text which cover this unit, facts needed for the understanding of the earth's crust, its formation, its composition, and the changes that it undergoes. The final quarter, however, Section IV, prepares to go beyond fact presentation and deals with a problem, that of soil conservation. Chapter 9 of the text is headed "How Important is Soil Conservation?", and it is found that the chapter opens with sound reasons, backed up by history, as to why we should study soils. Then an immediate plunge into the study of soils, not soil conservation, is made. The chapter heading is misleading, for nothing is said about conservation measures and practices with respect to the soil. Instead, the chapter is concerned nearly throughout with physical geography.

It is unfortunate that the term "Soil Conservation" is used at the top of each page in this chapter, for a wrong impression is conveyed.

Unit III. The earth's crust yields many substances of great importance to man.

This unit, dealing with building materials, common salt and coal and petroleum, is a unit in chemistry, factual, objective, and with little reference to conservation education.

Unit IX. The application of scientific principles to housing conditions has resulted in great improvements in our methods of planning and building modern homes.

Conservation begins in the home. All the theory of conservation is as nothing if it is not practised, and the home is where practice is most available. When unnecessary lights are turned off, when woodwork is painted, when fire hazards are eliminated, when the purity and humidity and the temperature of the air are regulated, when adequate lighting and water supply are maintained for the preservation of health, and when the grounds are kept in a state of high productivity and beauty, the owner of such a home is a practising conservationist. He is avoiding waste, and following the main aim of conservation, that of securing and maintaining the highest state of balance between preservation and utilization. In this way, he is contributing to the permanent welfare of himself, his household, and his community. There is no higher conservation than this, for out of this grow the habits and thoughts of conservation which weld

together community, state and nation. Only when conservation is practised in the home can it be practised in the larger aggregations. This is fundamental to conservation progress.

If the ideas expressed in the previous paragraph can be introduced into the detailed discussions of the modern home as offered in this Unit, then this is an invaluable part of the instruction provided for the Grade IX pupil. A teacher with the conservation outlook would introduce this Unit with a carefully-prepared talk on "Conservation in the Home", and so, through this appeal to the higher feelings of the pupil, make the detailed information to follow seem very necessary and desirable. Without this interest-provoking opening, many of the pupils would feel, as is too commonly felt, that this is another section to be learned, and nothing more.

Unit V. Knowledge of plants and animals, gained through scientific study, enables us to propagate those which are useful and to control troublesome species.

The lessons in conservation that are furnished by the activities of plants should not be overlooked in this Unit.

Section 1 deals with reproduction, sexual and asexual. The employment of devices by plants to secure maximum reproduction can teach man much in the meaning of optimum use of resources. That they have taught man a great deal is evident by the fruits from the painstaking work of such men as Luther Burbank and Charles Saunders. Their work, based on years of careful observation of plants, was a foretaste of the prolific and valuable work in the plant breeding of today.

The inter-relations of insects with plants and animals

can be noted in the section dealing with reproduction by insects. This same principle of interdependence also rises in the final topic of this Unit, the role that fungi, including bacteria, play in the environment. Man as a factor that interferes with the balance of nature should also find a place in such discussions.

The Grade IX Course, outside of the Unit which deals with the construction and maintenance of the home, does not offer the scope conservation teaching found in the previous two grades. Even in the Unit dealing with the home, it is expected that few teachers will have had the training to permit them to recognize the conservation implications inherent in the Unit.

The emphasis in the Grade IX year is on accumulation of a fund of knowledge, and the quantity provided, which seems somewhat overwhelming, would limit the possibilities of teaching the pupil to appreciate the meaning and philosophy of conservation.

General Science IV, V, Grades I, XI, XII.[23]

"Until recently, the science program in the upper grades of the secondary school has consisted of courses in specialized sciences, mainly Chemistry, Physics, and Biology. There is now, however, a distinct trend toward the unifaction of these into general courses designed to give the pupil a view of the whole field of science and an understanding of important principles, rather than a somewhat narrow knowledge of one or more of the specialized sciences...

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23. Programme of Studies for the Senior High Schools, op.cit. p.173.

In British Columbia it has been possible for a pupil who has taken one or two of the specialized courses to emerge with little knowledge of the other branches of science; to have little understanding of the scientific principles underlying such basic industries as lumbering, mining, agriculture, fishing, and manufacturing."[24]

"Definable educational values from science teaching will have been attained, if individuals acquire (1) an ability to utilize the findings of science that have application in their own experiences, (2) an ability to interpret the natural phenomena of their environment, and (3) an understanding of and ability to use some of the methods of study that have been used by creative workers in the fields of science."[25]

These quotations are used in this paper to point out that the goal of science education in the senior high school science is not the memorization of individual facts, but the ability to use these facts in the appreciation of generalizations, and the enlargement of understandings. They further indicate that varying stress will be laid upon the different parts of the Science course in the various parts of British Columbia, the scientific principles underlying the basic industries of the particular parts of British Columbia receiving greatest emphasis.

Since the teaching of conservation at this level, that of the middle teen-age group, is concerned mostly with the philosophy of conservation, then the aims of Conservation

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24. Ibid, p.174.
25. Ibid, p.174.

teaching and science teaching are really one and the same. In both, the pursuit of problems is the thing, the study of facts and the formulation and testing of hypotheses, the developing of reflective thinking so that the meanings of generalizations are gained. The formation of attitudes and the habits of thinking are the desired goals, achieved through acquiring a sufficient body of knowledge that can be applied in the practices of the scientific method. The accumulation of facts, it is stressed, should not at any time, be given priority over the objective of leading the pupils to interpret and appreciate their environment. This is fundamental in science, as it is in conservation.

A review of General Science IV and General Science V follows, and the opportunities to instruct in conservation philosophy noted.

General Science IV, Grades X or XI[26]

Unit I. Modern knowledge concerning the composition of matter and the changes which it undergoes has modified our civilization and culture.

The theme of this unit is discovery of some fundamental principles of science through a study of the behaviour of atoms in the every-day changes which are taking place about us, in living as well as in non-living matter. Involved in this study are such primary chemical topics as the composition of matter, changes in the composition of matter, the natural laws which govern changes in matter, the theories that explain behaviour of matter, chemical nomenclature that represents definite changes, and the benefits that accrue to man from changes that

26. Ibid, p.177.

take place in such phenomena as oxidation and reduction.

There are occasions in the progress through this unit when incidental conservation reference can be made, without detracting from the immediate ends of the study. The meaning of the word "Conservation" can be brought out when "The Law of Conservation of Matter" is being taught. "Balance" is an important term used in connection with equations, and a little time should be devoted to fixing its meaning. The help of oxygen in the removal of wastes is a third example of occasions when reference can be made to conservation. A good teacher will catch these points and introduce them without strain or irrelevance, bearing in mind that this is primarily a unit of pure chemistry, and does not permit more than a mention of items extraneous.

Unit II. Civilization has progressed as man has learned to control and to use energy.

Conservation concepts are again definitely incidental, for this unit also concerns itself with a pure science, Physics this time. The relationships between matter and energy is the subject, and a thorough introduction to the forms of energy, such as mechanical, heat, electrical, radiant and sound, comprises the work. The fact that man has not yet learned to utilize many sources of energy should be brought out clearly through this study, however, and that provides the opportunity to use and interpret the words "waste" and "exploitation", which are basic conservation terms.

Unit III. Water plays an essential part in many chemical, physical, and biological phenomena.

Much of the assimilative material in the present unit

appeared in Unit II of General Science I. Some of the concepts in the Junior High School Course will have been gained, and all that will be necessary here is to determine which have been gained, and to review them. Larger concepts of the importance of water can now be taught. We can extend our considerations beyond the community studies in General Science I, and try to present the importance of the role played by water in most of the processes and activities of nature and of man. This attempt will be in accord with the objectives of General Science Courses in secondary schools, the developing of larger thoughts into the major generalizations of science.

In this Unit there is much analysis and detailed examination. Intensive study is made of the hydrosphere, the chemical properties of water that make it useful to man, the physical properties that are of great practical importance, and the forms of life from the water habitat that yield man a rich harvest. Humidity, elements of water, stains, crystals, soap, specific gravity, capillarity, evaporation, plants and animals of the sea, are some of the studies dealt with experimentally. Water is given a wide, comprehensive treatment, and this is valuable. Yet if permanent values to the intellectual equipment of the pupil are to be obtained, and this is admittedly the general aim of the science studies, then all the experiences of this Unit must be distilled to provide very clear ideas of the social meanings of this great natural resource, water. In doing so, we are building up conservation generalizations.

Some of the conservation thoughts about water that are to be attained are as follows:

1. Water is not a static, but a mobile resource that seeks the ocean. As such, it is a public resource.

2. When a stream is polluted, the ill effects are carried to residents below the source of pollution, and they suffer from this selfish and unsocial practice.

3. When a stream is dammed or diverted, water values are impaired for those downstream.

4. When an individual or community drains a piece of land, or changes the channel, the flood and drought conditions are altered at lower levels, and may seriously affect other citizens.

5. Every use or misuse of water should be carefully evaluated as to its effect on the entire stream system.

6. It is estimated that about 90% of flood damage is the result of man's foolishness in building his roads, railroads, buildings, and highways on land that plainly belongs to the river.

7. There is need for clear thinking and broad vision that sees all values in terms of an entire watershed, not merely the desires and fancied needs of one small community or area.

8. Unrestrained grazing by livestock may easily have an equal or greater adverse effect on run-off than does forest destruction; and tilled lands, essential as they are to the national economy, accelerate run-off more than the most ruthless logging of the forests.

9. Irrigation is a use of water that may, and often does, adversely affect public rights in water. It may be either a public asset or a public liability, depending upon the source of the water and on whether or not consideration is given to public values in the management of the project.

10. Many of the flagrant abuses that are made of the great public resource called water could be eliminated, or at least greatly minimized, by the practise of that simple rule of good social behaviour - consideration for the rights of others.[27]

The writer feels that thoughts such as listed above must be incorporated into the General Science Courses in High School, for conservation of natural resources is the most important long-time problem before the nation today. To the teacher, the details as set down in the study of water in this Unit may seem, and may be, more immediately pressing, but in a few years hence, they will be history to the pupil. But not so the problem of intelligent husbanding of natural resources; that will be a continuing problem throughout the life of the student, becoming increasingly important as time goes on. The teacher and the school must contribute to their utmost to the end that the battle with nature may be won, and natural resources put on a permanent basis.

Unit IV. Appreciation of the usefulness of metals has induced man to make an intensive study of ores and to develop scientific processes for the extraction of the metals.

The overview of this Unit says in part: "The use of metals has become so general that very few appreciate the place they occupy in our lives. Still fewer are familiar with the properties of metals, cources, or the need for conservation of the world supply.

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27. The ten points listed are adapted from a paper, "Water - a Primary Natural Resource" by Kenneth A. Reid, Isaak Walton League of America, Chicago, Illinois.

To ensure a more intelligent use of our mineral resources, it is necessary that we realize our responsibilities as trustees of this wealth. To prepare ourselves for this trusteeship we shall now consider the properties of metals, and our use of these."

The last sentence explains the outlined work in the Unit, The place of metals in the lives of men, the origin of metallic substances, the extraction of minerals from the earth's crust, and the extraction of metals from their ores, are the four subjects dealt with in the body of the Unit. The other sentences in the quotation above, which are taken from the overview, have no further consideration. It is a thin wager that any mention, of any kind whatsoever, ever reaches the ears of the student, for teachers, in their hurry to get to the meat and bare bones of a Unit, pay scant attention to the overview, the philosophical setting against which the details of the Unit are arraigned. Somehow attention must be focussed on the thoughts that underlie the teaching of the Unit items, otherwise the child receives only material to be memorized for a future examination.

The teacher who is familiar with the meaning of conservation would have several remarks to make about the important sentences in the quotation above. And what was said would open theeyes of the pupil to the eminent position in the welfare and economy of the people that the metals occupy. He would point out that in the extreme southern part of Canada all of the principal resources, such as agricultural lands, forests, mineral deposits

and water-powers, are available but, as O'Neill[28] says:

"The picture becomes quite different as one goes northward from this narrow strip adjacent to the international boundary. Largely because of climatic conditions, and because of the glaciated terrain, agricultural lands and forests of economic worth become less and less extensive and finally disappear, and mineral deposits, potential water powers, fish, furs, and game are the obvious recourses to be considered.

Between the extremes of north and south lies a broad belt which contains scattered areas of good agricultural land, pulpwood forests, mineral deposits, and other resources mentioned, in varying degree of abundance. This is the territory which has been opened up by the mining industry within the last thirty years and which is at present almost entirely dependent on the mines for the maintenance of the population and of all the services which their operation demands."

With the last sentence in mind, and with a knowledge of the geography of British Columbia, and of events current and projected for the northern half of this province, the fascinating role of mining in the economy of the nation could be presented in a lively, stimulating way that would make the learning in the body of the Unit both pleasant and functional. The story behind the facts is just as absorbing to the child as to the adult. Facts are more readily assimilated if they are accompanied by the meaning and the philosophy that explains them. This is the method of conservation education.

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28. O'Neill, J.J., "The Role of Mining", The Wise Use of Our Resources, Royal Society of Canada, pp.29-33, May 21,1941.

Unit V. Through a scientific study of living things man attempts to control them to his greater advantage.

"It is the purpose of this Unit to give to the student those principles and facts most needed in obtaining the best returns from plants and animals. Because men and animals are dependent upon plants, either directly or indirectly, much of this Unit is devoted to the development of understanding pertaining to plants. The people of British Columbia are confronted by additional problems that arise from the great industries connected with the forst, and from another major industry, fruit-growing. The concepts dealing with animals can be emphasized more in those areas where animals assume an important position.

The real value of the Unit lies, not so much in the welding of helpful facts and principles into a cogent mass of knowledge, as in the development of citizens who (1) take pride in and endeavour to improve the appearance of the home and the community, (2) are vigilant in conserving our resources of land and forest at that level which our degree of scientific research makes possible, and (3) prevent wastage of foodstuffs for either man or animal."

This lengthy quotation from the overview for this Unit needs no excuse for its inclusion in this paper. This is a noteworthy statement, the first paragraph an outline of conservation material, the second an enunciation of conservation ideals.

The intention of the Unit, as expressed in the first paragraph of the above quoted passage, is carried through in the individual sections of the Unit. The relatively few plants that

man uses extensively, and their culture and propagation, are discussed first. This is followed by a section on the trees that are indispensable to man's welfare, with special reference to the coniferous trees of British Columbia, and to the scientific efforts being applied in order to conserve, perpetuate, and extend the forest resources. Particular attention is called, in this significant section, to the immense areas of little or no value for agriculture, but which can be utilized as forest land. The scientific procedures required in the production of essential farm crops is the subject of section III. Soils, minerals, and water, are treated under this section, as are maize, root-crops, other vegetables, and fruit. Fruit-growing, a big industry in British Columbia, receives detailed consideration. Animals are discussed in the fourth section, and the topics include; the dependence of animals upon plants for their food; the adaptations of animals to obtain food; the factors to be considered in maintaining the health of animals; the domestication of fur-bearers. In the last section, the problem of storage of the temporary excesses of food produced, is dealt with, and the importance of this question to man is explained carefully. The meaning of decay is taken up, and is followed by study of methods of prevention, such as salting or smoking meats, evaporation of fruit, freezing, and the use of chemical preservatives. The storage of food for animal use is brought up by discussions concerning the curing of hay, the treatment of ensilage, and the methods of root-storage.

This Unit is set down in the heart of the conservation

field, so to speak. Soil, water, erosion, balance (rotation), range, optimum production, waste prevention, are some of the conservation aspects touched. Add to that the facts that (1) the topics are dealt with in the language of conservation, and (2) the reference material is the medium in which the conservationist works, and it will be recognized that a conservation teaching situation has been compounded. The atmosphere and tone for the successful teaching of this situation is obtained from familiarity with and understanding of, the triple objective wherein, as the second paragraph of the above quotation states, the real value of the unit lies.

With such material and philosophy, it is probable that this is the finest Unit in the General Science courses for the teaching and promotion of conservation-consciousness.

Summary

At this time, when the review of General Science IV is concluded, a word of praise for the part that visual education plays is worthy of mention. What is said can be applied to previous General Science courses as well.

It is quite generally agreed that impressions taken in through the eye are fixed more rapidly, and in greater numbers, than are those where the stimuli come through other senses. Irritability of protoplasm, that life process which governs learning to a high degree, is accomplished almost instantaneously through the optic nerve, and the brain responses are sharp, clear, and generally more permanent than when evidence is gathered by other means. That this is true seems proved by the wide employment of films in the courses and demonstrations given to soldiers

in training, and in the statistics which evaluate the success of this method of instruction. The urgency demanding the speeding-up of soldier training has been met very largely by intensive use of visual education. The trainees note, over and over again, that interpretations which require pages of explanation, or much reiteration in lectures, may often be understood instantly when pictorial means of instruction are used. Authorities foresee, as a result of these war experiments of training by film, a great shortening of the school years in a post-war world, as long as the training remains sound in scope and procedure. If the preparation for life, as far as the amount of reading and writing plays a part is concerned, can be curtailed, then that is well-founded educational practice, for the tragedy of waste is as evident in the developing of children as it is in the exploitation of the other living resources.

Among the large number of films listed for science use many are primarily concerned with the state of our resources. It cannot be too strongly urged that liberal use be made of them.

General Science V, Grades XI or XII.

The methods and aims of this course are the same as those prescribed for General Science IV. The same philosophy, then, as discussed in General Science IV, will underlie the teacher-effort here. Since this course will be taken by a higher age group, additional ends are sought. These include:

1. Considerable practise in precision thinking by the use of problems which involve simple mathematical operations.

2. Practical use applications of the principles that the students will learn, and to a degree and extent not hitherto

demanded.

These additions fit well into conservation belief, since if the "doing" does not follow the "knowing", there is little aim to the subject of conservation, or any other form of science work.

Unit I. Living things adapt themselves to their environment by specialization and differentiation of structure and function.

While it may be supposed that this Unit repeats those of previous courses, this is so only in the nature of the work. It is true that principles developed in earlier grades reappear here, but they are extended far beyond the applications instanced when they were first outlined. The teaching of the principles, then, is but a review, and the time devoted to the Unit should be given largely to the activities. This idea is broached in the "Suggested Approach" to the Unit, which states: "It is suggested that the activities in this Unit be emphasized and that specimens living or preserved, be used whenever possible."

A sampling from the activities suggested will show the functional values contained in this broad Unit, and at the same time give the writer the opportunity of mentioning the conservation implications inherent in the subject of this Unit.

1. Use a complete nutrient solution for one specimen, and deficiency solutions for the others to show:

a. The small yellow leaf due to nitrogen deficiency.

b. The pale or chlorotic leaf due to iron shortage.

c. The purple or reddish leaves and stems of phosphorus starved plants.

d. The brown spotting and scorching of leaves due to potash shortage.

e. The mottling of leaves and discolouration of roots due to calcium deficiency.

In conservation, as in science, there is splendid practise in scientific method and procedure afforded in this exercise. Extreme care in measuring chemicals, preparing mold-free containers, selection and handling of live material, taking daily observations and measurements, compiling records, and drawing conclusions, are mandatory if the experiment is to be carried to a successful conclusion. Ample practise in doing, performing the steps in order, is training in putting theory into practice. This is a fundamental in conservation, as has been noted so often. The stimulation of reasoning, the carrying through of the results of the experiment to their application in the garden, on the farm, and in the fruit orchards, inclines to action rather than speculation, and so is highly functional training, and such training is synonomous with conservation education. The appreciation of the mineral factor in optimum production of plants for man's use is a highly important, if isolated, perception, contributing to the larger estimations in conservation.

2. Compare and contrast the grasshopper and the bee.

Out of the comparison grows recognition of the great field of entomology, with its enormous number of species, and its contribution to man's welfare. The contrast introduces man's never-ending war against those insects which interfere with man's undertakings. The ravages on the range and in the

fields by the grasshoppers amply illustrates this point. On the other hand, the contributions of the beneficial insects, such as the bee, can be discussed, and the role of the insects in relation to man adjudged in a general way. It is recognized, of course, that such thoughts are not the subject of the activity, but those which will arise from the investigation, given a competently-trained conservation teacher.

3. Examine and grow some bulbs, corms, tubers, rhizomes, and runners.

The variety of methods used by plants to obtain maximum production can be taken as a lesson from nature, though the accent is on learning by investigation, the meaning and methods of asexual reproduction.

4. Examine materials showing Mendelian characteristics, e.g., corn.

While acquiring knowledge about Mendelism is primary, the dynamics of evolution, and the fact that we are living in a changing world, arise from the activity.

Throughout the activities listed for this Unit, there is considerable scope for the expression of conservation thought, as has been pointed out above. There need be no straining to force such thoughts; the activities invite them. All that is needed is guidance from a teacher skilled in conservation, one who can expound and expand the thoughts that develop as the Unit progresses.

Unit II. Carbon and nitrogen are essential elements in the structure of all living things, and enter into many useful compounds.

This is another Unit relevent to the study of conservation. Of the three natural cycles greatly concerned in the maintenance of all forms of life, i.e., the hydrologic, the carbon-dioxide, and the nitrogen cycles, consideration of the latter two constitute the bulk of the work in the Unit. The first, the hydrologic, is involved in the operation of the other two, which, at various stages, are dependent upon water for the continuance of their respective cycles. Thus the three of them receive treatment in this Unit, although there is not a separate section for the hydrologic.

Again in this Unit, activities are noted to indicate the possibilities for making known to the student the conservation interest attached to their investigations.

1. Examine the underside of a leaf (e.g. geranium) with the microscope, noting the stomata and guard cells.

This is a mechanical inspection, but on its conclusion there would ordinarily be some discussion on leaf functions, e.g., transpiration, respiration, photosynthesis. The fundamental importance of three great basal resources, air, sunlight, and water, fits into the discussion, and it should be pointed out that these three, and soil as the fourth basic resource, are responsible for the life on the earth. Together, they create the conditions under which plants flourish, and it is the plants that sustain the animals. This generalization might well be used as an introduction to the study of carbon as an element, and the cycle of chemical changes it undergoes in nature. Orientation of the special study of photosynthesis, which follows,

is also assisted.

2. Examine clover roots for nodules, containing nitrogen-fixing bacteria.

Like the carbon-dioxide and the hydrologic cycle, the nitrogen cycle also receives careful attention from the conservationist. If, by failure of any of the chemical changes that comprise it, this cycle is interrupted, then it is impossible to satisfy the aim of conservation with regard to the renewable resources, that of sustained production. Many interruptions do occur in this cycle, and the majority of them are man-made. The result is that nitrogen-hunger is one of our most serious soil problems. Knowledge of these interruptions and how they can be offset by the use of leguminous crops, rotation that includes fallow periods, return of organic material such as bones, fish, manure, and offal, and the use of artificial fertilizers, is important to the farmer, and the concern of the conservationist.

Unit III. The earth's crust contains a number of non-metallic substances of great importance to man.

This Unit deals with carbon and its compounds, sulphur and its compounds, useful salts that occur in the earth's crust, and important building materials, both natural and processed, such as granite, sandstone, limestone, asbestos, gypsum, cement, glass, brick, and tile.

Recognition of the wide and important uses of these chemical substances, of their economic importance in the welfare of the nation, and of the very special consideration they must receive in conservation planning since they are, in many cases, non-renewable resources, are valuable thoughts which might well

give richer tone and sentiment to what is otherwise a series of direct, objective chemical studies.

Unit IV. The advance of science has resulted in great improvements in our methods of power development and its application to transportation.

External combustion engines such as the steam-engine and the steam-turbine, internal combustion engines such as the gasoline-engine and the Diesel engine, the electric motor, the automobile, water transportation, and the application of scientific principles to transportation by air, are the topics in Unit IV.

Unit V. The applications of scientific discovery have improved vastly our means of communication.

The discussion and activities contained in this Unit deal with modern inventions, and the topics dealt with are the telegraph, the telephone, the generation and reception of electro-magnetic waves as demonstrated in the radio and the photo-electric cell, light, its uses and applications in lenses, photography, lanterns, motion-picture machines, and microscopes, and the theoretical and practical importance of electrical conduction in gases.

The comments that follow apply to Units IV and V above.

Both Units are largely studies in the special science of Physics. Science is such an enormous subject that for convenience of treatment it must be broken up into departments of knowledge, which, however, more or less interlock. The writer has always taken time, in teaching these Units, to establish in

the student mind, the large conception of the whole field of science. This has been done by teaching the definition of science in the words of the great naturalist and philosopher of the last century, Thomas Henry Huxley, who stated it as being "organized common sense" or "organized knowledge". The word "organized" in the definition is important, particularly so to the conservationist, who is convinced of the necessity for large, master plans, as the key to the wise administration of resources. To know that the tide ebbs and flows twice a day is a useful piece of knowledge, so also is the fact that the moon waxes and wanes and travels around the earth, as well as the fact that the earth rotates on its axis once in twenty-four hours; but before we can see the connection between these items of knowledge and their relation to other items, such as the shapes of continents, the direction of the prevailing winds, the temperature of the air and of the ocean, and so on, all this knowledge must be organized, co-related, or put in order; then only it becomes science.

From the conservation viewpoint, the student needs some such teaching as indicated in the paragraph above, not alone to learn the proper definition of science, but to build up in his mind the urgency for organization and planning if our resources are to be maintained on a permanent basis. The fact that the two Units, IV and V, are correctly confined to the field of Physics, as far as actual activities are concerned, only increases the possibilities of teaching that, no matter how narrow the scope of investigation seems to be, it is impossible to sever relations between the investigation in question and the problems of human living, such as health or social welfare. As

a preparation for life, the student must learn the value of organization and planning, must learn that isolated bits of knowledge are not capable of extension, but that organized knowledge, which is science, has made the modern world, and its inventions, possible.

It has been the practice of the writer, further, to stress the interrelationships of the sciences, the impossibility of separating the advances in one science from those in another. Astronomy, for instance, has taken advantage of discoveries in physics to measure the distances of the stars and to analyse their composition; physics and chemistry have been so inextricably blended that a new science, that of physical chemistry, has had to be created; geologists use the knowledge of radioactivity to aid them in determining the age of the earth; chemistry and biology are joint studies in the field of bio-chemistry; in short, the independence of the sciences is a thing of the past, as the study of conservation so readily indicates. The scientist of to-day adheres to the principles of interdependence. The compartments of science are maintained for convenience, as has been mentioned before, but this is by tacit agreement, the while it is accepted that delimitation is impossible. The conservationist consciously subscribes to this belief, for conservation, to coin a definition, is "the study of the borderlands where sciences meet." It is because conservation is such a study, that opportunities for teaching conservation philosophy are abundant even in such "Physics" Units as Units IV and V in General Science V.

Other Subjects.

In this paper, the application of the principles and philosophy of conservation education in the fields of the Social Sciences and in General Science has been the important consideration since, as was mentioned at the beginning of the chapter, these subjects have the greatest scope and application in conservation teaching. It was further mentioned, however, that the study of conservation involves the teaching of a view, of habits of social living, of the philosophy of planned abundance for the permanent good of all the people. It follows, therefore, that the other subjects of the curriculum have contributions to make to the development of the conservation attitude. While these contributions are lesser than those in the Social Studies, and General Science programmes, their part should be acknowledged. Following is a brief statement on the part that the other subjects can play in the development of conservation thinking, as determined by a general review of the courses discussed.

A. Health

The Health programme framed for the schools of British Columbia places the accent on the health of the individual. The community aspects are implied, on the basis that if the individual is well, the community will tend to be well. That is to say, in other words, that if the individual practises the rules of health, he will see to it that local conditions are enforced whereby the health of the community is protected.

The methods of teaching are prescribed and in this regard the accent is upon teaching by doing and by investigation

rather than by children collecting facts from a text-book and pouring them back with considerable inaccuracy to the teacher. As it is put in the introduction to Health Education, "Information concerning the number, shape, and structure of the bones of the teeth is practically valueless if the possessor neither knows nor does anything to cause them to grow properly and firmly, or to retain their form, strength, and position." This emphasis upon health behaviour rather than upon health knowledge is a conservation viewpoint.

"Health is the first objective of education." That is an excerpt from the introduction to Health in the Programme of Studies for the Elementary Schools of British Columbia. No one will deny this, since most people realize that true health is that condition of the body in which there is a joy of living, a buoyancy, a robustness, a physical fitness that makes a person alert. A healthy person has physical endurance and, what is not usually emphasized, a freedom from worry, and a facility in meeting the social problems of life with common sense and making the necessary social adjustments. It is these characteristics that make good citizens out of our children, and the production of good citizens is the aim of conservation. If there are enough good citizens, there is sound administration of the resources of the community.

Thus it is that careful teaching of the subject of Health promotes the advancement of a conservation program. It may be remarked that this goal is not nearly attained as yet, and the reason is lack of thorough understanding on the part of the teacher, of the philosophy and the importance of the subject.

Health, as a subject, is more handied-around, and bandied-about, than perhaps any other subject in the curriculum. It is the "filler" that rounds out the teaching assignment for the year. "Anyone can teach health; no one fails in it" is a fairly general remark in educational circles. Health is on the same basis as Nature Study was in former years, one of the subjects, but requiring no particular training or concentration on the part of the teacher. This is a most unfortunate position for the most important subject~~ed~~ to be reduced to, and one that indicates a serious lack of emphasis on the state of health of our greatest natural resource, the children. There is great need for teachers who can inspire the pupils to observe the laws of health, for knowledge concerning the human body and its functioning is not enough. Most of us have knowledge which does not function in behaviour, because we lack the principles and philosophy which pushes knowledge into action.

B. English

In both the Junior and Senior High School courses in English, the sections on Reading have significance for the teaching of conservation philosophy. There is a connection between the principle of teaching to think critically and reflectively, and to develop economical and effective habits of study that is not inconsistent with conservation aims. Both seek to encourage worthy use of leisure; both seek the wise use of time in work as at play; both seek to prepare for the active productive life as well as for the life of leisure.

The specific attainments aimed at in the English

courses includes the development of effective habits and skills in reading and study in many subject fields. The student is to be trained to keep informed concerning current events, as in reading news items, editorial comments, and book and play reviews in daily newspapers or periodicals. The student is to be urged to learn more about events or questions of special interest, and to broaden his range of information. By so learning the opinions of others on civic, social, economic, and scientific problems, the student will be guided towards the discovery of the principles and the philosophy in the various intellectual fields. To achieve these aims, intensive reading and study is required, not only in English, but in all subjects. Correlation and co-operation between the various subjects in the curriculum is thereby set up as a steady aim in the teaching of English. This is the pursuit of unity in intellectual thought so stressed in conservation teaching, so important in conservation action.

C. Mathematics

One of the principles of education is that the subject matter of instruction shall be related to child-like experience or interest. With this taken for granted, it occurs that the field of mathematics is a section of general education where the principle finds great application. The problems of mathematics may readily be correlated with problems of particular local industries, and some of the material so used may be drawn from the conservation problems which face most industries from time to time. For example, the salmon fishing industry on the Fraser River finds many a statistical difficulty with regard to boats, gear, men, number of fish, money, storage, canning,

and so forth. Whenever possible, questions so posed should become familiar to the boy or girl who, some day, in the following of his or her vocation, may face kindred problems. These pertinent experiences are important to the future citizens of the community; their practical importance can be made known to them through the realm of mathematics.

The development of an appreciation of the universal application of mathematics in science, commerce, and industry, is made possible by the inclusion in the mathematics courses of apropos material and suggestions. Conservation studies are found in this material, more or less scattered through the Units, but given special consideration in Unit V of General Mathematics III of the Grade IX year. This Unit is concerned with the social aspects of arithmetic, and about one-third of the Unit is devoted to developing the ability of the student to solve practical problems dealing with the industries of agriculture, mining, fishing, lumbering, and manufacturing. It is suggested that graphs, as found in Mathematics II, Unit II, be employed in the solving of the questions.

It will be seen, from the brief comments above, that there are situations provided, in the mathematics courses, which are directly concerned with, or conducive to, the teaching of conservation. Problems range from simple, such as figuring out the percentage of refuse in salmon canning, to involved, such as the planning of budgets or the winter's fuel supply. It is true that mathematical skill is the primary concern of the teacher, and the conservation implications merely incidental, but the knowing teacher can take a few moments or so to mention

the importance of statistics in the field on conservation, giving some practical examples.

Optional Courses

Students intending to go to a University must take the courses required for University Entrance. The required courses are English VI, Social Studies V, General Science V, Mathematics VI, Foreign Language III, Health VI and Physical Education. A total of 97 credits is earned in this way. A further 15 credits are required from rather a wide choice of optional courses, which include certain courses to be noted in this paper, to wit; Art, Agriculture, Geography and Biology. Since these four courses are optional, they have a relatively small enrollment. Hence, even though they play a large part in the story of conservation, they will receive only brief mention in this paper, since their part in general education as it exists in this province, is minor.

D. Art

If Art is taught based upon the assumption that the school's task is to train artists, then there is no room for the teaching of conservation at the same time. If, however, the end is that each child is taught to understand and recognize beauty, and is taught how to create it in his own home and community, then conservation and art are being taught together. Among conservation studies, under the major name of Recreation, we note such topics as roadside beauty, scenic areas, parks, wild flowers, and many others that bear upon the wise use of leisure time. These topics belong to the field of Art in the sense that the Art instructor can develop the aesthetic sense

to the point where inconsistences, incongruities, and irregularities in a scene are apparent at first glance. With this ability developed to greater or lesser degree in the citizens of a community, many problems that confront the conservationist today would be non-existent. Such conditions as roadside ugliness the "billboard alleys" through which the tourist is welcomed to our cities, would not be tolerated if the residents had their talents trained in creating beautiful things for themselves, their home, and their community. Their sense of Art appreciation would demand that the environment about them conformed to the principles of art. In this way, our lands of scenic or recreational value would have their distinctive qualities protected and preserved.

In the Junior and Senior High School outlines for Art, provision is made for contemplation of nature, and activities based on outdoor subjects. In the Grade VII course, the setting of the home, that is, the relation of the exterior of the home to the environment is one such activity. This application of art principles to the home environment should acquaint the student with the proper treatments of the natural features of the landscape if the beauty and appeal of the environment is to be retained. Nature drawing, with emphasis on design, color, contrast, variety of shape, etc. introduces the student to the details in nature, and their place in the general harmony found in natural scenes. Flower drawing with observation of botanical detail, leads to an appreciation of the amazing complexities and wonders of nature. In the Grade VIII course, which covers design

in art and industry, further opportunities for nature-study are offered. The principles of pictorial composition applied to nature-study, and studies of flowers, seed-pods, leaf-sprays, and fruit, recording characteristic form, growth, proportion, light, shade, texture, value, and color-harmony, are examples of recommended activities which contribute to the building of life-long appreciations of the beauty of the world about us.

All through the Art courses in secondary education, opportunities present themselves, or can be created, for teaching the conservation attitude. The art instructor who is sensitive to, and can interpret, the loveliness and the moods of nature, teaches the meaning of conservation as a corollary to the teaching of Art.

E. Agriculture

The decline in the attention given to courses in agriculture in the secondary schools has been rapid and alarming. That this state should exist is almost unbelievable, for agriculture stands third in the industries of the province, the products of forestry and mining exceeding it in annual production of wealth. Added to this is the fact that most of the population of British Columbia resident outside the large centres is directly or indirectly concerned with the activities of agriculture. This means that a great number of secondary school children are getting most of their experiences from farm life. Yet Agriculture as a subject enrolls a mere handful of students, taking the province over all. Since it is the aim of education to make school experience functional, there would seem to be

considerable oversight in educational policy with respect to the teaching of agriculture. This is supported by the fact that but a fraction of graduates from the Faculty of Agriculture at the University of British Columbia choose the vocation of teaching, and of the few that do, not all find it possible to teach the work in which they were trained. Somewhere, there is a lack of the planning that means conservation, the wise provision to seek optimum use of resources, in this case the graduates in agriculture, and the students who are not permitted to make use of the experiences and material that form their environment.

Within the scope of this essay, there is neither time nor place for following through this problem in agriculture conservation. But at least it can be mentioned, for the solution must be sought in the best interests of the province. More attention must be given to the teaching of agriculture if the common welfare is to be advanced on a broad, unbrokem front.

The outline for the courses in agriculture offered in the secondary schools will now be examined for its conservation implications. We will find that the implications are many, but that it is regrettable that they reach so few students.

The Units can be adapted to meet the needs of communities in any part of the Province. They also show correlation with General Science, Home Economics, and certain parts of the Health course. Further, they are devised so that emphasis, as in all nature-study and science courses, is placed on first hand observational and experimental studies. By these characteristics, they show themselves similar to Units in conservation education, that is, they are broad, capable of correlation, and dynamic in

their nature. Organization on a project-basis is recommended, and the students are to be encouraged to carry on one or two individual projects at home every season. The progress of the individual projects is to be recorded carefully and accurately by the student.

Not all the sections offer equal opportunity for the study of conservation, but over the four years of courses in agriculture, there is more than sufficient experience available to acquire the broad foundations of conservation education. A few examples from the courses will illustrate how inherently conservational the subject of agriculture really is:

1. Section 7 of Agriculture I (a) (Grade VIII) is set out as follows:

The Study of Trees (Evergreens as a Winter Study)

(a) Recognition of species found in the district.

(b) How trees grow - the work of a year.

(c) Reproduction of evergreens.

(d) Distribution of most important timber trees.

(e) Chief forest products of British Columbia.

(f) Protection and perpetuation of our forests.

2. Section I of Agriculture I (b) (Grade IX) reads:

Soil Fertility

(a) The qualities that make a soil fertile.

(b) Chief mineral elements in soil.

(c) Importance of organic matter in soil.

(d) Essential plant-foods and fertilizers.

(e) Soil water, drainage, and irrigation.

(f) Soil cultivation and management.

3. Unit V of Agriculture I (Senior High School) states:

"Satisfactory crops of vegetables and flowers may be produced with a minimum of labor when garden practices are based upon a thorough knowledge of the growth requirements of the various plants, plus familiarity with the life-histories of parasites and the control of each."

4. Unit IV of Agriculture II (Senior High School) states:

Permanent success in any branch of agriculture is dependent upon the selection of a type of enterprise suited to the location, efficient farm management, and the amount of active interest displayed by the members of the family, not alone in monetary gain but also in the improvement and beautification of the farmstead.

Conservation is the avoidance of waste. In these courses in agriculture, we have an example of waste at its worst. The courses are carefully and logically outlined; they possess intrinsic interest; they are functional; they hold many lessons in civics, in management, in planning, and in the philosophy of conservation. Despite all this, and more, their values are never unfolded to more than a scattering of the boys and girls who pass through our schools. Their multitude of opportunities to practise the elementary gardening that most adults pursue, or develop the appreciations for plant and animal life that give flavor to post-school life, are hidden from the students at the period when they are most ripe to benefit from them. They are the unthumbed courses of the curriculum, though if "education is a preparation for life" is a true statement, these agricultural courses deserve major rank among school courses.

F. Geography

In the introduction to Geography for the senior high schools, some of the objectives particularly pertinent to conservation are noted:

1. To develop intelligent appreciation and sympathy in relation to peoples different from ourselves.

2. To establish, towards the people of other countries, the attitude that arises from realization that, to a large extent, natural resources and other geographic accidents determine the relative standing, progressiveness, and prosperity of different regions.

3. To develop the habit of independence in habit and action, coupled with the habit of service to and co-operation with others in the promotion of common ends and interests.

4. To gain steadily increasing power to interpret landscape in relation to the origin of the characteristic features, and to the bearing of such features on life, particularly human life.

5. To gain understanding of economic and cultural interdependence.

6. To gain and organize knowledge of the main facts of physical geography, in their bearing upon the Earth as the home of mankind.

This half-dozen objectives have been selected from the twenty-four set forth as being the most appropriate to conservation philosophy. There are others which contribute to a lesser degree.

The suggested activities for the attainment of these

prescribed objectives are legion, particularly in Geography I, and no attempt to cite them will be made in this paper. Suffice to say that most comprehensive outlines and suggested procedures are provided to implement the reaching of objectives. Whether the goals are reached or not depends upon the individual teacher. If the geographical understandings and generalizations are well-divined, and the teacher does not succumb to the admittedly great temptation to dwell overlong on the multitude of facts encompassed in this course, then much will be gained by the student that will contribute to his conservation understanding. To make this clear, some of the topics taken up might be noted:

Geography I: Bearing of the Earth's shape and size upon human life; surface features; latitude, longitude; and zones; surface transformation of the Earth; origin and characteristics of plateaux, plains, and valleys; uses and action of water on and under the land surface; origin of soil; distribution of various types of soil and bearings upon human life; basic human needs and occupations; the natural regions of the world; relation of life to environment in the various geographical regions.

Geography II: This year's work is confined to the political geography of the world, and the topics, such as distribution of population, distribution of principal cities, and the like, have conservation value chiefly in the fact that the teaching of such topics can help produce, in students of this age, a world outlook that is intelligent and well-informed.

The student of conservation is badly handicapped if he lacks training in geography. Conservation philosophy arises in part out of comtemplation of the fundamentals of geography;

conservation activity is predicated on the knowledge of regional, physical, and commercial geography. So important is this that a section of this thesis is devoted to a consideration of the geography of British Columbia, as a background pre-requisite for a study of the natural resources.

A striking remark by Caldwell[29] illustrates how important geography is in conservation education. He says: "...the best work that we have seen has been done not by the biology professors but by the geography departments of our teachers' colleges, because the biology professors have been prone to emphasize wildlife more than anything else and in our geography courses we have a good thorough treatment of the whole field of wise land use."

G. Biology

Conservation is a biological study or problem primarily, and the teaching of conservation must stem from biological principles. The teaching of conservation requires an understanding of the unity of nature, the interdependence of all her resources, and the destructive effect on these resources by human interference. These are but three of the fundamental concepts serving as foundation for conservation education, and they are, or involve, some of the great principles in biology. Because conservation as a study arises from biological considerations a page is taken here to mention the subject of Biology as it exists in the secondary school programme in British Columbia.

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29. Caldwell, John, "Conservation Education in Tennessee", Conference on Education in Conservation, The National Wildlife Federation, Washington, D.C.,1939, p.28.

Since Biology is taught as such only in the Grade XII or Grade XIII year, is an elective, and is taken by relatively few students, it cannot play a large enough part in conservation in the general program of education to merit discussion in this paper. Yet, for the reasons advanced in the previous paragraph, because it is the foundation of conservation-teaching, trespass is permissible here.

The comments that the writer wishes to make here are brief, dealing with general points, and suitable for summarizing as strengths and weaknesses of the present course in Biology I in furthering education in conservation. It is to be understood, of course, that, in the last analysis, such strengths and weaknesses are modified by the training and personality of the teacher.

1. Strengths

(a) The great contributions of the chief workers in the biologic sciences and the applications of these discoveries to our everyday lives forms an outstanding topic, with four weeks allowed for treatment.

(b) There is opportunity to continue practice in using the scientific methods of thinking, particularly in the choice of methods for the various biological problems.

(c) Attention is called to the overwhelming array of terms usual in courses of botany, zoology, and biology. The teacher is warned to develop technical vocabulary slowly in the student, and only those words for which there is no commonplace synonym is available are to be learned.

(d) Many of the biological generalizations that appeared in General Science III, IV, and V appear again, and so inte-

gration is provided with previous experiences.

(e) TO the previous fields of taxonomy, morphology, and physiology, so emphasized in former courses, have been added aspects of ecology, genetics, and behaviour. Thus a definite attempt has been made to infuse into the study of biology, the study of life itself.

(f) Unit VII reads: "The struggle among organisms for food and energy has resulted in various degrees of inter-relationships from balanced interdependence to complete dependence." Three weeks is allowed to teach this fundamental principle, the balance in nature, and the conservation-conscious teacher finds this a golden opportunity.

(g) The level of behaviour, from amoeba to human, permits a wide use of experiment with living forms, not books.

(h) "Progression" is the theme stressed in the two largest Units, which require about 18 weeks, and comprise the bulk of the course. In these Units, the plant way of living and the animal way of living are studied within the framework of a systematic introduction to the phyla.

(i) The complex variety in life, and the complexities in the various environments, can be well brought out in the Unit which deals with the plant way and the animal way of living within the environment.

(j) The permissible use of multigraphing outline diagrams is of inestimable value. The student is thus permitted to use the major part of the laboratory time to observe and examine carefully many more specimens, living or prepared, inside or

outside the classroom, than would otherwise be possible.

2. Weaknesses

(a) The teacher too often lacks the biologic background, and so is prevented from establishing the close connection between the great discoveries and what they mean in our daily lives. The result is that this valuable section becomes largely biography.

(b) The suggestions as to what can be done about practising the scientific method are clear and complete, but the directions as to how to do it are sparse, and many teachers have training in neither the content nor the method.

(c) Despite warnings as to the teaching of technical terms, the abundant use of such words on examinations demands that a considerable share of the period time be given over to introduction and learning of such terms.

(d) The course contains too much detail, particularly in Units III and IV, which are allotted 8 and 10 weeks respectively. These Units invariably run over their time limits, and as a consequence, the important topic of reproduction, perpetuation and maintenance of species, behaviour, and ecology, suffer. Revision of content is necessary, in the direction of a more limited survey within the borders of the phyla.

(e) Because the course is weighted down, in the parts mentioned in (d) above, with minutiae, there is insufficient time for outdoor work. It is only during out-of-school biology hikes and excursions that the teacher has the opportunity of carrying on directed study of the world as it really exists. Little opportunity exists in the prescribed class-room schedule. While it is true that the hatching of moths, the establishment

of aquaria and terraria, plant nutrition experiments, and the like can be conducted indoors, there are fundamental experiences, such as watching the migration of birds, and censusing the life of an area, that must be denied.

In summarizing, it might be said that the present Biology I course is a definite improvement over the older courses, and provides scope for biological principles, in their relation to human welfare. This course was definitely planned as an integral part of general education, while at the same time its content gives introduction to vocational biology. Depending on the outlook and training of the teacher, the instruction may follow one of two quite different lines, (1) as a dynamic study of the operations involved in life, or (2) as a weak imitation of college biology, in which the technical treatment is much to the fore. If taught along the former lines, it becomes a course in conservation education.

CHAPTER III.

ADVANCEMENT OF EDUCATION IN CONSERVATION IN THE SCHOOLS OF BRITISH COLUMBIA

Foreword

One or two remarks are necessary before the discussion proper of this section.

1. The Elementary Programme in the schools of British Columbia has not come under review in this study. However, the presentation of the principles of Conservation is needed by every teacher, for the subject is not a function of certain grades alone, but of all age-levels from pre-school to post-school, and so includes the Elementary groups. That will explain why the title of this section is phrased to include every school in the educational orbit.

2. In this section, the author has drawn heavily on the findings of the Conservation Education Committee of The National Wildlife Federation of Washington, D.C., U.S.A. This committee was appointed in November, 1938 to inaugurate the Number One Project of the National Wildlife Federation, a survey of Education in Conservation as it then existed. The subject was so broad and fundamental that it was recognized that no early report could be expected. Reports of progress were published in 1939, 1940, and 1941, in a series of three pamphlets.[30]

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30. Committee on Education "Education in Conservation", pamphlet Number 1, The National Wildlife Federation, Wash.,D.C.,1939.

Committee on Education "Education in Conservation", pamphlet Number 2, The National Wildlife Federation, Wash.,D.C.,1940.

Committee on Education "The Foundations of Conservation Education", pamphlet Number 3, The National Wildlife Federation, Wash.,D.C.,1941.

It is these pamphlets that contain many of the recommendations advanced in this section of this thesis. Suggestions for general consideration rather than final conclusions were submitted in the pamphlet reports. Conclusions reached in this paper have been influenced by the suggestions of this Committee on Education, and the writer wishes to acknowledge a general indebtedness here rather than by a considerable number of references throughout the program of discussion which follows.

Introduction

There is no need to emphasize the place on conservation in education, even if conservation of natural resources is a very modern theme in our life. The need for the preservation of existing values, the restoration of depleted national assets, and the adequate utilization of all these resources for the common good, has developed today into the cause of conservation, probably the most significant cause in the promotion of national and international understanding.

This cause has won widespread support, and the demand for its consideration in the public school curriculum has won general approval. How this approval is to be translated into action, and how education in conservation is to be developed into a coordinated and permanent educational movement in the public school system will now be considered. A broad, comprehensive plan must first be agreed upon; the details, that is, the materials and methods of teaching conservation and reforms or suggested changes in the present curriculum, will arise from considerations of the master plan.

General Plan; Foundations of Conservation Education.

Viewed in a broad, general way, there are two main methods of organizing a campaign of education. It may be handled independently by a system specially devised to promote it, or it may be incorporated into the national system of public education. The public schools obviously provide a most effective means for bringing conservation information to a great proportion of our citizens, particularly to those who in years to come will have the responsibility for administering the nation's natural resources, the basis of its prosperity. Only this aspect of conservation education, the teaching of it in the public schools, will be discussed in this report.

How then, can the course be charted, to achieve the goal of conservation education? What are the foundations of conservation education? What are the principles to be followed if sound, orderly progress is to be secured?

I. The fundamental character of conservation education must be firmly established.

Unless the meaning of conservation is thoroughly understood, there is no way of precisely indicating its place in the general program of public education. If there is a lack of understanding of the true relations implicit in the meaning of conservation, then there is no recognition of the public values inherent in conservation. Without this recognition of public values, no high purpose is achieved in weaving the pattern of conservation into the public school curriculum. In other words, the first duty of the educational authorities in bringing conservation education into the public education is to know why

they are doing it. This is accomplished not sooner than the meaning of conservation has been assimilated.

II. The main principles of conservation must be laid down.

These principles must be such as will command the approval and active support of the majority of the citizens in the province or in the nation. Inasmuch as the principles have also been considered in some detail in the opening chapter of this essay, they will not be repeated here. He who would advocate that conservation, or wise utilization of our resources, be the philosophic keynote of our living, must be aware of cardinal principles. They are the first requirements he must satisfy if conservation education is to have permanent values, and active conservationists are to be brought into being.

The question as to how the principles are to be arrived at should be mentioned. It is taken for granted that the educational program must be based on demonstrable facts, and that the sources of these facts are the agencies of public information which deal with the resources. That means that biologists, wildlife managers, foresters, agriculturists, ichthyologists, mineralogists, economists, sociologists, specialists in other forms of land use, and representatives of other interests, such as tourist bureaus, whose experience could be used, must be brought together to supply the facts from which a relatively few broad principles, whose application may lead to restoration and wise management, could be established. The ramifications of the program are many, but we must attempt to comprehend them if the educational scheme is to be coherent and effective. This is a complex job but far from impossible. Many educational

agencies have already commenced to function effectively in this province, and enough is already known to permit the formulation of basic principles to be used as an educational platform. All that is needed is to bring the proper authorities together for the conference from which usable major principles, broad enough and sound enough to fit the many interests, will arise. Without this framework of principles, we shall continue to work, as at present, at cross purposes, each educational agency pursuing its own line of attack without regard for the others. The water-rights officials will make recommendations, in the interests of conservation, that will seriously conflict with the objectives of the foresters, game groups, or fisheries men. The conservation that is co-operation must be practised. When that is done, common aims, arrived at by conference, concession, discussion, are not too difficult to settle. Until they are, the confusion in the minds of the public, including school children, will persist.

III. Conservation should permeate all of the work of the school and find expression on the part of the pupils in practically all of their daily actions.

This generalization disposes of the question, "Is conservation to be taught as a separate subject, or should it be incorporated in every appropriate subject now taught in the school?" The trend is decidedly away from multiplication of subjects in the school and in the direction of closer correlation and integration of subjects. For example, the programmes of study for the public schools of British Columbia contain many statements at the beginning of courses urging that the closest

correlation be established between subject and subject. The correlations that do exist in the course outlines are drawn methodically to the attention of the teachers. Again, the effects of a continuously-planning social order upon our living is a theme stressed by our educational authorities in the curricular publications. That, in other words, is instruction to the teacher to give the closest attention to the integration of the subject matter of the various courses. It appears, then, that the aim of education in this province is to promote a program which means integration as opposed to the disintegration which comes from the continuous adding of new subjects and the treating of each one as if it were sharply separate and distinct from all others, - an end in itself.

If the above generalization is accepted, and the weight of evidence collected in the last chapter to the effect that conservation problems can be studied in any subject does make it acceptable, then a corollary must be noted. It is to the effect that, since the study of conservation will cut across all subjects, the aims of conservation education in the public schools will be to establish in the mind of the pupil the basic philosophy of conservation, and stimulate the desire to practise conservation, rather than to insist upon the acquiring of facts relative to the conservation of specific resources. A broad understanding is much more desirable for the young citizen than is the technical training suitable to a specialist.

IV. There must be co-operation between conservation agencies and educational authorities.

It is difficult to see how a program of this nature

could be successful unless the agencies that possess the facts and can assess the principles worked in conjunction with the people who are responsible for the teaching of the facts and principles. The efforts of the two groups must be thoroughly coordinated. Departments such as agriculture, forestry, mining, fisheries, and so forth, are handicapped in that they are remote from children, from teachers, from schools; they are generally unfamiliar with the trends in the schools, with the characteristics and capacities of the several age-levels. However, their active co-operation and assistance is of primary importance to the teacher. The teacher is trained to the job of getting something done in school, but he is rarely trained to take the findings of a technical paper and reduce it to every-day language suitable for student consumption. The translation of technical material is a specialized kind of creative work, and is beyond the ability of the ordinary type of teacher. Each group has its limitations; each needs the other. One group knows more about teaching than the other; the other knows a lot more about conservation. There would seem to be a place for a liaison department, whose officers would be trained to take the material supplied by the conservation groups, prepare it for school use, and, in addition, guide and stimulate the teachers by means of suggestions and help when in difficulties.

V. The aid of teacher-training institutions is vital to the success of a conservation program.

Conservation education properly belongs to the sphere of those who are responsible for the general, fundamental education of the people. The school teachers are the people

properly equipped to instruct in conservation. They have been trained to teach and, what is equally important, they have the facilities and equipment, and the knowledge of the characteristics and capacities of the several age-levels and other essential information without which the proper experience with the environment and environmental factors could not be supplied.

It might be asked what other qualifications would aid the teacher in realizing the ends of conservation education. Authorities are in general agreement that the following requirements play a large part in the most successful teaching of conservation:

1. a rich background of science;
2. an understanding of conservation philosophy;
3. familiarity with the fundamental conservation principles;
4. information as to the teaching approaches possible in at least the immediate environment;
5. mastery of skills essential to teaching success in the science field;
6. a desire to do something for conservation.

These statements form an ideal, but they can be qualified considerably, and excellent results still be obtained. How excellent these results are to be can be decided largely by the instruction and inspiration the teacher-in-training obtains. Much of what the prospective teacher uses through his teaching career as his basic philosophy is received from those who prepare him for his vocation. This thought should constitute both a responsibility and a challenge to the staffs of teacher-training institutions. A comment or two about the statements

1 to 6, listed above; will indicate the part that can be played by those charged with preparing the teacher.

1. A rich background of science.

Relatively few teachers possess such a rich background. Language teachers generally have only their high school experience and perhaps one or two courses in university science. In their language training, however, an appreciation of nature has been built up through their experience with literature, and there is much in poetry and in supplementary reading that can contribute to conservation education. As in language, so to a much greater extent in geography or social studies. If the rich background of science itself cannot be supplied, at least a deeper appreciation of science can be established by generous use of the material in these subjects, and by pointing out the significant conservation fundamentals that often present themselves throughout the non-science courses. By introducing such method, the teacher-instructors can partially offset the lack of specialist-training in science.

2. An understanding of conservation philosophy.

"Attitudes towards life", and "ways of living" are considerations of importance in the philosophy of education in British Columbia. It is the aim of education to develop citizens able to play their part in a democratic state, but able also to make new adjustments in an evolving and progressive social order, so that social stability be united with social progress. For these purposes, schools have been established, and institutions for training personnel to achieve these purposes. Since conservation is an attitude towards life and a way of living consonant

with the general aim of education, it follows that the teaching of conservation philosophy is not inconsistent with the teacher-training program. Rather, it is part of it. When conservation authorities recognize this truth, and realize the tremendous influence that teacher-training instructors can exercise to multiphy the spread of conservation philosophy, then one of the permanent objects of these authorities will be to enlist the aid of those who are training the teachers. It is through courses given in the Normal Schools and in the Schools of Education in the Universities that the teachers can be educated to an understanding of conservation, and it is through the teachers that this education can be carried, by way of the classroom, to the homes of the nation.

3. Familiarity with the fundamental conservation principles.

When fundamentals of conservation have been formulated and agreed upon by those directly concerned with conservation, ways and means of stimulating the development and teaching of conservation by the staffs of teacher-training institutions would be well-advised. The teacher of geography or health may not be thinking at all of the part which geography or health can play in the teaching of conservation, yet he is going to convey to the prospective teacher most of the ideas that the teacher will start with when he takes service. To the instructor, then, syllabi, statements of philosophy and principles, suggested material for inclusion in courses, sample units, and the like, could be sent. In this way, an appreciation of conservation principles could be added to the teaching equip-

ment of the young teacher.

4. Information as to the teaching approaches possible in at least the immediate environment.

It is an axiom in teaching that we must first know our subject. A wealth of information must be supplied the teacher so that he can familiarize himself thoroughly with what he is going to teach.

Obviously no single agency can supply this information. The information from all agencies, of their fields and objectives, must be brought together and correlated. The liaison officers attend to this work since they link the research scientist and the teachers. The link can most readily be fashioned while teachers are preparing themselves for their vocation, that is, while they are in training. The co-operation of those responsible for the training would determine how well the gap between the technical and the teachable can be bridged, how well the teaching approaches of the problems of resources can be outlined.

5. Mastery of teaching skills essential to teaching success in the science field.

Since Elementary Science, and General Science, have supplanted the former Nature Study, and the special courses in Botany and Zoology, and since most of the pupils are required to take all the courses up to General Science V, it follows that the science enrollment is nearly equal to the total population of the school, whereas before, the number was much less. It further follows that more teachers are teaching science today than ever before. Yet the number of teachers who have a rich background in science still remains relatively few. For these

reasons, the importance of teaching skills essential to teaching success in the science field is greater than it once was. This fact is recognized by educational authorities, and stress is accorded to this part of teacher-training. Since conservation problems are, in large part, science problems, the importance of this training in conservation education is recognized. Since conservation problems at times cut across all subjects, however, the mastery of general teaching skills is more important still. Both skills are essential, with the former having special application to the teaching of conservation. If the teacher is a master of science teaching skills, and he can be so taught during the teacher-training period, then, whether he is experienced in science or not, he will be able to carry out the dissemination of ideas, principles, and information of conservation quite thoroughly.

6. A desire to do something for conservation.

Upon this hinges any success attendant upon teaching. The greatest resource any teacher has is his enthusiasm, the steady drive on objectives, the readiness to get behind and push. Lacking this, conservation education, like any other, will bring no practical values to the pupil or to the community. Conservation, after all, should begin at home, and should be characterized by practise, not preaching. It is the function of the teacher to so stimulate the desire to put philosophy into practise that there is purposefulness on the part of the child in the study of conservation. If the teacher is not greatly concerned with both his immediate and remote environment, and does not apply the principles of conservation in his own daily

living, then there will be little or no effort on the part of the pupil to use his knowledge of conservation, or influence others by it. The incentive to work hard, so that his own well-being and that of his fellows in the community is assured must be stimulated by example, and the example can best be set by the teacher.

This view, to teach ways in man's relation to man and to his environment, is easy to teach only if the teacher recognizes that children are like grown-ups - they understand what others do better than what others are saying. Unless the teacher is willing to practise conservation, that practice will be hard for the younger generation to adopt. The establishment of this view in the mind of teachers can best be accomplished when they are fresh and eager, attending school for their training. The Normal School instructors can establish this view.

Materials of Conservation and Methods of Teaching

Introduction

Conservation is not, in the writer's opinion, a technical subject. It is just the everyday business, like eating or sleeping, of everyone from the elementary youngster to the post-graduate adult. It is conservation when the child drinks his milk "to keep his teeth white", or tidies up the room in which he sleeps, or adjusts his time so that he can have play as well as homework. It is conservation when the adult turns out unnecessary lights, or plans the use of his butter ration, or keeps his garden weed-free and beautiful. Conservation is just such common-sense, down-to-facts, waste-avoiding behaviour that gives best returns in use of the hours and in the develop-

ment of worthy citizens. Because conservation is so practical, then the materials and the methods in teaching conservation must be practical. In selecting materials, we must take into consideration the known facts regarding a child and his nature and his needs. We must recognize that a first-grade child, for example, is interested only in his home and immediate surroundings; that as he grows up he gets a broader viewpoint which embraces, in turn, his community, his province, his nation, and then the foreign world. It is imperative, then, that we grade the content of conservation education and present it in language that the child can understand at different levels, and we must show the child, by example whenever possible, how conservation can be practised. Unless we do these things, he is not going to do anything about conservation. Unless those charged with assembling the materials and outlining the methods for teaching conservation can keep the viewpoint as discussed above, their work will be largely futile.

Materials

It is not the purpose of this essay to prescribe the materials of conservation. That is the work of curriculum committees. However, a few general remarks about the topic may provide some assistance in the choosing of material.

1. The material must be appropriate to the age-level and environment of the child, and must be in language understandable to him. Too often, the conservation lessons in text-books, pamphlets, and other reading material, are written in such a way that the child is unable to grasp the meaning, or the flat statements of fact provides no hint as to their importance in

living. The material must be positive, provocative, and on the level of the child's interest if a background of understanding regarding conservation is to be built up.

2. The vast majority of our children are no more interested in technical conservation, for example, the oil-content of sockeye salmon at the mouth of the Fraser River, than we were at the early formation stages of our careers. If this fact can be kept in mind when writing and producing material, it will go a long way toward helping produce the right kind.

3. The supply of material must be plentiful and varied. No single set of detailed class material can possibly be used for such a varied area as British Columbia. This point is recognized in the present programme, and a wealth of content is noted in the science courses particularly.

4. It has been noted in the introduction that conservation, aside from its technical aspects, is concerned with quite simple ideas, if the writers would just leave them that way. It is not often that they do, however. When a new study, such as ecology, is struggling to attain a position among the sciences, nothing will do but that a terminology, elaborate and confusing and unnecessary, must be evolved to provide a dignified entrance for the new arrival. Scientists themselves shudder as they bore through ecological publications, trying to catch a glimpse of this new science through the swaddling of verbiage. In an educational program for the public schools, the treatment of conservation materials must be the antithesis of this, that is, a great deal can be done in conservation by just simplifying.

When we are talking about wildlife conservation, for example, we are really talking about something with two basic requirements. One of them is a place where the wildlife can live, and the other is that we have to have wildlife to live on that place. The material used in the study of wildlife conservation should be so selected that it will emphasize these two problems, and teach the simple idea that we have to see that we don't take so many of the wild creatures that there are not enough breeding birds and animals left to occupy the place. The simpler the material the easier it is to teach, the less time it takes to teach, the more time to drill in the basic facts at every opportunity, the easier it is to learn, and the sooner the permanent awareness of the meaning of conservation can be established.

5. Teachers can help themselves to a great deal of material. The Dominion and Provincial governments support many public agencies carrying on conservation work. These bureaus, except rarely, are not geared for publicity work, but they do maintain information staffs, who can supply interesting information about the interests of the child. The Dominion government Bureau of Statistics, for twenty-five cents, offers the Canada Yearbook, the official handbook of present conditions and recent progress in Canada and its provinces. They also offer "A Fact a Day About Canada", a monthly or bi-monthly presentation of the facts, told in an informal manner, dealing with the use of our resources. This sprightly publication takes the reader into the outdoors, takes him to the earth where things actually are done, and infuses him with some emotion as well as facts. These are but two examples of sources of authentic information open to the teacher

or the curriculum maker.

6. There are competent agencies, such as the Dominion Park's Branch, or the Erpi Films Corporation, that prepare educational films related to conservation. These films are invaluable as teaching material. It is noted that excellent listings of films are provided throughout the General Science courses, and provisions made, through the Vancouver School Board and the University Extension Service for example, for their economical use. More material of this sort, supplemented with written talks or outlines of suggestions for talks, and made available for general circulation through the province, would do much to stimulate an educational program of conservation, both with children and adults.

7. There is considerable precedent, particularly in the Vancouver area, for the production of slides and pictures worked up by the children. This has shown enough possibilities to warrant feature stories in the local newspapers. Preparation of such material has particular value inasmuch as it is content that the children have produced themselves, under direction. In conservation education, participation of the pupils is a keynote of success, and there is no reason why this idea cannot be applied. On field trips, hikes, and so forth, photographs of things relating to conservation, such as an eroded hillside, or spawning salmon, or burned-over forest land, can be taken. Organized, these photographs can be worked up into illustrated lectures for the use of themselves and other classes. No claim can probably be made as to the production of superior conservation material, but what is produced is vital to the children

and the community producing it. This is conservation in action.

8. One problem that has not been very well met as yet is the production of suggestions and materials for teachers to follow when taking the youngsters on a field trip. Yet in education today, it is coming to be more and more recognized how important it is to get some time out of the restricting walls of the classroom and into the actual fields of teaching endeavor. With the help of conservation groups, this movement to the outdoors can be given impetus if suggestions, materials and consultation service can be provided toward making school and youth activities more beneficial and less superficial. Experience in out-of-door situations breathes life into the book-learning acquired indoors.

9. A conservation library, or at least bibliographies of material, should be maintained by the educational authorities, much as a visual education bureau is maintained. Materials such as films, supplementary reading, conservation exhibits, and instructions concerning activities, can be circulated from such a centre so that even the remote areas will not suffer from lack of aid and inspiration in teaching conservation. The curriculum workers can also make free use of this material when they are developing new units of instruction in the field of conservation in whatever area may be appropriate, -- geography, social studies, science and others.

Methods:

The methods of teaching conservation are predicated on a statement that was made earlier, namely, that conservation should permeate all of the work of the school and find expression

on the part of the pupils in practically all of their daily actions. It is only out of the experiences of youth, and these mostly of a practical nature, that the fundamental and pivotal concepts, that are known as the principles of conservation, come. Conservation education is largely a program of action, and the methods to be used in teaching must demand and initiate active responses from the child. Classroom instruction, reading and discussion are necessary to the success of the program, but their time should be definitely limited to permit the maximum time for student activity.

For many years most of the biology laboratory time was devoted to drawing, in meticulous detail, the external features of plant and animal specimens. What moments were left were given over to examination. As consequences of this method of teaching biology, the few who were gifted artistically derived considerable pleasure from their work and obtained beneficial practice in drawing; the majority were given a wholly wrong impression of the science of biology, and often developed a definite dislike for it, since, because they couldn't draw very well, they found the laboratory work distressing and tedious. This example shows that, while activities are fundamental in conservation work, care must be exercised to see that they are meaningful to the child, and appropriate to the subject.

With the above notes in mind, the question of methods can now be examined in more detail. The strategy for this educational campaign was laid down at the beginning of the chapter as the general plan, or foundations of conservation education. The forces to be used in the campaign were reviewed

under the heading of "materials". We are now concerned with the procedures to be used so that calculated ends may be gained. This involves the use of skilful devices whereby the best possible use of our forces, or materials, can be made. To the militarist, this planning-in-action is known as tactics. The teacher calls it procedure or method. To both, it means the art of disposing forces when action is about to commence. In the case of the teacher, it means how best to press home the lesson that he wishes to teach.

How is conservation to be best taught? There are many methods, and they will vary with the age-level of the pupils, with their immediate interest, with the nature of the subject, with the nature of environment, and the like. As in battle, the tactics must be fluid, and highly adaptable to changing conditions. (This means that the teacher, if he is to be successful, must become more conservation-minded, and less conservative-minded.) Special tactics are needed for special situations, and their successful innovation depends upon the inventiveness and ingenuity of the teacher. However, general methods, applicable to most sets of circumstances, can be asserted as suggestions for the teaching of conservation education.

1. "The love of nature is a matter of affection and aesthetics." Love of nature is natural to the child, and is particularly noticeable, because unmasked, in the school beginner, in the early formative years. At this age, pets play an important part in the lives of children, and this definite

interest should be capitalized, and extended to appreciation of the beautiful, which is the matter of aesthetics. Nature as a whole can be given sympathetic treatment; the birds, the bees, the flowers, and the trees offer many approaches which are essential to the development of such desired results as a high regard for nature, and an understanding of the large part it plays in the life of everyone. The subjects of health, art, geography, reading, and others, have the material and opportunities for presenting the wonderful world of nature. The child is at the most impressionable age for fixing habits and attitudes that will gradually build up into a philosophy of conservation. He can readily be taught the proper attitudes towards wild flowers, weeds, lowly animals such as the earthworm, and higher animals such as the insects and the birds. It goes without saying, of course, that much of this teaching should be done by stepping outdoors.

2. "The understanding of nature is science." The approach which recognizes this role of science can lead to the maximum results in establishing the principles of conservation. This is the field where problem-solving is pursued, and generalizations are concluded, that is, principles are established. Since statistics and definite data are indispensable to the construction of conservation principles, then the practice in so building these guiding principles is to be found in many areas of school learning, from the special studies in mathematics and geography to the general work in general science and social studies.

Methods which will contribute to the understanding of nature are scientific. They must involve accurate observations,

which are the building-stones of science, and reasoned conclusions, which form the framework of science. This is, in essence, a strict adherence to scientific method. There is no need to elaborate on the well-known rules of the scientific method, but it should be noted that observations, whenever possible, should be first-hand and direct. If a study of salmon spawning conditions is projected, the experience gained through a field trip to watch the progress of spawning has much more permanent values than dealing with symbols in a class-room. If the adaptations of a willow tree to its environment is the problem, a truer conception of the unity in nature is gained by observations of the habitats than by considering pictures in a book. Direct contact with the environment has no substitute in the growth of conservation-mindedness. Actual experience with life as it is being lived in the world has no rival in methods of teaching conservation.

3. Employment of a multitude of facts is inimical to the advancement of the conservation program. The method of covering a conservation topic by inundating the student with a welter of information defeats the ends sought. This practice is a regrettably common one, since it is the easiest way of disposing of a problem, and since it seems the way to teach conservation, by teachers who know little about the subject or how to teach it. This situation is often aggravated by the text-book writers who cram in every known fact to give body and bulk to topics. The conscientious, but misguided teacher, takes this powerful array of facts, one by one, and packs them into the mind of the child. It is no wonder that the child soon

suffers from a mental indigestion, to be followed by an ever-increasing resistance to more of the same diet, and finally to a marked repugnance to the teacher and the subject responsible for his upset.

Only such facts as are necessary to elicit the required understandings, appreciations, and attitudes, should be taught in the sciences, such as geography and general science. This method is fundamental in general education. As the study of protoplasm must precede the studies of anatomy, histology, and embryology, which are specialist fields, so also must the appreciations of the principles and philosophy of conservation precede the intensive study of such departments of conservation as forestry, fisheries, or agriculture. Any method that is contrary to the pursuit of such a course has no place in a conservation program of education.

4. Methods that are practical lead to something being done about conservation. If the teacher can say: "Let's get out and see what living things are to be found on the trail to the river," or "Will you build bird-houses for a wren, a robin, and a woodpecker, if I buy the plans?"; or "I wonder how many of you are free on Saturdays to go hiking with me", then not only is provision being made for directed use of child energy, but thoughts and experiences that promote the cause of conservation are being stimulated. The children are brought into contact with nature as it really is, with its unity, with its inter-relations, and with its problems. This is of supreme importance, for the study of life, and the relations of natural resources to life, are fundamental to human welfare.

5. That instruction which contributes most to good citizenship will contribute most to conservation. Methods of presenting the work, then, that will make the pupils see in their communities and their daily living the facts that can be synthesized into the principles of conservation, are to be approved. Whatever method is employed, - for example, in the study of stream pollution, whether by teacher-recitation, discussion, or direct observation, - provided the child is not only interested but becomes aware of the significance of such a problem, that method is to be endorsed. There is degree in the value of methods, of course, that of direct contact with the problem ranking first, but the best method is not always permitted. In that case, the best alternative method is to be followed. The teacher very often has little to guide himself in the selection of the method, but he can appraise his methods by appraising the amount and kind of interest awakened in the child. In this way, he can soon arrive at the best methods for the phases of the subject being presented. By wise choice of the best methods, the teacher capitalizes on the opportunity to develop an appreciation and an understanding of national problems from the local experiences of the pupils.

6. In the elementary years, the "pointing to" and "calling attention to" methods of the pre-school years should be continued. Observation trips, nearby excursions, and use of such material as aquaria, sand tables, gardens and flower boxes can furnish the more formal experiences for these years. Little by little, with each adding its bit, the study of birds, flowers, insects, minerals, soil, water, and scenery, taught practically through the use of the material just suggested, helps to

strengthen and extend conservation attitudes and appreciations. Integration features this method of instruction, since the information and ideas used are contributed by many subjects, such as geography, history, art, music, science, language and reading. The method of formal instruction in the principles of conservation is not recommended before the junior high years, and only in an elementary form there, for the students are not yet mature enough to appreciate the formal principles of conservation.

7. The Junior High School student, with keen interests in nature and explorations, and of years in which deep and lifelong impressions are made, is mature enough to develop proper attitudes, form concepts, and have an understanding of the necessity of conservation. The student in the public school system is ordinarily at the peak of his energies and enthusiasms during these years. He is ripe for more than interest and enthusiasm in causes of various sorts; he becomes readily inflamed with them, as witness his zeal in such current war drives as "savings" and "waste paper". It is the junior high group that piles up the largest total sales of war savings stamps, or the mountains of old newspapers and magazines salvaged in the district.

Though it seems like an anachronism, the building up of attitudes and activities of conservation varies directly with the amount of destruction caused by the war. There has never been a time in our history when the philosophy and practice of conservation has been more popular than during the present years. This is because warfare demands the application of conservation principles to a degree never exacted in peace times. Application means doing, and that is why, at the moment, because the Junior

High School student is a person of action rather than mature thought, we must not neglect these years when promoting the cause of conservation. Also, we must see to it that the method of activity is employed to a much greater degree than the method of formal instruction. If this is done, the impressions of conservation will have become so impressed on the minds of the students, that it will become difficult, if not impossible, to erase them in the years that follow. The seeds of good citizenship will have been carefully sown, and the willingness to do something to prevent waste and misuse, to restore, and to preserve our natural resources for the sake of our national prosperity, and for the welfare and happiness of future generations, will become a firmly fixed characteristic of the individual.

8. Methods that will continue and expand recognition of conservation principles should be employed in the Senior High School. Biology, geography, agriculture, general science and social studies are subjects that offer much opportunity in guiding the thinking of youth on conservation problems, and to show their relation to human conservation. The other subjects can add their quota too, of course, since the aims of conservation are the same as those of all general education. Expressed in other words, we are interested in conservation of natural resources, with the sciences largely furnishing the experiences, because that is a means of providing for human conservation, which is the common aim of all the subjects in the curriculum. Thus the art teacher who shows the pupils how to arrange a vase of flowers artistically, and the mathematics teacher who uses

the data of conservation problems, make their contributions too, to the great social study which is called conservation.

9. In the final year of high school, it might be profitable to point up all the previous conservation facts, principles and precepts into an elective course. Here attitudes and appreciations can be further developed, and special stress laid on the principles of conservation. The relationships that form the unity in nature would form a large part of this course, from the standpoint of consideration of how the various subdivisions, such as soil, water, wildlife, scenic and historic spots, forests and minerals, affect human welfare and how they can be preserved, utilized, renewed or restored to the end that they maintain their respective contributions to the prosperity of the nation.

There is no doubt as to the importance of such a course. Among its fundamental values could be listed the composition of the conservation teachings throughout all the preceding years into a connected whole, into a philosophy that was permanent, into a behaviour that is the mark of a good citizen. The special course, besides assembling the framework of the study of conservation, gives opportunity to the student to cover this framework and produce, in his own mind, the completed picture that reveals the significance of conservation. This picture he can show and explain to others, and in so doing, spread the gospel of conservation.

Conclusions:

The methods in teaching conservation are flexible and varied. They are governed by such factors as the nature of the material, the age-level of the pupil, the amount and kind of

of interest that can be developed, and particularly by the ability, skill, knowledge, and philosophy of the teacher.

Since it has been stressed that conservation is a way of good citizenship, it follows that every teacher is, or should be, a teacher of it. And since the aims of conservation are the same as all general education, then the methodology of the particular subjects is adaptable to the teaching of conservation. Perhaps one or two illustrations may illustrate this.

(a) The objective of literacy is one of the objectives of the school. The learning of language symbols and usages is a sure way to ready learning. In conservation, the story of the way in which nature makes contributions to our food, clothing, and shelter is a means of securing this want to learn to read. The special vocabulary, characteristic of every subject, supplies words that enrich the ability to talk, write, and read. Conservation has such a fruitful fund of concepts that many words are needed to communicate them. Thus, the objective of literacy is aided by the method of inquiring into the meaning of conservation terms such as mammals, covey, forests, bacteria, natural resources, habitat, utilization, zoning flora, predation.

(b) The objective of self-expression is important in our programme of studies. In conservation we find many possibilities for enabling the individual student to develop his own abilities and to cultivate his interests in useful and satisfying activities of social worth. The methods to be applied for realization of this objective are such that minimum teacher-instruction and direction are associated with maximum student-performance. Among

the many ways that the student can exercise his own interests, and carry through and be responsible for on his own recognizance, are the planting of trees, the planning, planting and care of a victory garden, the growing of school forests, the care of wild-life refugees, roadside beautification, the making of signs and other directions for tourists, the salvaging of necessary materials, the serving as forest patrols, the selling of living Christmas trees, and many others.

Use of methods that permit such student participation and control of activities, are worthy of commendation. The writer has used such methods with marked success in his local community. As one student remarked when he left high school, commenting on a project our Conservation Club had carried through at the Green Timbers Forestry Station, "Whatever I forget in the years to come, I'll always remember Pinus resinosa, the red pine, what it is, where it comes from, and how to plant it."

(c) The objective of scientific method is a major pursuit in public education. In this objective there is not intention to train scientists, but there is a steady pursuit, in all the grades, of the object of leading the pupils to understand and to use the methods of scientists in making their decisions in the conduct of their daily living. Teaching methods that conform to this object, the training of youth to accept, appreciate, and use the findings of sound scientific research, should be kept to the forefront and in the practice of teaching as much as possible.

These three illustrations will serve to suggest that there are many ways for the interested teacher to teach conservation. The worth of the method employed can be calculated by an appraisal of the results, in interest evolved, in work accomplished. The presentation of the subject, the soundness of the method, will, in any case, be a reflection of the teacher, how well he knows his class, and how well he understands conservation.

CHAPTER IV.

EXTRA-CURRICULAR CONSERVATION ACTIVITIES

Introduction

If conservation education is to have social significance the participation of the student in conservation activities must be extended beyond the schoolroom to the home and to the community. Education must not be too academic, the intellectual must not be stressed to the neglect of the physical, socially useful work must be provided as laboratory experience for education through doing. Conservation education, like character education, implies effort towards a purpose, and this in turn implies harmony of emphasis on the mental and physical.

It is the purpose of this brief chapter to outline instances of work that can be done outside formal teaching, work which exemplifies the philosophy of conservation in action. This work will bring the student to realize that he has a part to play in the life about him, and teach him that life is not fragmentary, like the brief periods and short units he experiences in school, but is continuous, with purposes that often carry through long periods of time. This work in the community is a complementary program of education which contributes to the conservation of all human values by creating co-operative communities functioning through conservation.

Examples of such socially useful work here listed have been collected from various sources. It is hoped that this list will be helpful in suggesting specific projects and perhaps even more, in illustrating how the teachers can, through the students,

lead the community to establish its own conservation policies with regard to health, wealth, and utilization of natural resources. In this way, a high level of community culture can be maintained in the country, and the undertakings that go on within the community will always be viewed from their educational point of view. Education will take its place much closer to the industrial life and the soil than is true at the present time. The inherent values of conservation that can only come through community life will be realized.

It may be questioned whether many of these examples are suited to children; whether there is not undue interference with the work of others in the community; whether students are not being overburdened with work beyond their capacity. The reply to these questions is that, provided reasonable judgment is shown in choosing projects, and proper supervision supplied in their applications, these difficulties may be escaped. It should be remembered that children like doing hard things if they can really do them well, and that young citizens have suffered more from the frustration of not being invited to share in solving real problems than from being overtaxed in working at them. If the projects are adjusted to meet the strengths and knowledge of the group taking part, the education and social values gained stimulates the conservation viewpoint, since the workers come to identify themselves with purposes far greater than themselves.

For convenience, the activities will be grouped roughly into elementary, junior, and senior, corresponding with these

same divisions in the educational system of British Columbia. Some of the activities may be pursued by all three groups and by adults as well. Though the list of activities is brief, undoubtedly they will suggest many others to the reader.

ACTIVITIES

Elementary

1. BIRDS' CAFETERIA. The first graders can make a feeding board from odds and ends of lumber. The tray can be placed outside the window where the children can observe the birds feeding. The idea can be extended to the homes. The community may become a bird sanctuary.
2. HOME BEAUTIFICATION. Students from about the fourth grade can carry on intensive campaigns for improvement of the home lot. Flowers and vegetables can be grown.
3. COMMUNITY MAP. Elementary school children can follow the compass, count their paces, and keep notes to guide them in drawing a map of their immediate locality. By using segments, the map may be increased to the desired size. A final map in color may be compiled.
4. SHRUBBERY EXCHANGE. Shrubs at home can be listed and compared. Cuttings and rooted shrubs can be exchanged. Children who have no plants may be given cuttings.
5. CLEAN-UP CAMPAIGN. Maps of community areas that need improvement can be drawn. The co-operation of officials, such as the health officer and the police chief, can be sought in remedying unsanitary or otherwise unsatisfactory conditions. The students can do some of the work, such as destroying

mosquito breeding places, tidying up paper litter, and the like.

6. BETTER-GARDEN CAMPAIGN. Planting, growing, and supplying fruit, vegetables, and flowers, in their early stages, can be handled easily by elementary pupils. The money earned can be put to community use, hot lunches at school, buying garden implements, or some such similar group purpose.

7. REFORESTATION. From the fifth grade up, reforestation projects are popular. Trees may be secured from the Forest Service, and areas in need of reforesting are common. Transportation to the scene of activities can be furnished by parents or organized groups in the community, such as service clubs. The goal of the project may be the establishment of a school forest or of a community forest, or it may be the establishment of wood-lots for farmers. This type of activity is particularly appropriate to British Columbia, as well as being tremendously appealing to students. The town of Squamish has been carrying on such a project for some years. A day each year is set aside for the excursion and most of the citizens and all of the school children make the trip by train to the forest site. About five acres are planted during the earlier part of the day, and the rest of the day is given over to picnicking and sports. There is much interest in the examination of previous plantings and in watching the community forest increase in size from year to year. It would be difficult to select a more socially-useful activity to weld the community into a co-operative unit.

8. SCHOOL GARDEN. Children six to fourteen years of age can be

shown how to analyze the soil, add minerals, plant and cultivate. The produce can be used for school lunches, taken home, or sold for school purposes.

9. SCHOOL BOY PATROL. The value of this training in safety and citizenship is well-known.
10. SCHOOL PLAYGROUND. Sixth grade boys and girls can develop a model miniature playground, showing better location of equipment, courts and fields, walks and bicycle paths, trees, hedges, and foot paths. They can then contribute much of the labor to carry out the suggested improvements.

Junior

1. ELECTRICITY. Boys ten to fourteen would enjoy building a dam over a small river, installing a water wheel, and creating electricity. The studies of water, fish and other resources suggest themselves when such a project is under consideration.
2. BEAUTIFYING THE COMMUNITY. The approaches to a community may be greatly improved by suitable plantings and removal of ugly signs and debris.
3. SERVICE KITS. One junior high school group has made up kits which are used by the boys and girls for rewashering faucets in their own homes and the homes of friends. Use of the kits conserved the local water supply. Each kit contains two wrenches, one pair of pliers, a seven inch screw driver, a half round file, two boxes of assorted washers, screws, two wiping cloths and instructions. The tools must be returned in good condition.
4. SCHOOL NURSERY. In a rural North Carolina school, a school nursery has produced in twenty years one-half million trees and

shrubs, without cost to anyone. Three propagating houses have been built, the last requiring the felling, and sawing by the children of forty trees. Schools, churches, roadsides, a factory and hundreds of homes have been landscaped, and the total appearance of the little community transformed.

5. BETTER SEEDS CAMPAIGN. In Krasnoplovka, U.S.S.R., children co-operated with the Central Bureau of Young Pioneers (equivalent to our Boy Scouts) in sorting seeds, organizing groups and staging demonstrations to teach their parents how to sow clean seeds.

6. PEST-DESTRUCTION CAMPAIGNS. Posters showing damage caused can be made and displayed in stores. Surveys of infested areas, the circulation of directions for getting rid of pests, and actual killing of pests are labor contributions that the students can make.

7. SERVICE UNITS. Groups can be organized to help around the homes of men overseas. They can practise conservation by looking after the garden, making small repairs and by keeping up the general appearance of the grounds and buildings.

8. GREEN-TIMBER PRESERVATION. Girls can make "forest fire prevention" bags in which hunters can keep their tobacco and matches. These pouches could be presented to the sportsman when he buys his license, as a reminder about the danger of forest fires.

9. CEDAR SACHETS AND WREATHS. The huskings left when cedar seed is being cleaned can be put into little sacks and sold as a moth-deterrent in the home. Cedar wreaths are readily sold

at Christmas time, and the money obtained can be devoted to conservation work.

10. CLUB-ROOMS. The junior high school students can plan and prepare a club-room, carrying out the rustic, outdoor effect. They can make the furniture and the wall decorations out of the natural objects of the forests. By the use of photography, taxidermy, wood-carving, and the like, a natural setting can be provided for club meetings.

Senior

1. IMPROVEMENT ASSOCIATIONS. High school organizations can perform such tasks of community and home beautification as the following: cleaning snow from sidewalks, taking a tree census, public playground work in the summer, planting trees for shade, filling washouts in roads and gullies, clearing up empty lots and cutting down brush, building bird houses, destroying moth eggs and cocoons, removing rotten limbs from trees, destroying weeds.
2. TRUCK-TREKS. Using a specially constructed truck complete with living facilities, a group of boys or girls can travel and study their country inexpensively during the summer. The resources of a more specific area can be studied by cycling or riding group.
3. FAIR EXHIBITS. At fairs and exhibitions artistic exhibits using plants and animals can be displayed by senior boys and girls. The Boys Game Club of Kamloops presented a most effective showing of the game resources of the Kamloops area at the Vancouver Exhibition.

This active boys' club from Kamloops has erected guide

posts throughout their district as an aid to the visiting anglers and hunters.

4. SCHOOL FARMS. Many Mexican schools have attached to them farms where scientific agriculture, animal husbandry, and marketing are taught. The farms produce for the school lunch-rooms, and surplus products are marketed.
5. FIRE PATROL. After observation of soil-erosion on burned-over lands, students can be trained in fire control. Training can be given in back firing, proper use of hoes, rakes and shovels, and in building fire lanes. In the summer, groups of high school boys can be used in fire prevention work by the Forest Service. This is being done, and very successfully in most cases, in the lower mainland area of British Columbia.
6. RANGE CONTROL. Students can be given field instruction during their holiday seasons on the problems of range administration. Their labor can be used in opening trails, protecting water-holes, seeding, and similar activities.
7. LAND RECLAMATION. Acreage can be acquired where students practise correct methods of cutting trees, planting crops, reclaiming worn-out farms, constructing lakes, erosion pre-vention, and related conservation activities.
8. SCHOOL SEWAGE. Because the old sewage system was dangerous to health, a student body undertook to replace it. All labor was performed and all materials were figured and bought by the students. Under supervision, work of the highest quality was performed. The students wrote a movie scenario as they worked and made a movie of the entire project. This was a student contribution to health conservation.

9. CULTURAL RESOURCES. Among the variety of nationalities and races, there are many cultural resources that should not be lost. Groups can be organized to put on cultural exhibits and programs for the community, helping adults to a better understanding of one another's arts, music, dancing, handicrafts and literature. This is a conservation activity of great value.

10. ARBORETUM. The students of the New Westminster high schools surveyed an area suitable as an arboretum where specimens of the trees and shrubs native to British Columbia could be established. This living educational exhibit would serve adults and visitors as well as the local school population.

11. LIVING XMAS TREES. In many places, students can dig, pot, and sell living evergreen trees for use at Xmas. The New Westminster students introduced this idea in their community. Instructions for care of the trees was given to the buyer and the students replanted the trees in the yard of the owner when the season was over. The same tree was thus preserved for use during the succeeding years.

12. FISH BARRIERS. Students can remove debris that impede the movements of migrating fish.

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