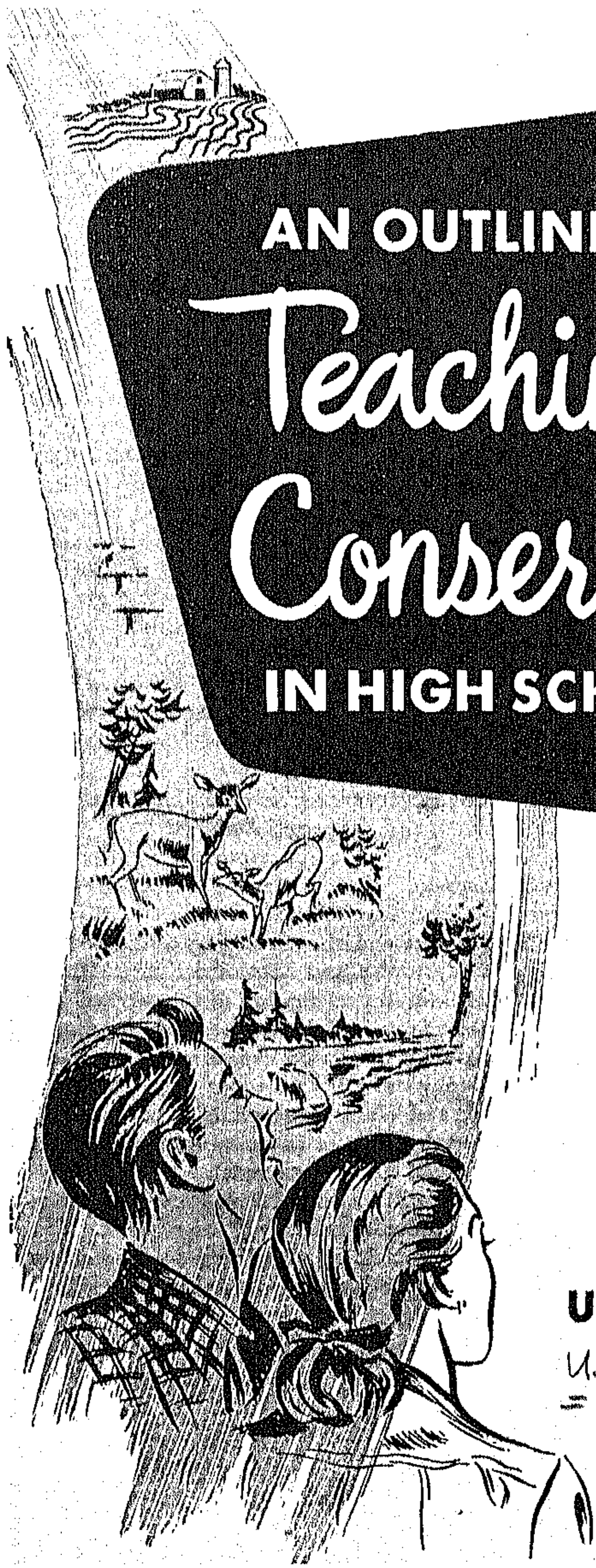
AN OUTLINE FOR
Teaching Conservation
IN HIGH SCHOOLS



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PREFACE

THIS IS ONE of two outlines prepared in the Education Section of the Soil Conservation Service at the request of educators from various regions of the country. The other is "An Outline For Teaching Conservation in the Elementary Grades." The objective is to furnish some broad outlines that can be used by State, county, and independent school systems as general guides in drawing up teaching plans.

Many publications issued by State departments of education, teachers colleges, and other institutions were drawn upon freely in compiling these outlines. The outlines, which were reviewed by educators from several sections of the United States, apply generally to the conditions most commonly found throughout the country. With conservation problems and educational systems varying greatly over the Nation, however, teachers will want to revise, expand, and adapt the outlines to local conditions.

The problem of conservation of natural resources is too important to coming generations to be bypassed by any students. This outline, therefore, has been organized in a form which will permit the teaching of conservation to the greatest number of students; namely, by interweaving the subject with the physical and social sciences commonly taught in American high schools. Conservation of natural resources is closely related to these other sciences. In fact, wise use of natural resources is an integral part of these sciences if they are studied from a practical point of view.

Probably more students can be reached through this method than by presenting conservation as a separate course. A special course in conservation in most high schools, even in rural areas, probably would have limited enrollment.

Not all the possibilities of integrating conservation into the related subjects have been explored but most of the obvious relationships between current subject matter and conservation are pointed out. The entire field of natural resources is touched, with emphasis on soil and water because they are the basic resources that support life.

Conservation concepts brought out in each school subject are arranged under three main headings—Objectives; Topics for Study or Discussion; and Suggested Activities.

Each subject is discussed and outlined separately. There is some duplication in the conservation concepts and the "topics for study or discussion" listed under the various subjects. There is necessarily an overlapping of subject matter in these subjects.

Additional space has been provided for "Notes" at the end of each subject discussion for the teacher's use in expanding the outlines of study topics and lists of activities, listing references, and such other special uses as will assist him in presentation of the subject.

For reference purposes for the use of teachers and students, each high school library should include some or all of the books, bulletins, and other writings on conservation that have been issued in recent years. A selected bibliography on soil and water conservation is included in "Books, Booklets, and Bulletins on Soil and Water Conservation" published in September 1951 by the Soil Conservation Service as Agriculture Information Bulletin No. 63. Movies, charts, and other visual aids are also useful teaching material.

This outline offers suggestions only. In practice it will be desirable to localize the conservation education problem, with each State or community making its own plans. The important thing is that public schools take on the responsibility of making our youth into conservationists, lest our young people continue to make the same mistakes their elders have made, and at much greater danger to their welfare.

AN OUTLINE FOR TEACHING CONSERVATION IN HIGH SCHOOLS

CONTENTS

The physical sciences grew out of man's use of natural sources and his curiosity about the natural laws governg these resources. A study of the natural resources and eir conservation involves biology, chemistry, and physics, well as the social sciences. Since the relationship of ch of these to conservation will be considered in greater tail elsewhere in this outline, the present study will be nited to developing an acquaintance with the resources d their simpler relations to the sciences in general.

Air, sunlight, rainfall, and soil are the natural resources at come to mind first since they are found all over the ce of the earth and are necessary to all of the higher rms of life. Other resources important to man are trees, asses, legumes, other herbaceous plants, song and game rds, game and fur-bearing animals, domestic animals, h, and other aquatic life.

In man's progress through history he has discovered her natural resources in the earth and has learned to ake use of them. Among these are coal, petroleum, tural gas, metals, building stone, and minerals used for mmercial fertilizers and other purposes.

These latter resources have always been present upon e earth but have been discovered at various times under e dual spur of man's need and his curiosity about his rroundings. Copper, gold, silver, iron, and coal were own and used to a limited extent by some early civilitions. Petroleum, natural gas, and many of the metals d other minerals have been discovered more recently. eir important use coincides largely with the coming of dustry and the industrial revolution. The use of most them has increased greatly in recent years, and exhausn of the known supplies of some of these resources is reatened. It is impossible to predict how long some of em will last, because the location and extent of all posits is not fully known. New deposits are still being scovered in the United States, and little is known about eir occurrence in many other countries. There is great riation in quality and ease of extraction for many sources. Easily accessible supplies of high quality are ed first. The discovery of cheap methods of extracting w-grade deposits will prolong the supply of some metals d other minerals.

Of importance equal to or greater than finding new mmercial processes for the recovery and utilization of tural resources is the conservation of known sources of ese materials through reducing the waste in extraction, ocessing, distribution, and use. Important also are the vaging and reuse of metals, the substitution of more entiful materials where possible, and better use of our ater facilities for power. Atomic energy holds promise some day furnishing some of our power.

Nature took care of her resources until man threw her ork out of balance. Most virgin soils were fertile and ere protected against erosion by a covering of trees and her vegetation. Plants grew wherever temperature, oisture, and soil conditions permitted. Animals rived where food and shelter were sufficient. The flow of rivers, streams, and springs was more constant the ye round, and the water was not contaminated by indu trial and other wastes. Nature's methods were successf because natural laws had free play and the forces of natu balanced each other.

The organic resources are dependent upon soil a water. The principal natural factors limiting their pr duction are the amount of fertile land and proper moistu conditions. Consequently, these factors also tend to lim the ultimate world population. Much of the producti and potentially productive land has been impair through ignorance, exploitation, and mismanagemen Man has also wasted many of the resources produced the land and, in so doing, has accelerated soil depleti These conditions, together with the growing populati force upon our attention the need for conserving our n ural resources and, so far as possible, repairing the dama already done.

A great deal of science has been applied to the bro field of agriculture during the past century. Soil che istry has done much to maintain soil fertility. Throu genetics and plant and animal physiology, great impro ments have been made in plants and domestic anima Many farms have been mechanized. The result is t in many places two blades of grass now grow where grew before; average per-acre crop yields have been r terially increased; new strains of plants and fruits h been produced; and farm animals with highly desira characteristics have been developed.

While agricultural science has progressed over a c siderable period of time, soil and water conservation been virtually ignored. With few exceptions, the sa applies to forest, range, and wildlife conservation. O in recent years has interest in the conservation of natu resources become strong enough to give rise to acti The establishment of soil conservation experiment stati in 1929 and of the Soil Conservation Service in 1935, f lowed soon afterward by farmer-operated soil conservati districts, gave real impetus to the soil and water cons vation movement. Through research and supervised perience with the resources, conservation practices h been developed and have proved successful through w application.

Today there is an applied science of conservation. T recognized practices are based on natural laws and entific principles. The integration of conservation w a course in general science offers an excellent opportun to learn the principles and practices of conservation.

Objectives

To develop a consciousness of the need for the cons vation and rehabilitation of natural resources.

To study the natural laws and scientific principles gove ing the various natural resources.

To acquire a working knowledge of the science conservation.

Topics for Study or Discussion

The natural resources: Classification and importance; dependence of man and civilized society upon natural resources.

Organic resources and their occurrence: Plants and animals; their nature, dependence upon each other, and their products.

Depletion and waste of inorganic resources.

Conservation of inorganic resources.

Depletion and waste of soil and water.

Conservation of soil and water: The recognized soil and water conservation practices and how they accomplish their results.

Depletion, waste, and destruction of range lands, forests, and woodlands.

Conservation of range lands, forest, and woodlands.

Depletion and destruction of wildlife.

Conservation of wildlife.

Some recent discoveries of science in the use and management of natural resources.

Farm chemurgy: New products developed from waste products of the farm.

The use of industrial waste products.

Some new methods of extracting or refining minerals; e. g., magnesium from sea water.

Substitutes that have been developed for critical resources.

The need for trace elements in the soil to aid plant and animal development.

Obtaining maximum use of resources while protecting them and maintaining their productivity.

Increased yields of farm crops through conservation farming.

Increased yields from ranges and forests through conservation practices.

Increased value of water and wildlife resources through conservation practices.

Suggested Activities

Field trips to study soil erosion; water problems; forest, range, and wildlife waste and destruction.

Field trips to study soil, water, forest, range, and wildlife conservation practices.

Discuss the interrelationship between the organic resources.

List the natural laws that operate in soil-erosion and water problems, and describe their action.

List and describe the scientific principles employed in the various conservation practices.

List possible substitutes for the mineral fuels and some of the metals.

Notes

The conservation of soil, water, forest, grassland, and wildlife resources is largely a biological problem. Man must use these resources in order to exist. And because of this dependence upon natural resources, man is also forced to conserve them as he uses them, in order to assure his own continued existence upon the earth.

Soil, water, and life are so closely related that they can hardly be studied separately. Soil, itself, is a living thing; it is teeming with life. It is the basic resource that supports all land life. The value of soil to man, animals, and plants, however, depends largely on the amount of organic matter and living organisms in it. Soil without organic matter and life is sterile and unproductive.

Most of the organic matter and the living organisms in the ground are in the topsoil. That is why topsoil is the most important resource of the earth. Nature worked thousands of years to build up the organic matter and life in the topsoil of the earth. Today all land life depends on this topsoil.

The soil is the most important direct source of the minerals needed by growing plants. Although these minerals comprise only a small part of the food used by plants, that part is essential. Without them, no plant can use the large amounts of carbon, nitrogen, oxygen, and hydrogen that it takes from the air and water and the energy it gets from the sun to make organic matter from inorganic matter. Without this process of photosynthesis, all higher forms of life cease to exist.

Water is necessary to all life. Its physical action was probably the biggest factor in creating soil from the rocky crust of the earth. Water has many uses besides its value in supporting life. It loses most of its value to man and other living things, however, when it is not properly used and controlled. If improperly managed, it may destroy both life and the soil which it helped to form.

The water of most value to man and other living things is that which soaks into the ground where it falls as rain or snow. It feeds the plant life of the world, replenishes the underground water and causes springs to flow. Streams fed by water that has been filtered through the soil flow clear the year round.

The water most destructive to life is that which falls on the ground and runs off immediately. This water takes with it the life-supporting part of the soil, causes floods, and pollutes streams and lakes with mud and sand, killing much of the aquatic life.

Man depends upon the soil and water resources of the earth for all of his food, a considerable part of his shelter, most of his clothing and many of his other needed fibers, and much of the fuel and power he uses. But, important as these resources are, they have been and are being depleted and wasted.

Civilized man has lost, often in a few generations, a large part of the soil, water, plant, and animal resources that he inherited from nature. During recent years he has depleted these resources faster than ever before. There are virtually no new frontiers of great masses of unused land readily available for agricultural development. Yet populations continue to increase all over the world. We can't continue to feed *more and more* people on *less and less*. Man must plan his future on the basis of wise use of the available natural resources if he is to live and prosper.

Man-induced soil erosion is one of the greatest threats to future civilization. It removes topsoil and often leaves the land sterile. Erosion pollutes and depletes the usable water resources. It leaves an environment that will support only a small number of inferior species of plants and animals. Forests, grasslands, and wildlife can be replaced after a while if the land keeps its topsoil; but topsoil can be replaced on eroded land only through decades or generations of human endeavor. It may take centuries for nature unaided to build back the soil.

Conservation is not hoarding. It is a way of using natural resources for maximum production while protecting the capital assets for future use.

Conservation practices for soil, water, forests, grasslands, and wildlife are largely interdependent. There is no way to conserve soil and water without affecting some or all of the other resources. All land life is dependent upon soil and water. The living things supported by the soil in turn play a major role in conserving the soil and keeping it productive. Thus there is a natural balance in nature.

The conservation of natural resources is man's attempt to restore and preserve that balance, and to abide by nature's laws as closely as possible in using the resources. The biologic aspects of the broad conservation program designed to achieve these results may be summed up briefly under three basic principles: (1) To use the land to produce only those plants and animals for which it is adapted; (2) to get more rainfall into the ground and to control that which runs off; and (3) to use, protect, and care for those species of plants and animals that are most beneficial to man and to the land. Following are some objectives and topics for study and discussion that indicate ways by which conservation may be integrated into the study of biology.

Objectives

To develop an understanding of the interdependence of all plant and animal life and their dependence on soil and water.

To develop an appreciation of the dependence of man upon the natural resources of the earth.

To show that civilized man has wasted or depleted the resources of nature.

To study soil erosion and its effects on water resources, plant and animal life, and on man.

To teach that the soil, water, plant, and animal resources can be conserved while being used.

To develop an understanding that conservation practices for soil, water, forests, grassland, and wildlife are closely interdependent and are, thus, parts of one broad conservation program.

To study some methods of conserving the soil, water, forests, grassland, and wildlife resources through the application of biological processes.

Topics for Study or Discussion

The formation and composition of soil and the differences between soils.
The water resources of the earth and their relation to soil and to life.
The interdependence of plants and animals, soil, and water.
Man's dependence upon soil and water.
The waste and depletion of natural resources.
Soil erosion, its causes and effects.
The conservation of natural resources; wise *use*, and the part that biology plays in the conservation program.

Suggested Activities

Make a field trip to study the relation of natural vegetation and wildlife to their environment.
Make a cross-reference chart showing the different ways in which soil, water, plants and animals, and man depend on each other.
Make a field trip to study soil erosion and water loss.
Make a field trip to a farm where a complete conservation farming program is being followed. Have the farmer or a conservationist explain the different conservation practices.

Notes

Chemistry is important to modern agriculture, hence to all modern life. Soil chemistry is a vital phase of the general subject because life itself depends upon it.

The most important chemical reaction in the world is that which occurs in the green leaf of a plant during photosynthesis. This is the beginning of all plant life. Here is the first place where nonliving matter is changed to living tissue and food. The nonliving materials come from soil, water, and air. A plant contains only small quantities of soil minerals, but must have them in order to use the larger quantities of carbon, oxygen, and hydrogen that it gets from the air and water to manufacture organic matter.

A deficiency of any essential mineral element in the soil will lower the ability of that soil to produce food and fiber for man. The food value of plants varies with their chemical content. The deficiency of certain key materials in the soil will not only lower production but will also lessen the food value of plants grown on that soil, because the composition of plants varies according to the composition of the soil on which they are grown.

The amount of organic matter present may be even more important in most soils than the mineral content of the soil. Much of the natural soil nitrogen, a vital element in plant growth, is contained in the organic matter. The organic acids of a soil usually have considerable effect on the solubility of soil minerals, thus affecting the availability of the minerals for plant use.

Most of the organic matter and a large part of the soluble minerals are contained in the topsoil. That is why the topsoil is so important to plant growth. Erosion removes the topsoil first and thus immediately and seriously affects the productive capacity of the soil.

Following are some objectives and topics for study in integrating conservation into chemistry.

Objectives

To study the chemistry of soil and plants.

To show that minerals that come from the soil are needed in the formation of organic matter.

To determine some effects of soil nutrients on the plants, animals, and people who get their food from the soil.

To show that soil erosion seriously impairs the fertility of the soil.

To study some of the chemical processes involved in the conservation of soil, water, and plants.

Topics for Study or Discussion

The chemistry of soils and plants.

The manufacture of organic matter from inorganic matter.

Some effects of soil composition on the nutrition of plants, animals, and people.

Some effects of soil erosion on soil fertility.

Some chemistry problems in the conservation of soil, water, and plants.

Suggested Activities

Test some soil samples of the community for organic matter, available phosphorous, potassium, calcium and other plant nutrients. Use a quick commercial test. Compare samples of topsoil and subsoil, virgin soil and eroded soil, garden soil and field soil, virgin soil and field soil, and soils of different origin.

Test samples of commercial fertilizer for plant nutrients. Test samples of barnyard manure for organic matter and plant nutrients.

Submit samples of important types of soil in your community to a State laboratory for analysis of available plant-nutrient content.

Test some soils of your community for acidity or alkalinity. Determine the amount of lime needed to correct acidity in the samples tested.

Make a field trip to determine soil-improving practices used in your soil conservation district.

Notes

novement of soil and water is governed by the
aws that function in all motion on the earth.
n, man has ignored these laws in his management
d water with the result that soil erosion has been
ed, floods have increased, and losses have mounted
perty destruction.

ws and principles of gravity, friction, velocity,
on, inertia, surface tension, cohesion, adhesion,
absorption, suspension, osmosis, capillarity, and
on are the principal factors that influence the
behavior of soil and water. These are also the
ws and principles that we must use in conserving
water.

tical study of physics might well be based upon
cation of natural laws to the soil, water, and plant
we wish to conserve. A study of the physical
s of soils should not be out of place in the physics
The normal behavior of soil and water should be
ecause of its importance to all life.

ing are some objectives, topics for study or dis-
nd activities to assist the physics teacher in inte-
onservation principles into the study of physics.

Objectives

some laws, principles, and theories of physics
ey apply to the soil, water, and plant resources
e community.

some physical properties of soils and the relation
een these properties and the erodibility and pro-
vity of soils.

that destructive soil erosion and the waste of
al resources has been brought about by man's
gard of physical laws.

To show that conservation practices are man's efforts to cooperate with nature so he can use the resources of nature without abusing or depleting them.

Topics for Study or Discussion

The conversion of energy from the sun into organic matter through photosynthesis. The necessity for plants to have the minerals and water from the soil for this process.

How energy is wasted through lack of conservation practices.

Some physical properties of soils and their relation to each other.

How man's violation of natural laws has resulted in accelerated erosion and waste of all natural resources.

The functioning of physical laws in soil and water conservation practices.

Suggested Activities

Test different types of soil for water-absorbing and water-holding capacity.

Test different types of soil for rate of capillary water movement.

Test different soils for texture; separate the clay, silt, and sand particles with sieves or a centrifuge machine. Also separate organic matter in the same way.

Test different types of soil for adhesion. Determine effect of organic matter and size of soil particles on adhesion.

Demonstrate the shattering power of raindrop impact upon various soils.

Demonstrate the soil-carrying capacity of water flowing at different velocities.

Notes

Soil and water, the life they support, the minerals used by man, and the climate largely determine man's physical existence and activities in various regions of the world.

Soil and water are the most important physical features of the land. They help to support all forms of life. The land produces according to its richness and the amount of water it gets. Minerals that are mined from the earth are important to industry and commerce and to modern man's way of life, but modern man knows how to find substitutes for some of the scarcer minerals, and the possibilities for the substitutes are growing daily. Man has not yet found practical substitutes for soil and water and he is faced with the proposition that he may never find them.

Lands may deteriorate or improve with use, for not all lands are alike. Soils vary in depth, capacity for taking and holding water, fertility, and ability to resist erosion. The slope of land ranges from level to steep. Much land has been seriously eroded, some not so badly, and a little not at all. All these differences in land directly affect the capacity of the land to produce food just as lands differ in physical properties and environment.

Any given piece of land is capable of doing only certain things. When it is misused it is damaged. When it is not used at all it does not contribute its full share. But all land cannot be used and managed in the same way any more than can all human beings. Land must be used and treated according to its capabilities if it is to last and continue to produce. This is the first principle of conservation.

Water is essential to all life and the most useful water is that which soaks into the ground where it falls. This water replenishes the underground water that keeps springs flowing. Where springs flow the year round, so do the streams.

The most destructive water generally is that which falls to the ground and immediately runs off. This is the water that washes the soil away, causes floods, and clogs streams, reservoirs, and harbors with mud and sand.

Man-induced soil erosion probably has caused more changes in the physical features of the earth during the last 8,000 years than all other factors combined. Most of these changes have been for the worse. Misuse of the land has changed verdant grasslands to semideserts; forested hills to barren rocks; and clear streams and lakes to mud flats. Man's disfiguration of the earth's surface has been increasing at an alarming rate during re years. In the United States we have done more dam to our land in less than 200 years than any other pe have done in the same length of time; and we did i land better than many other people even started wit

In view of man's exploitation and waste of all of nat resources, a practical conservation program is absolu essential if we are to continue to inhabit the earth an prosper. Such a program will actually increase pro tion while still conserving and increasing the value of capital assets.

The following are suggestions for the integratio conservation into the study of physical geography.

Objectives

To study the effects of soil erosion and man's influ upon the physical features of the earth.

To study water resources and their distribution over earth.

To show the relation between natural resources and m well-being in various regions.

Topics for Study or Discussion

Types of erosion: Geologic and accelerated (man-ma erosion.

Kinds of soil erosion: Wind erosion and water erosion.

Results of soil erosion.

Land classification:

- Conservation surveys based on soil types, degre slope of land, degree of erosion, and present
- Land-capability maps: Delineation of areas of suitable for the production of cultivated c pasture and range, forests, and wildlife.

Eight land classes for soil and water conservation: Li tions in use and the specific conservation prac required for each class.

The need for conservation of natural resources.

- Man's dependence upon natural resources.
- Man's inability to create natural resources.

Suggested Activities

Field trips to observe erosion damage and soil and w conservation practices.

Participation in conservation projects.

Notes

Natural resources are the source of all wealth, industry, and commerce. Economic geography concerns itself with areas where resources are found or are produced and processed, and with the lanes of commerce between the areas of production and those of consumption.

Most basic resources need to go through several stages of processing or manufacture before reaching the ultimate consumer. These steps in a sense are really stages of consumption. The iron ore is consumed at the smelter and steel mill. The steel is consumed at the factory. The manufactured product may be consumed all over the world. All of these stages and processes create wealth.

In the case of many resources, the processing and manufacture are carried on at great distances from the point of deposit or production. Other resources are brought into the picture. The energy resources for processing may be bulky, so that it is cheaper to transport the basic resource than the secondary resource. Labor may also be a factor. So, Pittsburgh, Birmingham, and Gary became great steel centers. Chicago, Kansas City, and St. Louis are meat-packing centers. Detroit is the center of the automobile industry, and Akron, Ohio, a rubber center.

The transportation and distribution of resources and their products give rise to commerce. This is carried on over water, railroads, highways, and through the air. Each has developed into a gigantic industry. Along the lanes of commerce, great cities have sprung up. These are located at strategic points, usually at good harbors, on lakes and rivers, or at inland railroad junctions.

In the United States, industry and commerce have been developed to a remarkable degree, and they together with the professions employ a large majority of the population. Not more than 25 percent of the population is engaged in agriculture and timber production. The number employed in extracting the minerals and metals is also insignificant as compared to the number engaged in other types of work.

Yet all of this wealth and wealth production is dependent upon the natural resources. The only way to maintain our prosperity is to conserve our natural resources. Unless we do conserve them, our economic system will some day collapse as surely as a house built without a solid foundation.

Objectives

To develop an understanding of the relation of the geography of natural resources to the geography of industry and commerce.

To study some effects of the exploitation and depletion of resources on changes in centers of commerce and industry.

To develop an appreciation of the need for conservation in the community and Nation in order to maintain industrial and commercial activities.

To study some possible effects of conservation on future development of industrial and commercial centers.

Topics for Study or Discussion

(In view of the close relation of the subject matter of economic geography and economics, reference should be made to the outline on Economics and Conservation for conservation concepts and topics for study or discussion.)

Notes

Countries and their peoples have changed from the time of the invasion of Canaan by the Israelites; through invasions of Persians into Europe, the Romans into western Europe, Asia, and Africa, the Huns into the land of the Goths, and the Goths into the Roman Empire; through the advances of the British into every continent, the Germans, Italians, and Dutch into Africa, and the Japanese into Korea and Manchuria. Important motives were to relieve population pressure and to gain control of desired natural resources. In this way vast empires were built. Although the people of the invaded areas were not always destroyed or replaced, they were made subservient to the stronger governments. In many cases their resources were exploited.

The discovery of the Americas and their colonization and development were definitely based on the desire of European nations to acquire resources. The policy of the United States is not to invade or take forceful possession of other countries for the resources they would supply, but to acquire by purchase any lands needed for this purpose.

The strength, wealth, and standard of living of any nation depends not only upon the possession of natural resources but also, and perhaps more importantly, upon the development and use of the resources. Continued prosperity depends upon wise use and conservation of the resources. In the past, nations and civilizations have collapsed and disappeared through misuse and depleti of their natural resources. Today, many countries st have undeveloped resources. The future of the wh world will depend upon proper conservation of t remaining natural resources.

Objectives

To show the effects of natural resources on political bour aries of the past and present.

To show the effects of natural resources on populati government, and welfare of the people.

To show why the future welfare of the nations of t world will depend upon conservation of natu resources.

Topics for Study or Discussion

The story of Babylonia, Chaldea, Persia, and Syria.

Past civilizations of the Near East.

Fall of the Roman Empire and its causes.

The Mayan civilization in Central America.

A comparison of the standard of living in countries of t modern world.

The present trend toward conservation of natural resour throughout the world.

Notes

The whole economic process of man is based on natural resources. All the food, clothing, machines, and materials that we use or trade originally came from nature's storehouse. The soil and the things it produces, the water resources of nature, and the minerals of the earth furnish the wealth and materials that support our commerce and industry.

Two basic conditions to bring any nation or community greatness and economic security are: (1) Access to natural resources and (2) the ability to use them wisely. Permanent prosperity must be based on a wise program of conservation and use because many of these resources are irreplaceable and the others can be replaced only through long and arduous effort.

The economic life of man has developed in complexity and scope in proportion to his mastery of the use of natural resources. His progress from individual self-sufficiency as a savage to his specialization in today's complicated industry and world trade has been made step by step, as he learned new and better uses for the resources of nature.

Throughout man's economic history, commerce and industry have declined or ceased to exist in areas where natural resources were overexploited to the point of depletion. The sites of many former commercial or industrial centers are now inhabited by nomadic tribes, not much above the barter and handicraft stages in their economic life, because the resources to support modern commerce and industry are no longer there.

Even in the new land of America, we have many sad sights of ghost towns, economic decadence, and impoverished people in communities that once were thriving or booming. The fertile soil, the water, timber, fish, wildlife, oil, or minerals that supported the communities are being depleted. The trend continues over most of the world. But the number of human beings continues to increase. We are faced with the prospect of having to feed and supply the wants of more and more people from the resources that remain.

Industrial cities and commercial centers are just as dependent on natural resources as are the fishing, mining, and lumbering villages and agricultural communities. We cannot have modern industry without minerals, fuels, and products of the soil. We cannot have commerce without something to trade, sell, or ship. People cannot even live, either in country or city, without food, clothing, and shelter. And all of these things come from resources that are becoming scarcer each year. Populations continue to increase and the land is declining in productivity, largely as a result of soil erosion. Many of the known sources of critical materials are nearing exhaustion.

It is still the soil and the things it produces that are the most critical. Soil fertility can be restored by man through wise and skillful efforts, but these are likely to be costly and time consuming. Infertile soil left to nature's ministrations is almost useless for generations, sometimes for centuries.

Conservation does not mean hoarding. It means using resources for maximum production while conserving the capital assets for future use. The soil and water resources of the earth will actually give greater current production under a program of conservation than under a program of exploitation. This has been proved.

Conservation must be a part of any sound economic program in this age of increasing populations and decreasing resources. Following are some objectives and topics for study or discussion that may serve as a guide for integrating conservation into the study of economics.

Objectives

To develop an understanding of the relation between natural resources and the economic processes of man.

To study some of the economic benefits of conservation.

To study the effects of natural resources, and of resource exploitation upon the economic development of civilized man.

To develop an understanding that an economy of exploitation causes waste and destroys wealth.

To develop an appreciation of the need for a comprehensive program of conservation in order to assure economic security for the community, State, Nation, and the world.

Topics for Study or Discussion

The dependence of industry and commerce on natural resources.

The relation of man's use of resources to the development of industry and commerce.

The decline of industry and commerce in some nations and communities owing to the depletion of natural resources.

The need for conservation to assure future economic strength.

Some economic benefits from conservation.

Notes

Natural resources and their exploitation or conservation have played a leading part in shaping the history of mankind. The entire history of man; the development of his arts and sciences; his progress from savagery to civilization; his travels, explorations, and discoveries; his standard of living and political systems; and sometimes even his ability to exist have been shaped to a great extent by the natural resources available to him and his need for additional resources.

There is much evidence to indicate that past civilizations have developed in areas where resources were sufficient to permit the people to make a living and still have some leisure time to devote to the arts and sciences. There is evidence, also, that these civilizations expanded and survived largely in proportion to their natural resources and the care taken of them. The set-backs in civilization have occurred usually when and where resources were exploited and exhausted.

The United States has become the richest and one of the most powerful nations in world history partly because we have discovered, developed, and exploited the vast natural resources that were built up by nature before this country was settled by the white man. We thought we could afford to exploit and waste these resources during the period of settlement and development because they seemed abundant. Now we are realizing that we have exploited our natural resources more rapidly and depleted them faster than have any other people in history.

We can no longer afford the luxury of waste. We must begin to conserve our natural resources as we use them if we are to preserve our national integrity and our democratic way of life.

The conservation of soil, water, grassland, forests, minerals, and wildlife is not something that should interest only farmers, ranchers, lumbermen, miners, and sportsmen. Our philosophy with respect to these things is going to determine the future history of this Nation. Housewives, merchants, laborers, stockbrokers, and school children must all be concerned with these resources. These are the things on which we live and trade.

A realistic and objective course in history will cover the effects that natural resources and their exploitation have had on important historical events and trends.

Following are some objectives and topics for study or discussion that may serve as a guide in the integration of the conservation of natural resources into the study of history.

Objectives

- To study the history of resource exploitation in ancient times.
- To study the effects of natural resources on historical trends and events.
- To study the history of conservation in both ancient and modern times.
- To study the effects of exploitation and waste of natural resources in the United States.
- To determine the necessity for the conservation of natural resources of the United States.

Topics for Study or Discussion

- The effects of abundance or scarcity of natural resources on the history of ancient and modern peoples.
- The relation between the exploitation and depletion of natural resources and the decline or fall of states and civilizations of the past.
- Wars that were fought primarily for the control of natural resources.
- The relation of natural resources and their development to the wealth and strength of communities, States and nations.
- The effects of natural resources on the wealth and power of the United States.
- The history of conservation in ancient and modern times; use of conservation practices by ancient peoples.
- The necessity for the conservation and wise use of the natural resources of the United States.
- The United States soil and water conservation program; its spread in the United States and its effect on other nations of the world today.

Notes

Conservation of natural resources has been receiving more and more attention from governments during recent years. In fact, practically all progressive nations of the world have accepted conservation as a major responsibility of government. Many of these countries have sent their young agriculturists to this country to study our methods of combating erosion.

In the United States we have Federal agencies that devote their principal efforts to the conservation of such natural resources as soil and water, minerals, forests, and wildlife. Most States have conservation commissions or their equivalent to deal with the problem. Many cities and other local governmental units have found it necessary to adopt measures to deal with specific conservation problems. All 48 States have enacted laws authorizing the creation of soil conservation districts. By 1952, more than 2,400 such districts had been established as political subdivisions of the States. Similar laws have been passed in Alaska, Hawaii, Puerto Rico, and the Virgin Islands.

Governments in general have entered the field of conservation as a means of self-preservation. Fortunately, statesmen have been farsighted enough to see that conservation is not merely desirable but is absolutely essential in this age of increasing populations and diminishing resources.

During the early history of this country, the government encouraged or permitted exploitation in order to get the land settled and the resources developed. We thought we could afford an economy of exploitation because we were so rich in resources. We know now that we cannot afford to waste our resources. Poor schools and churches, poorly paid civil servants, rundown government buildings, and decadent institutions of all types are the result of serious depletion of the natural resources.

A stated purpose of the conservation laws enacted by our Federal, State, and local governments is "to provide for the public health, safety, and welfare." Our State conservation laws permit the people of the various States to adopt such conservation measures as they deem necessary. Some countries have statutes that compel individuals to use and manage their privately owned farm lands in specified ways. It is questionable whether such laws will ever be adopted by the people of the United States in view of the progress being made in this country toward conservation on a voluntary basis.

Many conservation problems cannot be solved by individuals, working alone. Wind and water, flood, drought and fire, migrating beasts, birds, and invading insects do not recognize man-made boundaries. The damages caused by these agents often extend across property lines and their prevention and remedy become the concern of government.

Any objective study of civil government should be concerned with those government agencies and laws devoted to the conservation of natural resources. It should teach something of how and why the government encourages and regulates conservation activities.

Following are some objectives and topics for study or discussion that may serve as a guide for the integration of conservation into the study of civil government.

Objectives

To point out the responsibility of government in the conservation of natural resources.

To bring about an appreciation of the effects upon government of the waste or conservation of natural resources.

To promote a realization of the need for governmental coordination of conservation efforts.

To study some governmental activities in the conservation of natural resources.

Topics for Study or Discussion

The responsibility of government for the conservation of natural resources.

The effects of the waste or conservation of natural resources on kinds of governments, past and present.

Why the government must assume the leadership in directing the efforts of the people in the conservation of natural resources.

Some governmental activities in the conservation of natural resources.

- Federal government activities and agencies.
- State government's part in the conservation program.
- Some local government units and their conservation activities.

Suggested Activities

Obtain and study a copy of your State Soil Conservation District Act.

Find out how many soil conservation districts there are in your State, and the area in the districts.

Locate the soil conservation district office and Soil Conservation Service headquarters in your soil conservation district.

List Federal and State conservation agencies in your State and study their functions.

Study the main provisions of your State and community laws that pertain to the water, game, fish, forest, and range resources.

Notes

The social institutions of man are largely a product of his environment. An advanced civilization and well-developed society flourish where there is economic security. This requires an abundance of natural resources and their proper development. If these resources are wasted, the civilization and society will probably decline and can even perish. The world abounds with examples of poverty-stricken people and backward civilizations, due solely to exploitation and destruction of the resources that nature left for man's endowment.

Even in America we have numerous ghost towns, dilapidated and unused schools and churches, and social groups of a primitive character in areas where natural resources have been exhausted. In modern society, we find good schools and churches, playgrounds and parks, progressive governments and civic clubs, and an advanced society only in areas that can draw upon an abundance of resources for their support. Where soil erosion has progressed to a critical stage; where forests and grasslands have been denuded and left to wash away; or where oil and other mineral resources have been wasted, there are poor people and decadent institutions.

In our complex society today, many who live in cities unconsciously feel themselves independent of natural resources. This cannot continue. The cities themselves are the byproduct of the fertile soil and other natural resources that produce food, fiber, and the materials for industry, commerce, and recreation.

The conservation of natural resources is a responsibility of all society. Only through conservation can we save the resources necessary to maintain the elaborate and progressive society that we have built up in America.

Conservation is a problem that cannot be solved by one individual. In most instances it requires group action. It is a social problem. In the conservation of natural resources, what benefits an individual also benefits the society of which he is a part.

This problem of conservation is so important to coming generations that it must not be ignored in any study of social science or social problems. Following are some objectives and topics for study and discussion that may serve as a guide to the teacher who wishes to inject conservation concepts into the study of social sciences.

Objectives

To study the effects of the wise use or misuse of natural resources on social institutions, past and present.

To develop an appreciation of the need for conservation in order to preserve our way of life.

To study some social institutions that may help solve the problem of conservation.

Topics for Study or Discussion

The relation between natural resources and social institutions.

Some effects of natural resources on the development of social institutions.

Some effects of resource waste on society and social institutions.

Conservation as a responsibility of society.

Some things that social groups can do toward conservation.

Suggested Activities

List the social institutions of the community which i fluence or are influenced by soil and water conserv tion.

Determine the conservation program of your State an local garden clubs and other women's organization

List the merit-badge projects and activities of the Bo Scouts and Girl Scouts that can be classed a conservation.

Study the conservation activities of the religious instit tions of the community, including participation i Soil Sunday or Conservation Week, and the result of such activities with respect to community welfar

List the natural resources that make your homes, school churches, parks, and other public places more pleasan and more useful.

Let the class participate in tree planting and other con servation practices.

Notes

Soil and water conservation should be of interest to students of domestic science because of its relation to the home and better living. Any home will be benefited by soil and water conservation because of the resultant increased production of food and fiber and the improved quality of these products.

Soil depletion may have serious effects on human nutrition. Depleted soils do not produce healthy plants. Plants suffering from mineral deficiencies do not nourish healthy animals. Deficient plants and undernourished animals do not support people in health.

Water must be free from pollution and contamination for drinking, cooking, and other domestic uses. Naturally grown foods will not contain all of the mineral elements required by the normal human body unless these elements are present in the soil in which the food plants are produced. Animals and plants must depend upon the soil for their mineral ingredients.

Some soils never did contain all the minerals necessary to make a soil fertile. Other soils have had their fertility depleted through erosion, leaching, and exhaustion by continuous cropping and lack of fertilization. In addition to controlling erosion, a soil conservation program aims at maintaining and building soil fertility. When necessary, the mineral elements are added to the soil in lime and commercial fertilizers. Soil fertility is further enhanced by liberal growing of legumes. This results in higher protein content of foods.

Objectives

To show that soil depletion affects the nutritional value of plants grown in the soil.

To show that a deficiency of minerals in the soil may cause disease in plants, animals, and man.

To show that the conservation of natural resources increases the supply of food, fiber, and other products, improves their quality, and makes for a higher standard of living for the entire population.

Topics for Study or Discussion

Soil erosion and its effect on soil fertility and on the available plant food in the soil.

Soil erosion and its effect on water resources.

Soil fertility and its relation to nutrition (animal and human).

Some effects of soil depletion on human nutrition.

- Effects of soil erosion on available plant food in the soil.
- Effects of mineral deficiencies in the soil on the mineral content of plants grown on it.
- The relation of mineral deficiencies in plants to some nutritional diseases of animals.
- Some effects of mineral deficiencies in plants and undernourishment of animals on human nutrition.

Distribution of nutritive elements in plants and animal carcasses.

Misuse and waste of nutritional elements in food through custom and habits.

Other resources in relation to domestic science and their dependence upon soil and water.

Domestic science and the need for conservation of all natural resources.

(For other topics, see the section on "Hygiene and Conservation.")

Notes

Soil erosion, stream pollution, silting of reservoirs, and other exploitative uses of natural resources may have far-reaching effects on human health apart from those immediately involved in body nutrition.

Nature usually provides a healthful environment for the higher animals. But experience has shown that man, through lack of full knowledge of that environment or through force of circumstances, is likely to upset the natural balance. The result, too often, is waste, filth, and an unhealthy community.

True conservation eliminates many of the health hazards brought on by man's exploitation of nature. By wise use of resources it is possible to restore somewhat of a balance in nature and still get the best use from the resources. This usually results in a cleaner, healthier community and a more prosperous and better fed people.

The teacher of hygiene should not ignore the conservation factor in the study of individual and community health. Following are some objectives and topics for study or discussion that may serve as a guide in pointing up conservation concepts in the study of hygiene.

Objectives

To show the relation between resource exploitation and human health.

To study the effects of soil erosion, deforestation, stream pollution, and silting on human health.

To show that an effective conservation program would alleviate most of the health hazards caused from exploitation of natural resources.

Topics for Study or Discussion

Some health hazards resulting from exploitation of natural resources.

- Mud-filled lakes, poorly drained farm land, and swamped land as breeding places for mosquitoe and other harmful pests.
- The pollution and silting of streams and reservoir as a threat to city water supplies.
- Water famines in cities as a result of reservoirs be coming filled with silt.
- The destruction of beneficial species of wildlife tha prey on insects, rodents, and other species tha are a threat to human health.

Conservation practices to eliminate health hazards result ing from exploitation of natural resources.

- Elimination of breeding places for mosquitoes.
- Erosion-control practices.
- Safe sewage disposal by cities.
- Protection of beneficial wildlife.
- Flood control.
- Protection of forests from fire.

Suggested Activities

Study the water supply and sewage disposal of a farm o country home from the standpoint of health. Sug gest practical improvements that are needed.

Study the mosquito-breeding places in the community an suggest practical controls. Study the cost of perma nent or seasonal control.

Visit the city water-purification and sewage-disposal sys tems and determine their effectiveness.

Study the source of the city water supply and its purity

Visit local markets and grocery stores and study the stor age facilities and condition of perishable foods.

Study the packaging of food from the standpoint c health.

Visit dairy barns and dairy centers to study the sanitar conditions.

Visit canneries and other food-processing plants to stud the quality of the product and sanitary conditions.

Notes

Conservation is a vital subject to all American school children. It is something concrete and interesting about which students of English and public speaking can write themes and make speeches. There is a wealth of recent and excellent literature on this subject. The teacher of English or public speaking should be able to arouse considerable interest in conservation without much effort. There is no better way to teach conservation than by having students do their own research and write or talk about what they find out. Following are some objectives and suggested activities that teachers of English and public speaking may use.

Objectives

To study some of the excellent literature that has been written about natural resources and their conservation.

To create an interest in the conservation of natural resources as an economic and social problem that affects the lives of all world citizens today.

To teach some conservation concepts by having students write about and discuss this subject.

Suggested Activities

Write themes and make speeches on various phases of conservation. Suitable subjects for themes and speeches include the following:

- Soil Erosion—A National Menace.
- What Soil Erosion Has Done to Our Community.
- Our Land Tomorrow.
- Ghost Towns That I Know.
- Natural Resources—A Heritage for Future Generations.
- Poverty or Conservation.
- Lost Lakes—Filled with Soil.
- Plant Factories—The Key to Life.
- How Wildlife Helps the Farmer.
- Our Friends—Birds and Animals of This Community.
- Trees on Our Farm.
- How Long Will Our Forests Last?
- Fire—Friend or Foe.
- Conservation in Other Countries.
- Why People of Our City Should be Interested in Conservation.

Debates about current, controversial policies and problems on conservation. Suitable questions for debate include:

- Resolved: That a farmer has the right to do as he pleases in the use of the land he owns.
- Resolved: That the government should regulate cutting in all privately owned forests.
- Resolved: That a soil conservation district be created in .... community (or county).
- Resolved: That a soil conservation district be given supervision of all government conservation activities within the district.
- Resolved: That hunting and fishing regulations be controlled by the State conservation commission rather than by the State legislature.

Notes

The conservation of natural resources provides a secure foundation for the development of interest in the arts from both the artistic and material standpoints. Nature, in its innate form and as modified by man's handiwork, has always been a good subject for art studies. Cultural pursuits, in turn, can come only after the fundamental needs for food, clothing, and shelter have been met. With fertile soil and plentiful water, for instance, one man can produce food and fiber for many men, and thus release them for other occupations. A nation rich in natural resources can afford such community projects as libraries, symphony orchestras, art schools, and exhibits.

It does not require a trained eye to see that soil erosion leaves ugliness in its wake and that soil and water conservation restore the landscape to beauty. Rundown people living in rundown houses on rundown land may inspire the artist but the people are too concerned with bare existence to be inspired by artistic creations.

Art departments have an unusual opportunity to develop youthful and adult consciousness in regard to soil erosion and other forces imperiling natural resources. The graphic portrayal of conservation practices and of their effects upon the land and people can bring the subject to the attention of the students as well as to those who view the exhibits of their work.

Objectives

To create conservation consciousness through study and observation of the exploitation of natural resources, and the use of this subject matter for art exercises and activities.

To develop active interest in the conservation of natural resources by using conservation practices as subject matter in art classes.

To extend conservation interest to the whole community through the activities and products of the art class.

Suggested Activities

Study soil erosion, forest and wildlife exploitation, stream pollution, floods, etc., as well as conservation practices already in use, through literature and visual aids.

Take field trips to study exploitation and damage, as well as effective conservation practices of the various resources.

Prepare posters and other illustrative materials on conservation for classroom decoration, window displays for special occasions, and visual material for use by community organizations sponsorin conservation.

Suggested subjects for art activities portraying waste exploitation, and mismanagement of natura resources:

- Soil erosion: soil washing, silt deposits, dust storms
- Muddy streams, siltation, floods and flood damage streambank cutting, dry streams, and dr waterholes.
- Abandoned farm lands and buildings, poverty-stricke families, waste lands, and neglected livestock.
- Forest fires, thin stands, trees unfit for lumber, etc
- Grass and marshland fires, wildlife destruction.
- Strip mining and spoil piles of earth and rock.

Suggested subjects for art activities portraying conserva tion and beneficial results:

- Contour plowing, planting, and construction.
- Gully and roadbank stabilization with plantings o shrubs and other vegetation, and tree planting o spoil banks of strip mines.
- Clear streams, streambanks protected by trees an other vegetation, fishing and bathing scenes.
- Farm ponds and water holes; ponds fenced again livestock; banks planted to trees and shrub water trough or tank outside of fence with catt drinking; swimming, fishing, and boating scen
- Tree-planting scenes, plantations of various-ag trees, and plantations fenced against livestock.
- Desirable woodland scenes, woodlands fenced again livestock, woodland borders of shrubs for wil life food and cover, fire fighting and fire lan woodland improvement and manageme scenes—thinning and pruning.
- Song and game birds, bird houses, feeding statio and shelters; hedges planted for food and shelte living fences of multiflora rose; fence rows trees and shrubs managed for food and shelte travel lanes for game birds and animals; veg tated field borders between woodland and cul vated land.
- Game and fur-bearing animals in familiar poses an appropriate locations, feeding and drinking.
- Scenes portraying the benefits of conservation on th farm and in the community; improved buildin schools, churches, highways, factories, and oth industries.

Notes

Mathematics in some degree is commonly involved in the science of conservation. Why not use the soil, forest, water, minerals, and wildlife, and their conservation, for exercises in arithmetic and algebra? These are as familiar as the traditional eggs and apples, and they involve the same mathematical principles and processes.

Conservation of natural resources is of concern to the welfare of any community. Teachers are urged to give instruction in conservation through integration with every school subject, and arithmetic and algebra are no exception.

Objectives

To create an interest in conservation by showing some of the results of exploitation and conservation.

To teach some facts about resources and their conservation through their presentation in arithmetic and algebra exercises.

Suggested Activities

Let students solve problems dealing with the use and conservation of natural resources. Following are a few sample problems that bring out some points in the conservation program:

Arithmetic

1. One rain washed 4 tons of soil per acre off a 20-acre cornfield planted in straight rows uphill and downhill. On a nearby 20-acre field where corn was planted in level rows around the hill, only one-half ton of soil per acre was lost. How much more soil was lost from the straight-row field?
2. Farmer Brown raised 82 bushels of corn an acre in a 30-acre field planted on the contour. His neighbor, Jones, who planted his corn the old way (uphill and downhill), had 35 acres of corn which produced only 70 bushels an acre. Which one had more corn? How much more?
3. A farmer cut 30 boards 1 inch thick from one white oak tree; 12 of them were 1 foot wide and 10 feet long, and the other 18 were 8 inches wide and 6 feet long. How many board feet of lumber did the tree produce? (One board foot is 1 foot square and 1 inch thick.)
4. Three fields on one farm needed limestone, according to soil tests. The 20-acre field needed 3 tons per acre, the 15-acre field 2 tons per acre, and the 10-acre field 4 tons per acre. How much limestone was needed for all three fields?
5. Soil is being washed into a lake at an average rate of 40 acre-feet a year. The lake averages 20 feet deep over 50 acres. How soon will the lake be filled with soil?
6. Assuming that the soil washed into the lake, in problem 5, was removed by sheet erosion at a uniform rate from 3,000 acres of farm land in the watershed of the lake; how long will it be before this land will lose 6 inches of topsoil?
7. An inch of topsoil weighs 140 tons per acre. How many tons are in a 40-acre field where the topsoil is 10 inches deep?
8. A soldier eats 4 pounds of meat each week. If one farm produces 10 tons of meat in a year, how many soldiers will it feed for 1 week?
9. When the Mississippi River is at flood stage, it carries enough soil past Vicksburg, Miss., every minute to cover 40 acres 7 inches deep. How many acres would it cover at the same depth with soil that flows by in 1 day?
10. If the average weight of the dry topsoil on a 40-acre field is 87 pounds per cubic foot and the average depth of the topsoil on the field is 7 inches, how many tons of dry topsoil are on the field? (An acre covers an area of 43,560 square feet.)
11. If 6 percent of the average dry topsoil in problem 10 consists of organic matter and 5 percent of the organic matter consists of nitrogen, how many pounds of nitrogen are in the organic matter of the topsoil of the 40-acre field? How much would this nitrogen cost if purchased in commercial fertilizer at a price of 27 cents per pound?
12. If 20 acres of the field in problems 10 and 11 are farmed with rows running up and down the hill and lose an average of 20 tons of soil per acre each year, and if the other 20 acres are terraced and farmed with rows running on the contour and lose only one-half ton of soil per acre each year, what will be the difference in the commercial value of the nitrogen lost in the organic matter from the two 20-acre fields in 5 years?
13. If the fine sandy loam topsoil on a 30-acre field weighs 90 pounds per cubic foot, and 550 tons of topsoil are washed off the field each year by sheet erosion, how long will it take for the top 3 inches of the soil to be removed?
14. When the Mississippi River is at flood stage it carries 40,000 tons of soil past Vicksburg, Miss., every minute. Assuming that 75 percent of this soil is topsoil washed from upland farms and that the average dry weight of the soil is 85 pounds per cubic foot, how many acres of upland will be washed off to furnish the soil carried by Vicksburg in 24 hours if each acre lost 1 inch of topsoil?
15. A 30-acre field of very fine sandy loam loses through sheet erosion an average of 18 tons of topsoil per acre per year for 5 years. The topsoil is 6.5 percent humus, and 5.2 percent of the humus is nitrogen. How many pounds of nitrogen are lost in the organic matter of the topsoil during the 5 years?
16. The farmer attempted to replace the nitrogen by spreading barnyard manure on the field in problem 15. He hauled 1½ tons of manure per load that contained 0.7 percent nitrogen; how many loads did he have to haul to replace the nitrogen lost through erosion in 5 years?

17. Farmer Brown planted 40 acres of corn and 40 acres of oats in square fields with rows running uphill and downhill. He made 50 bushels of corn and 40 bushels of oats per acre. His neighbor planted 25 acres of corn, 25 acres of oats, and 30 acres of red clover in contour strips on a terraced field and made 65 bushels of corn, 50 bushels of oats, and 2½ tons of clover hay per acre. Assuming prices for the crops were 90 cents per bushel for corn, 65 cents per bushel for oats, and $15 per ton for clover hay, which farmer received the most for his crops? How much?

Algebra

1. Field A, with rows up and down the hill, loses 25 times as much topsoil per acre per year by sheet erosion as does field B with contour strip crops. But if field B lost 33 tons per acre per year more than it now loses, it would lose 3 times as much as A. How much topsoil is washed from each field per acre each year?
2. The topsoil on field A is 2 times as deep as on field B, but field A is farmed with straight rows up and down the hill whereas field B is terraced and farmed on the contour. Field A loses 1/20 of its topsoil each year from sheet erosion, which is 11 times as much as field B loses. Field B loses 1/110 of its topsoil each year. How deep is the topsoil on each field and how many years will it be before the amount of topsoil remaining on the fields will be the same?
3. Before the conservation farming practices were started on a farm, it produced an income of $10 per acre from the cropland and $5 per acre from the pasture land, and the total income was $1,025. After soil and water conservation practices had been established, the cropland produced an income of $15 per acre and the pasture land produced $10 per acre, the total income being $1,625 per year. What was the total acreage in crops and pasture?
4. A hawk ate 32 mice and 4 rabbits for every chicken he ate. Each chicken weighed 16 times as much as each mouse and one-half as much as each rabbit. The total weight of the rabbits and mice he ate was 10 times as much as the weight of the chickens. How many pounds of chickens did he eat?
5. Soil from an overgrazed grassland watershed washes into lake A at 12 times the rate that soil washes into lake B which has a well-managed range on its watershed. Lake A will fill up with silt in 20 years at the present rate. Lake B now holds three-fourths as much water as lake A. How long will it be before both lakes hold the same quantity of water? How long before lake B will be completely filled with silt?

Notes

SHOPWORK AND CONSERVATION

Objectives

To create an interest in conservation projects.

To teach methods of making some special conservation equipment and structures in the shop or at home.

Suggested Activities

Complete one or more projects in the making of articles needed for conservation work.

- Build bird houses, bird baths, and homes for other wildlife.
- Relocate fences on the contour on the home farm.
- Construct one of several types of home-made farm levels.
- Build a home-made V-drag for terrace construction.
- Cast concrete tile for subirrigating the farm garden.
- Build forms for casting concrete water trough for use below farm-pond dam.
- Make a soil auger to use in determining depth of soil.
- Make soil-profile monoliths.
- Construct a device for bulk inoculation of legume seed.
- Build a drag for leveling land.
- Build a stalk cutter to use in mulching operations.
- Adapt a drill to plant grass seed.
- Install a fertilizer attachment on a drill for planting legume and grass seed.
- Adjust a combine and adapt reel bats for grass- and legume-seed harvesting.
- Build a vibrating seed scalper.

Notes

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