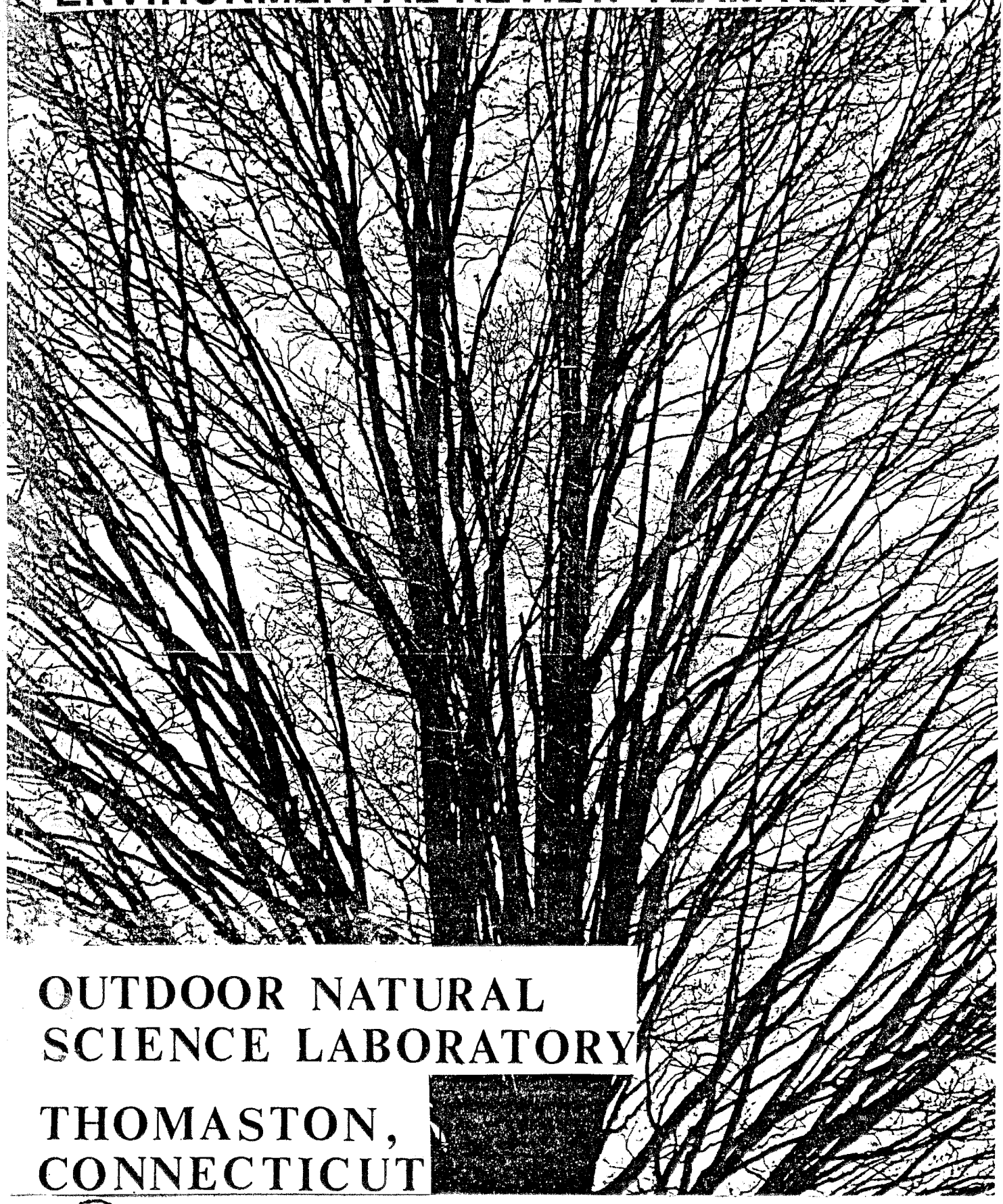
ENVIRONMENTAL REVIEW TEAM REPORT



OUTDOOR NATURAL SCIENCE LABORATORY

THOMASTON, CONNECTICUT

KING'S MARK RESOURCE CONSERVATION AND DEVELOPMENT AREA, INC.

OUTDOOR NATURAL SCIENCE LABORATORY

Environmental Review Team Report

Prepared by the King's Mark Environmental Review Team
of the King's Mark Resource Conservation
and Development Area, Inc.

Wallingford, Connecticut

for the

Town of Thomaston

AUGUST 1986

Acknowledgements

The King's Mark Environmental Review Team Coordinator, Keane Callahan, would like to thank and gratefully acknowledge the following individuals whose professionalism and expertise were invaluable to the completion of this study:

* William Warzecha, Geohydrologist
  Department of Environmental Protection

* Paul Rothbart, Wildlife Biologist
  Department of Environmental Protection

* Timothy Barry, Fishery Biologist
  Department of Environmental Protection

* Ralph Scarpino, Forester
  Department of Environmental Protection

* Geri Nebor, District Manager
  Litchfield County Soil and Water Conservation District

I would also like to thank Patricia Newton, Secretary, and Janet Jerolman, Cartographer of the King's Mark Environmental Review Team for assisting in the completion of this report.

Finally, special thanks to Dr. Eugene Diggs, Superintendent of Schools, Town of Thomaston, and Steven Fish and Martina Delany of the Information and Education Unit of the Department of Environmental Protection for their cooperation and assistance during this environmental review.

EXECUTIVE SUMMARY

The Superintendent of Schools for the Town of Thomaston requested that an environmental review be performed on a site proposed to be utilized as an outdoor natural science laboratory for grades K - 12. The site is characterized by open woodland and wetland communities, with Branch Brook bordering the site.

The project proposes to use an 10-acre east to west linear strip of land south of the elementary school and the high school as an outdoor natural science laboratory and classroom for students and teachers. The project also proposes to use the outdoor natural science laboratory as a training site for teachers in nature study and the natural sciences.

The primary goal of this Environmental Review Team (ERT) was to inventory and map the flora and fauna occupying the site, and determine how these resources can be used for environmental educational purposes. Specific objectives included:

(1) assess the hydrogeology of the site and determine its value or use for environmental education;

(2) identify existing vegetative cover types on the site and determine its value or use for environmental education;

(3) identify existing fish and wildlife habitats and species and discuss its environmental interpretation value, and;

(4) review existing soil types.

The Environmental Review Team process consisted of three phases: (1) inventory of the study sites's natural resources (collection of

data); (2) assessment of these resources (analysis of data); and (3) identification of environmental education opportunities. This report provides a natural resource data base on the 10-acre site and suggests numerous environmental education opportunities of the site.

Through the inventory and review process, specific resources and environmental educational opportunities were determined. They fall into two broad categories: (1) natural resource characteristics and (2) environmental education opportunities.

NATURAL RESOURCE CHARACTERISTICS

Topography

The land surface is generally flat. Topographic relief has been partially disturbed probably due to the construction of the high school and placement of a public sewer line. Land area adjoining the study area to the northwest has also been disturbed as a result of a sand and gravel mining operation. Elevations on the site range between about 390 feet and 370 feet above mean sea level.

Bedrock Geology

The site lies within the Western Highlands Physiographic region of Connecticut. This region is underlain primarily by very old, crystalline, metamorphic rocks (i.e., rocks that have been geologically altered by great heat and pressure within the earth's crust).

Bedrock does not appear to break ground surface on the parcel. Depth to bedrock on the site ranges between 10 feet and 40 feet and appears to be thickest in the southcentral parts.

Surficial Geology

The surficial geology of the site refers to those unconsolidated mineral and organic materials overlying bedrock. The site is characterized by two surficial geologic deposits: (1) stratified drift and (2) postglacial sediments, comprising primarily of regulated inland wetland soils.

Hydrology

Most of the study area drains into the unnamed tributary to Branch Brook which flows through the site. Runoff from the remaining portions of the parcel flows directly into Branch Brook. The watershed area for the site is about 193 acres or 0.3 square miles

Precipitation falling on the parcel will be quickly absorbed by the permeable soils covering the site. It will percolate downward until it reaches the groundwater table.

Flood Hazards

A 100-year flood is a flood with a one chance in 100 or a one percent chance that it will happen in any year. A 500-year flood has a one chance in 500 or a 0.2 percent chance that it will happen in any year. The 100-year flood boundary does not infringe on the property. However, the 500-year flood boundary covers the southern parts of the site.

The generally flat topography in the floodplain makes the area very effective in storing water during periods of flooding.

Soils

All soils were once part of rocks. Soils were formed, and are continually being formed by the dissolving and disintegration of rocks by abrasive action as the particles move against each other in flowing water, moving ice, wind, or falling downslope.

Three soil types occur on the study site. They are: (1) Bk - Borrow and Fill Land, coarse material; (2) Bz - Birdsall, silt loam, and; (3) HkC - Hinckley, gravelly sandy loam on 3 to 15 percent slopes.

Forests

The vegetation occuping the site is dictated by either past management of the site or by the presence or lack of moisture. There are three distinct areas of vegetation: (1) borrow area; (2) mixed hardwood, and; (3) wetland/swamp area.

Inland Wetlands

Inland wetlands on the site perform some very important hydrological and ecological functions such as flood and stormwater retention, improving water quality, trapping sediments, and providing wildlife habitat.

Wildlife Resources

The proposed outdoor natural science laboratory site may be divided into three wildlife habitat types. These are: (1) mixed hardwood forest; (2) open field, and; (3) wetlands.

Fishery Resources

The site has an excellent diversity of aquatic habitat for such a small area. The fact that both lentic (standing waters) and lotic (running waters) ecosystems exist side-by-side greatly enhances the usefulness of the area as a teaching environment, and lend it to conducting both contrast and comparison studies of the aquatic environment.

Branch Brook can be considered suitable trout habitat throughout. Most of this area of the river consists of short shallow riffles and pools. The substrate appears to consist of gravel and cobble with instream boulders providing "holding" areas for trout.

Largemouth bass were observed spawning in the ponds adjacent to the brook during the field review. Along with white suckers and common shiners, other expected species would be bluegill sunfish, pumpkinseed sunfish, rock bass, and possibly carp.

ENVIRONMENTAL EDUCATION OPPORTUNITIES

Forestry Education Programs

A common response to educating people about the value of our woodlands is to make a list of wood products we use from the forest, emphasizing how much we depend on our forests for many products. Other opportunities for forestry education is a forest appreciation approach. This is where the value of the forest is evaluated. Wood products are looked at as essential but the need for our forestlands to provide soil stabilization, water conservation, wildlife habitat, clean and cool air, or scenery should also be stressed to students.

Educational programs focusing on past forest history and the ever changing landscape can be interesting and enlightening.

Interesting programs centered on broad questions can be a good learning experience. How did these trees get here? Why is this particular species here? This can lead into concepts of ecological succession, forest soils, moisture, forest regeneration requirements and past management activities.

Wildlife Educational Activities

A trail system along with an accompanying informational pamphlet could be developed. Discussion could focus on vegetation succession and its importance in wildlife management.

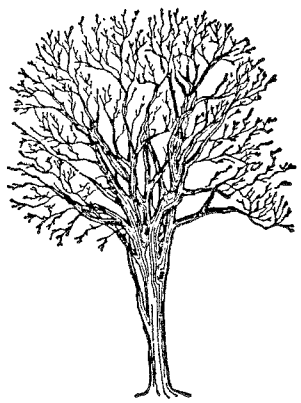
Wildlife habitat development projects could be used to provide excellent educational benefits for youth groups.

Fishery/Aquatic Programs

Compare and/or contrast the different ecosystems and their aquatic organisms. Some species to look for and possible environmental education topics might be fish, how are they important in the food chain (predator-prey relationships); their body form, how it is suited for their particular habitat or mode of feeding; amphibians such as frogs, salamanders, toads, etc.; reptiles such as turtles, and water snakes; aquatic insects and anything else associated with the aquatic environment.

The physical and chemical limnology of the lake and pond could be investigated for such things as the concentration of dissolved oxygen and pH, and phytoplankton and zooplankton could be sampled and studied under a microscope.

A miniature environ could be established in a classroom using an aquarium, with organisms actually collected in the field. Some of these activities could also be tied into discussions on current topics in science and politics such as acid rain and pollution.



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INTRODUCTION

Introduction

The Superintendent of Schools for the Town of Thomaston requested that an environmental review be performed on a site proposed to be utilized as an outdoor natural science laboratory for grades K - 12. The site is characterized by open woodland and wetland communities, with Branch Brook bordering the site.

The total study area, including both the high school (which is not shown on the topographic map) and the elementary school, is approximately 31 acres (Figure 1). The project proposes to use an 10-acre east to west linear strip of land south of the elementary school and the high school as an outdoor natural science laboratory and classroom for students and teachers (Figure 2). The project also proposes to use the outdoor natural science laboratory as a training site for teachers in nature study and the natural sciences.

Three phases of planning and development have been identified to complete this project. They are: (1) natural resource inventory of the site; (2) development of the site; and (3) utilizing the site for summer workshops and outdoor classrooms. The ERT was involved in only the first phase. Phase One specifically involved having the natural resources on the site inventoried, assessed, and mapped by the ERT. The information generated by the ERT will then be incorporated into an environmental education handbook for science teachers.

Therefore, the primary goal of this ERT was to inventory and map the flora and fauna occupying the site, and determine how these

resources can be used for environmental educational purposes. Specific objectives included: (1) assess the hydrogeology of the site and determine its value or use for environmental education; (2) identify existing vegetative cover types on the site and determine its value or use for environmental education; (3) identify existing fish and wildlife habitats and species and discuss its environmental interpretation value, and; (4) review existing soil types.

Definition of Environmental Education and Interpretation

Freeman Tilden describes environmental interpretation in his book, Interpreting Our Heritage (1967) as:

> "...An educational activity which aims to reveal meaning and relationship through the use of original objects, by firsthand experience, and by illustrative media, rather than simply to communicate factual information..."

Tilden (1967) also developed six primary principles of environmental interpretation. They are:

(1) Interpretation is not the presentation of information; it is revelation based on information;

(2) Interpretation must relate what is being displayed or described to something within the personality or experience of the individual;

(3) Interpretation must present the complete story and should relate to the whole person;

(4) Interpretation for children should be specifically prepared and not be a dilution of the adult version;

(5) Interpretation's primary purpose is provocation, not instruction, and;

(6) Interpretation is an art, combining many arts; an art can be taught and successfully learned.

LOCATION OF STUDY SITE

Figure 1

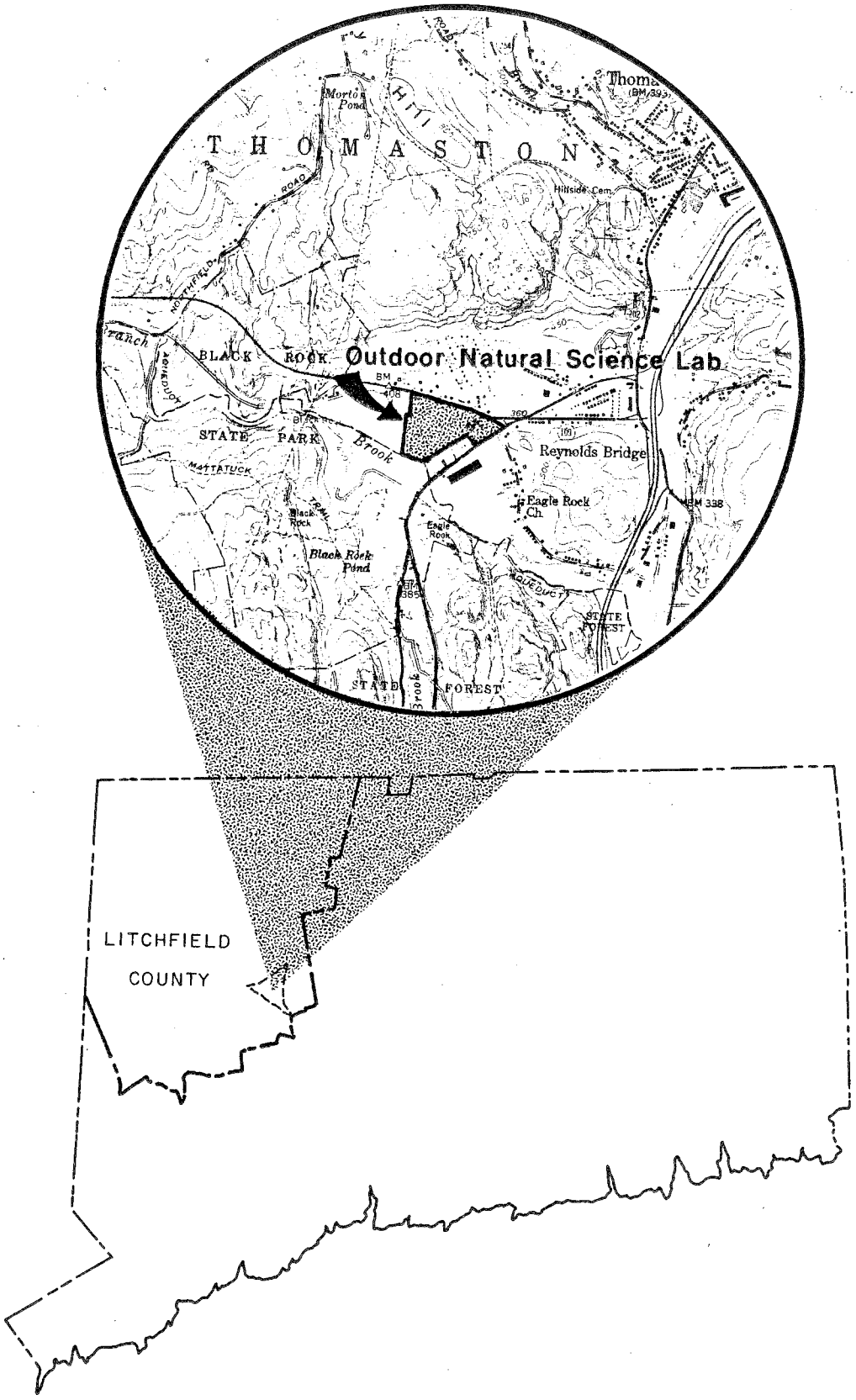

Figure 2

OUTDOOR NATURAL SCIENCE LAB

THOMASTON, CONNECTICUT

CONCEPTUAL DEVELOPMENT PLAN

King's Mark Environmental Review Team

NOT TO SCALE

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Joseph Bharat Cornell, in his book, Sharing Nature With Children (1979), has identified five basic tenets for outdoor teaching. These principles will help channel a child's lively energies into constructive and satisfying pursuits. They are described below:

(1) Teach less, share more;

(2) Be receptive and sensitive to a child's question or comment -- This provides an opportunity to communicate and respond to a child;

(3) Focus the child's attention without delay;

(4) Look and experience first; talk later, and;

(5) A sense of joy should permeate the outdoor classroom experience.

These five tenets of teaching nature to children outdoors are by no means definitive. Teachers are encouraged to improvise and expand upon these principles to suit their needs. These principles are presented only to act as a guide and to provide some direction.

Finally, children are naturally drawn to learning if the spirit of the learning experience is happy and enthusiastic. Enthusiasm is contagious and is perhaps a teacher's greatest asset.

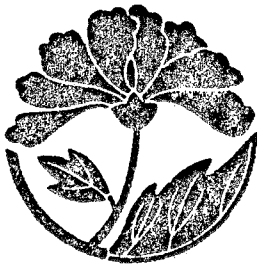
The ERT Process

Through the efforts of the Superintendent of Schools, the Information and Education Unit of the Department of Environmental Protection and the King's Mark Environmental Review Team, this environmental review and report was prepared for the Town. This report provides a natural resource data base on the 10-acre site and suggests numerous environmental education opportunities of the site.

The review process consisted of three phases: (1) inventory of the study sites's natural resources (collection of data); (2) assessment of these resources (analysis of data); and (3) identification of environmental education opportunities

The data collection phase involved both literature and field research. Mapped data and environmental education reports were perused and specific information applicable to the site was collected. Field review and inspection of the site proved to be a most valuable component of this phase. The emphasis of the field review was on the exchange of ideas, concerns, or alternatives. Being on site also allowed Team members to check and confirm mapped information and identify other resources.

Once the Team members had assimilated an adequate data base, it was then necessary to analyze and interpret their findings. The results of this analysis enabled Team members to arrive at an informed assessment of the site's environmental education capabilities.



PHYSICAL

Physical Setting

The proposed outdoor natural science laboratory is comprised of 10 acres and located at the rear of Thomaston High School and Black Rock Elementary School. The land consists mainly of inland wetlands that generally parallel an unnamed tributary to Branch Brook, which forms the southern boundary of the parcel. Branch Brook, classified by the Department of Environmental Protection (DEP) as a class "A" stream, is the major topographic feature on the site. (See Water Classification of Lower Housatonic River Basin). A class "A" stream may be suitable for the following uses: (1) drinking water supply; (2) bathing, and; (3) suitable for all other water uses. Water character is uniformly excellent and may be subject to absolute restriction on the discharge of pollutants. Except for medium density residential development along Route 109 in the southern parts of the watershed, the central and northern parts of the watershed are virtually undeveloped.

Topography

The land surface is generally flat (Figure 3). Based on visual inspection during the field review, the site has been partially disturbed probably during the construction of the high school and placement of a public sewer line. Land area adjoining the study area to the northwest has also been disturbed as a result of a sand and gravel mining operation.

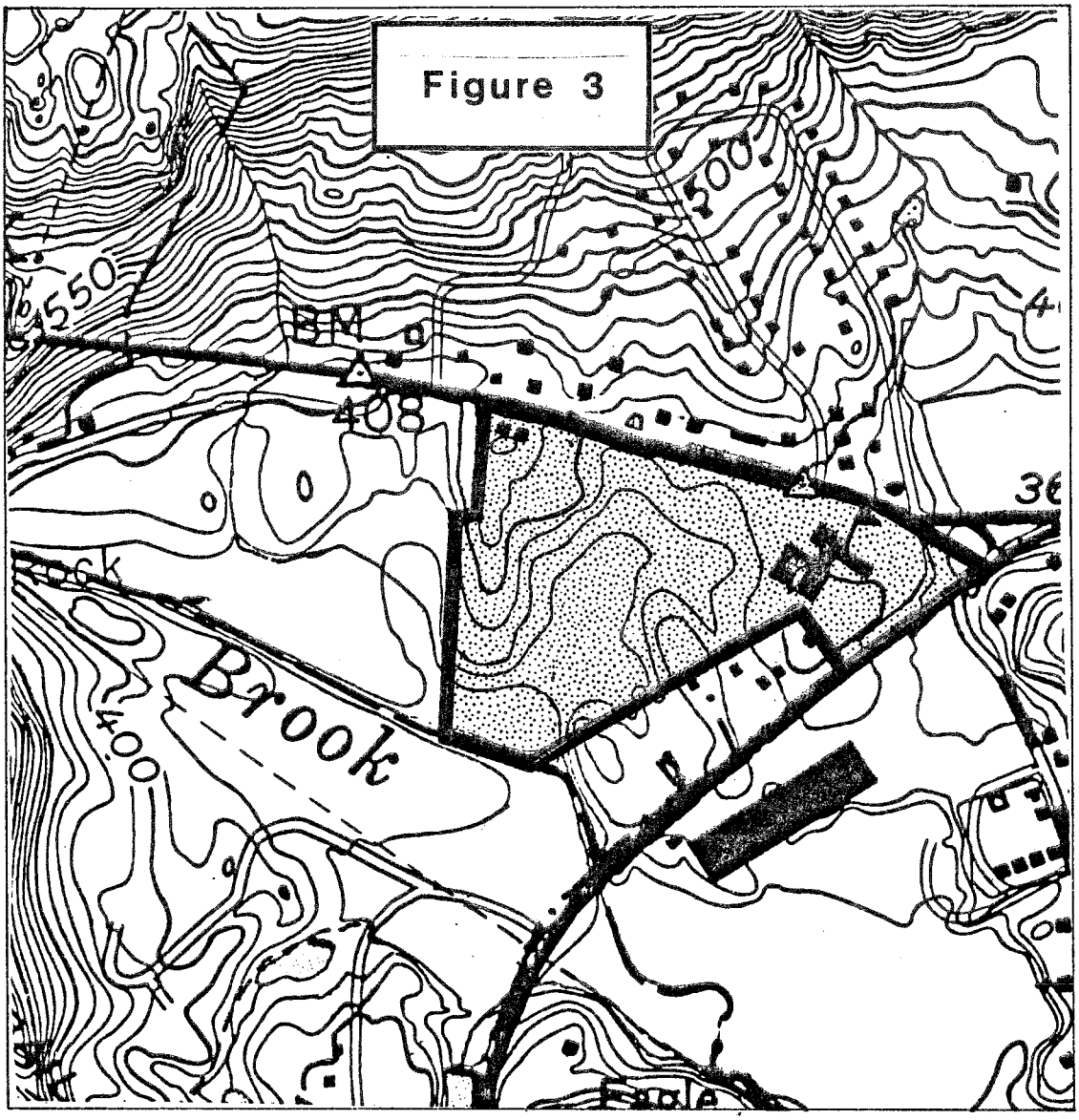
Elevations on the site range between about 390 feet and 370 feet above mean sea level.

Bedrock Geology

The proposed outdoor science laboratory is located within the Thomaston topographic quadrangle. A bedrock geologic map for the quadrangle has not been published for the quadrangle. As a result, the Team's geologist relied on John Rodger's Bedrock Geological Map of Connecticut (1985) for the purpose of this report.

The site lies within the Western Highlands Physiographic region of Connecticut. This region of the State, like the Eastern Highland physiographic region of Connecticut is underlain primarily by very old, crystalline, metamorphic rocks. Metamorphic rocks are rocks that have been geologically altered by great heat and pressure within the earth's crust. In contrast with the Eastern and Western Highlands, the central parts of Connecticut are underlain by much younger (i.e., less than 250 million years old) bedrock. For example, igneous rocks, formed by molten magma and sedimentary materials such as sandstone and conglomerates were created by the deposition and cementation of eroded material derived from igneous, metamorphic or other sedimentary materials.

Bedrock does not appear to break ground surface on the parcel. However, it was exposed near the high school probably during construction phases. Rodgers identifies the rocks underlying the site as the Collinsville Formation (Figure 4). He describes these rocks as a mixture of rocks which includes gray and silvery, medium- to coarse-grained schist, dark, fine- to medium-grained amphibolite and hornblende gneiss. The material which formed these rocks probably consisted of deep ocean sediments and volcanic material deposited during the Ordovician geologic period, approximately 438 to



OUTDOOR NATURAL SCIENCE LAB

THOMASTON, CONNECTICUT

TOPOGRAPHY

King's Mark Environmental Review Team

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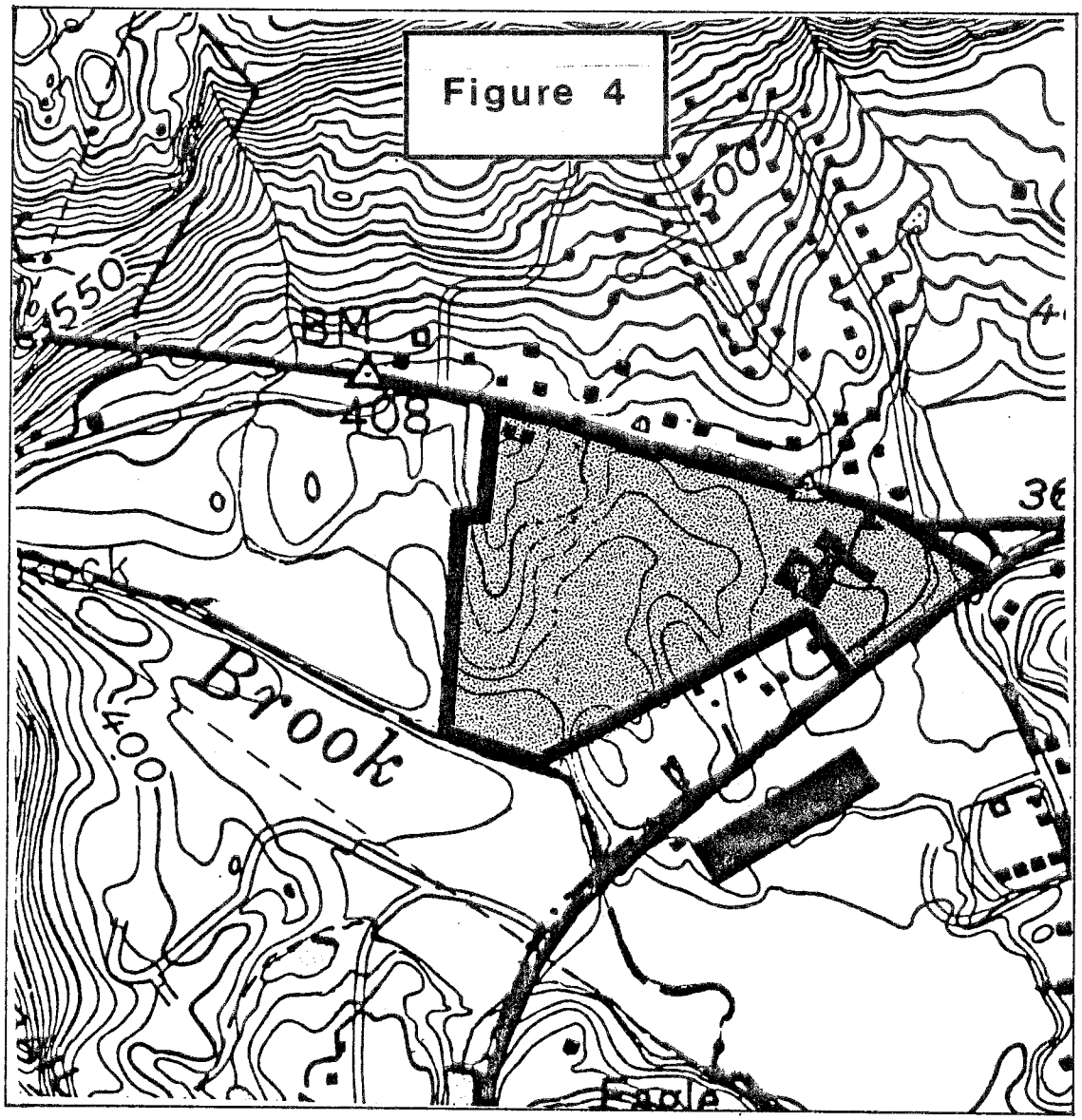

COLLINSVILLE FORMATION
(Rodgers, 1985)

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THOMASTON, CONNECTICUT

BEDROCK GEOLOGY

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505 million years ago. Common minerals in the Formation include quartz, feldspar, and micas (i.e., biotite and muscovite). These minerals and others are visible in the chunks of blasted rock which were placed on the wetland area of the proposed outdoor classroom. Close examination of the boulders within this area may yield the above minerals for ambitious rock-hounds.

"Schist" is a rock in which flaky, platy or elongate minerals have become aligned due to metamorphic processes to form surfaces of relatively easy parting. The term "amphibolite" refers to a rock which is dominated by the mineral hornblende, in the amphibole group. Finally, a "gneiss" is a rock in which light colored granular minerals alternate with dark colored platy or elongated minerals. This mineral arrangement commonly gives the rock a banded appearance.

Each of the above rock types may grade into on another in a single outcrop.

Depth to bedrock on the site ranges between 10 feet and 40 feet and appears to be thickest in the southcentral parts.

Surficial Geology

The surficial geology of the site refers to those unconsolidated mineral and organic materials overlying bedrock. The surficial geologic map (GQ 984) for the quadrangle has been mapped by Charles R. Warren and published by the U.S. Geological Survey.

Bedrock throughout the study area is covered by a glacial sediment called stratified drift (Figure 5). As elsewhere in the State, glacial ice covered the project area approximately 10,000 to 12,000 years ago during the Wisconsin stage of glaciation. When ice

blocks situated in the Naugatuck River Valley began to melt, it created streams of meltwater, often with torrential flows. These streams were filled with rock debris collected from the ice, and the debris was redeposited in well-sorted to poorly-sorted layers. Sand and gravel were commonly deposited near the ice, while fine-grained materials such as silt and clay were washed further downstream to be deposited in glacial lakes or into Long Island Sound. The resulting deposits are known as stratified drift.

As mentioned earlier, the stratified drift in the study area has been quarried in the past. The type of stratified drift found on most of the site consists of sand and pebble sized sediments, generally with scattered boulders. Hence, the sediments were probably deposited in a generally quiet environment such as a temporary glacial lake.

Postglacial sediments, comprising primarily of regulated inland wetland soils overlie stratified drift throughout most of inland wetland soils. These soils, designated as Bz (Birdsall silt loam), form irregular-shaped pockets throughout the study site.

Inland wetland areas perform some very important hydrological and ecological functions. The following are a few of these important functions:

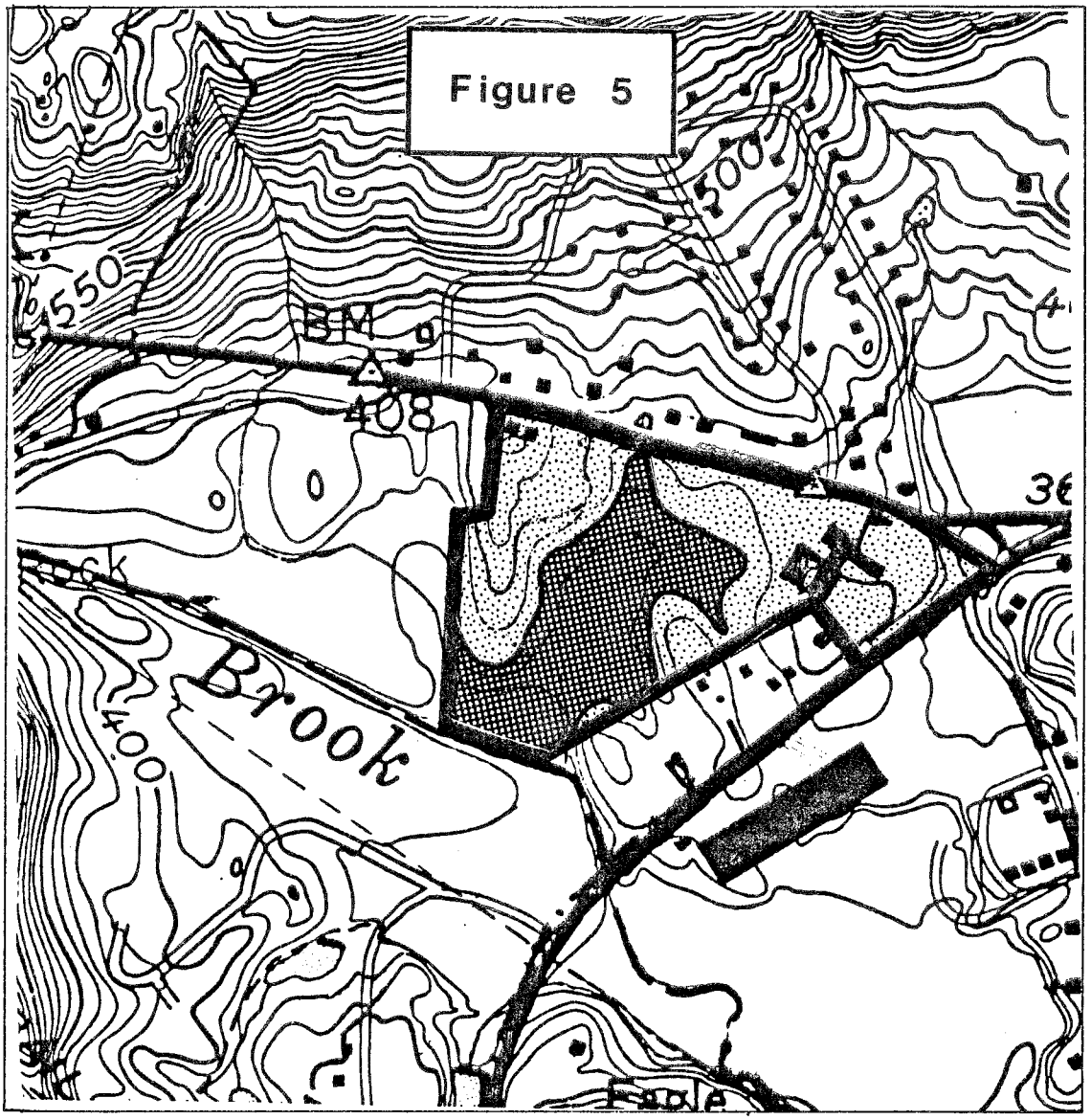
(1) Wetlands serve as a flood and stormwater retention areas, thus reducing downstream flood flows during periods of heavy rainfall;

(2) Wetlands improve surface water quality through various biochemical processes;

(3) Wetlands trap sediments from upstream areas;

(4) Wetlands forms natural floodways that convey flood waters from upstream to downstream points, and;

(5) Wetlands provide important wildlife habitat.



STRATIFIED DRIFT DEPOSITS

REGULATED INLAND-WETLAND SOIL*

*Based on Soil Survey for Litchfield County

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THOMASTON, CONNECTICUT

SURFICIAL GEOLOGY

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For these reasons, it is encouraged that disturbance of wetlands and floodplain soils be avoided or minimized if possible during the development of this outdoor classroom.

Hydrology

Most of the study area drains into the unnamed tributary to Branch Brook which flows through the site. Branch Brook is a very attractive natural feature. This area would not only be favorable for educational purposes, but could also be used for passive recreational uses such as hiking, picnicking, and fishing. Runoff from the remaining portions of the parcel flows directly into Branch Brook. Branch Brook ultimately flows into the Naugatuck River southeast of parcel. At the point where the unnamed tributary empties into Branch Brook, it drains a watershed area of about 193 acres or 0.3 square miles (Figure 6).

Precipitation falling on the parcel will be quickly absorbed by the permeable soils covering the site. It will percolate downward until it reaches the groundwater table. Once it reaches the groundwater table, it moves by the force of gravity towards discharge zones, such as streams, springs, wetlands, or panels. Groundwater movement on the site is probably southward towards Branch Brook.

According to the map entitled Groundwater Availability in Connecticut by Daniel B. Meade (1978), the stratified drift deposits overlying bedrock mainly in the southcentral parts of the site are generally capable of providing high yields (i.e, 50 to 2,000) gallons of water per minute. The potential of the stratified drift deposits on the site as a groundwater supply source will depend upon the

texture and thickness of the deposits, the proximity to streams and the size of those streams, as well as other hydrogeologic factors.

The metamorphic bedrock underlying the parcel is also a groundwater supply source. Although they are not prolific aquifers, bedrock wells are generally capable of yielding usable quantities, usually 2 to 5 gallons per minute of water to a well. An aquifer may be defined as any geologic formation which is capable of supplying water in a usable quantity to a well or spring.

Groundwater in the metamorphic rock underlying the site occurs mainly along fractures or in cracks. The amount and natural quality of water obtained from a bedrock well depend upon the number and size of water bearing fractures that the well intersects, and on the mineralogy of the rock formations through which the fractures pass. Most wells drilled in bedrock can achieve substainable yields of 3 gallons per minute or more without drilling more than 300 feet of rock.

Groundwater in the area is classified by the DEP as GA, which means that it may be suitable for public or private drinking water supplies without treatment.

Flood Hazard Areas

A flood boundary and floodway map for the Town of Thomaston has been prepared by the Federal Emergency Management Agency (FEMA). The maps identify areas in Thomaston that are subject to flooding during a "100-year flood" or "500-year flood." A 100-year flood is a

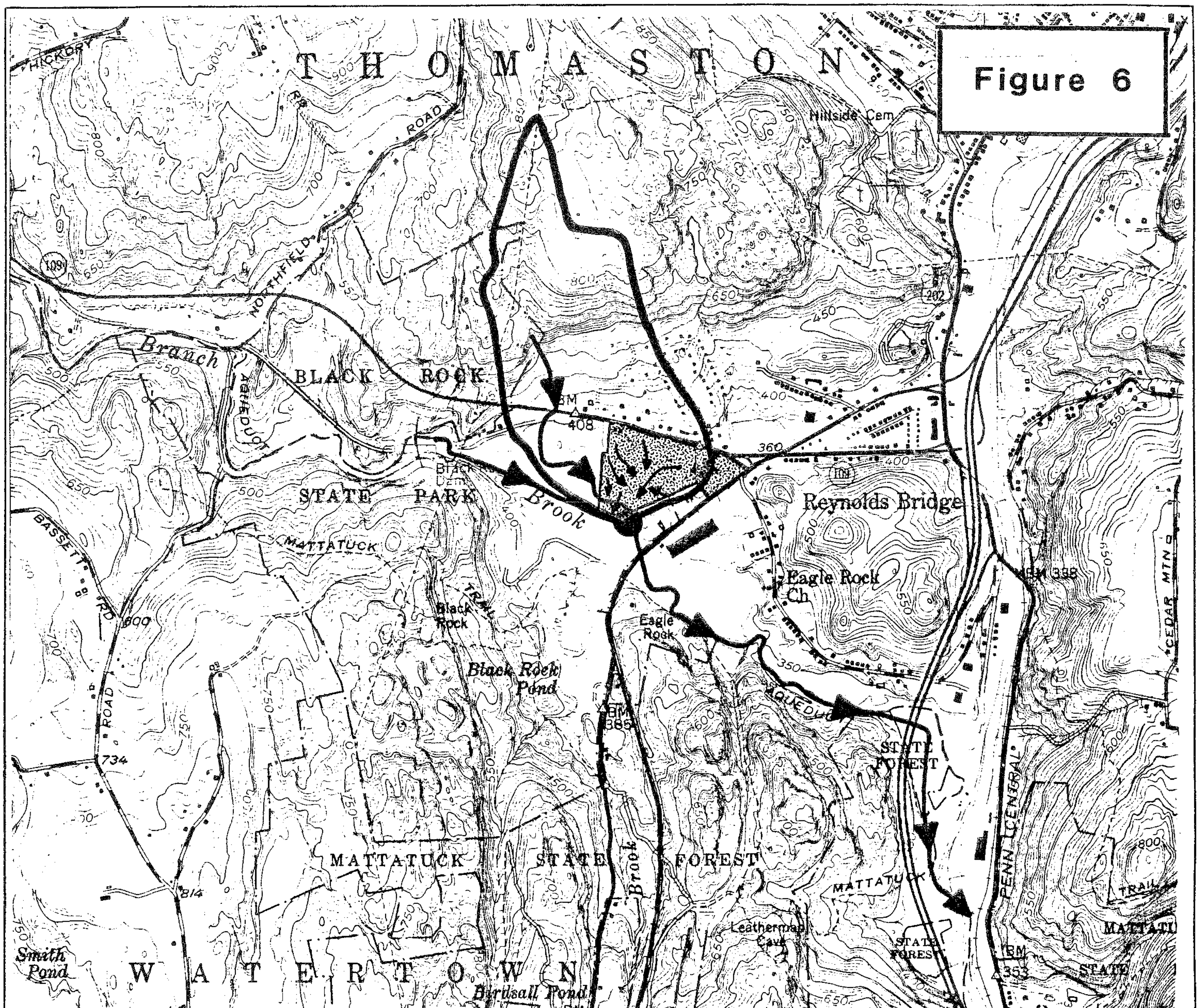

Figure 6

STUDY AREA

WATERSHED BOUNDARY FOR THE UNNAMED TRIBUTARY TO BRANCH BROOK WHICH FLOWS THROUGH THE STUDY AREA AND ITS RESPECTIVE POINT OF OUTFLOW

WATERCOURSES, SHOWING DIRECTION OF FLOW

DIRECTION OF SURFACE RUNOFF

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THOMASTON, CONNECTICUT

WATERSHED BOUNDARY

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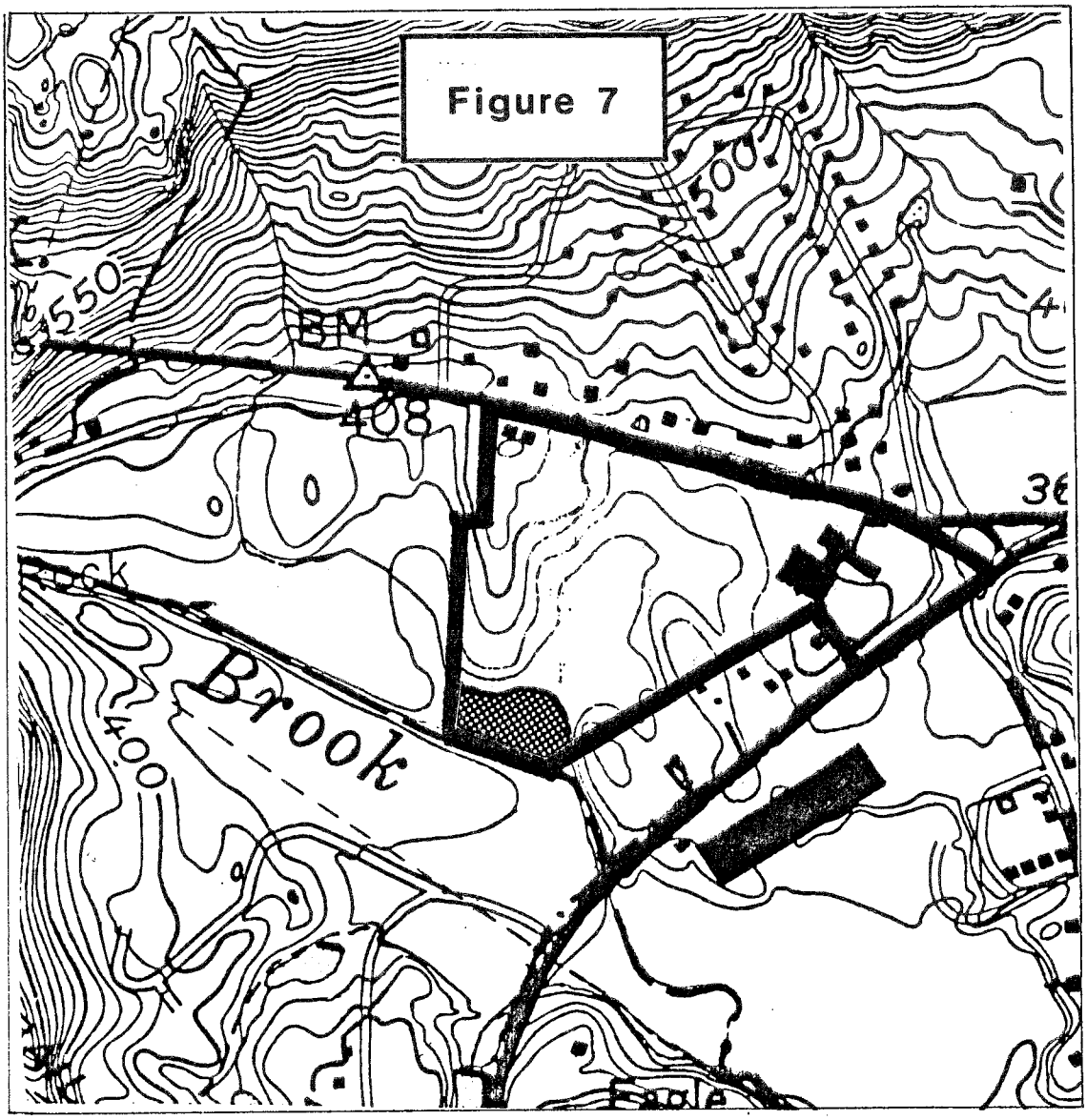
flood with a one chance in a 100 or a one percent chance that it will happen in any year. A 500-year flood has a one chance in 500 or a 0.2 percent chance that it will happen in any year. It should be pointed out that this does not mean a flood of the magnitudes mentioned above will occur only once in a 100 or 500 year period. The probability of occurrences remains the same each year regardless of what happened the previous year.

According to the map, the 100-year flood boundary does not infringe upon the property. However, the 500-year flood boundary covers the southern parts of the site (Figure 7).

There may be swampy or topographic depressions within the site subject to wetness and perhaps flooding during periods of particularly heavy rain.

The generally flat topography in the floodplain makes the area very effective in storing water during periods of flooding. The flatness maximizes the available flood storage volume, while existing floodplain or wetland vegetation reduces flow velocities. For these reasons, filling in of floodplains or wetlands paralleling the streamcourse on the site and Branch Brook should be avoided if at all possible under any development scheme.



500 YEAR FLOOD BOUNDARY*
(approximate)

*adapted from Flood Boundary and Floodway Map for Thomaston, CT by the Federal Emergency Management Agency

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FLOOD BOUNDARY

King's Mark Environmental Review Team

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Soils

What Is Soil?

All soils were once part of rocks. Soils were formed, and are continually being formed by the dissolving and disintegration of rocks by abrasive action as the particles move against each other in flowing water, moving ice, wind, or falling downslope. Changes in temperature such as the warming and freezing of soils also contribute to the formation of soils. The small, loose rock particles that result from the grinding and temperature action become a "parent material" mass in which soils may begin to develop. The continued formation and shifting of the parent material has occurred over tens of thousands of years. With time and the addition of organic matter and various other changes, this mineral mass becomes soil we see today.

Since soils are extremely variable, distinguishable layers of soil have formed into distinct "soil horizons." Depending on geographic location and exposure time, different areas will have different soil horizons. The horizons may be of many kinds such as layers of organic matter accumulation on the soil surface, accumulations of clay in subsoil layers, or deposits of lime or salts in subsoils. Most soil horizons are noticeable because they differ from other soil layers or clay content color, amount of organic material, or kinds and amounts of various salts.

A typical soil horizon has five distinct layers. They are: (1) the "O" horizon; (2) the "A" horizon; (3) the "B" horizon; (4) the "C" horizon, and; (5) the underlying rock, or "R" horizon (Figure 8).

The "O" or "organic" horizon consists of 20 to 30 percent of organic matter, such as identifiable leaves, needles, stems and roots. The "O" horizon occurs on the soil surface as the top layer. The "O" horizon is further developed if decomposition of vegetative matter is extensive enough that the original form of most material cannot be recognized.

The "A" horizon is the top mineral horizon and darkened somewhat by organic matter. This horizon is located directly below the organic soil layer.

The "B" horizon is a deeper mineral horizon beneath the "A" horizon, where small particles have washed through the "A" horizon and accumulated in the "B" horizon.

The loose parent material lacking horizon development is referred to as the "C" horizon. It is immediately below the "B" horizon and above the "R" horizon, which consists of underlying consolidated rock.

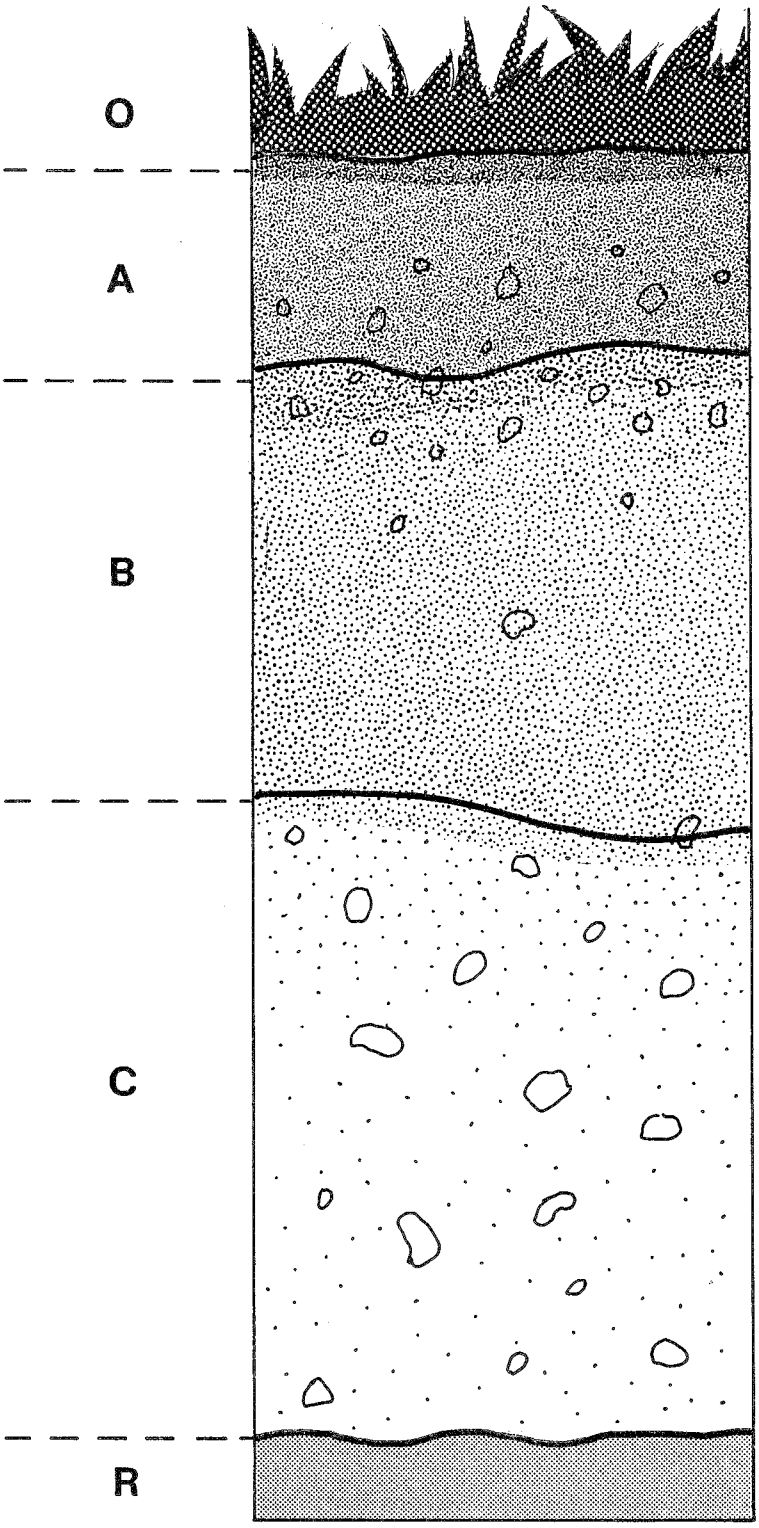
Types of Soils Occurring on the Site

Three soil types occur on the study site. They are: (1) Bk - Borrow and Fill Land, coarse material; (2) Bz - Birdsall, silt loam, and; (3) HkC - Hinckley, gravelly sandy loam on 3 to 15 percent slopes (Figure 9).

Borrow and Fill Land consists of areas where the original soil has been disturbed or removed during construction or quarrying activities. This soil area is generally composed of coarse material as well as borrow areas or cut and fill material over sand and gravel or coarse glacial till. The soil horizons above the underlying

SOIL PROFILE

Figure 8



material have been disturbed or removed.

Birdsall (Bz) soil map unit are level or slightly depressed non-acid, very poorly drained soils that developed in waterlaid or windblown deposits of silt and very fine sand. These soils occupy small areas in the valleys and to a limited extent, the upland areas. They have a water table at or near the surface in winter and spring. Runoff of precipitation is slow.

Though not important agricultural soils, Birdsall soils provide suitable areas for either woodland and wetland wildlife habitat. These soils are also regulated inland wetland soils.

The third soil type found in the study area is referred to as Hinckley (HkC) gravelly, sandy loam soils. Hinckley soils are nearly level to undulating and rolling, and excessively drained and droughty. They developed in deep pockets of stratified sand and gravel that were derived mainly from granite, gneiss, and schist.

These soils occupy slopes of 3 to 15 percent and are widely scattered through the river valleys of Litchfield County. Slopes are usually broken and irregular. Hinckley soils are droughty, rapidly permeable, and have low available moisture capacity.

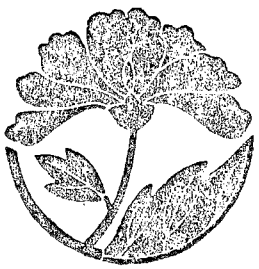
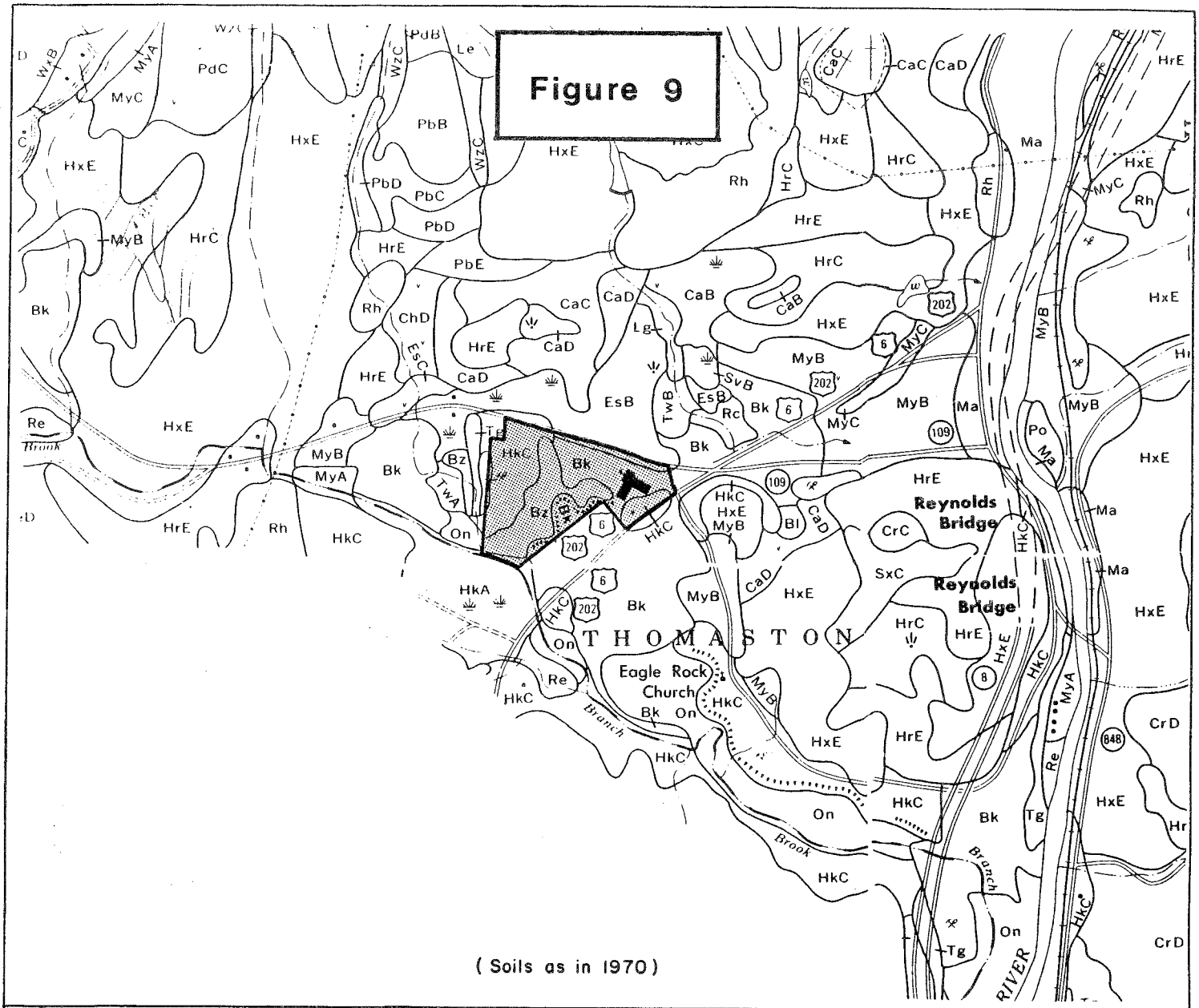


Figure 9



(Soils as in 1970)

Bk BORROW AND FILL LAND, COARSE MATERIAL

Bz BIRDSALL SILT LOAM

HkC HINCKLEY GRAVELLY SANDY LOAM, 3 TO 15% SLOPES

OUTDOOR NATURAL SCIENCE LAB

THOMASTON, CONNECTICUT

DISTRIBUTION OF SOILS

King's Mark Environmental Review Team

0 1320'

N

BIOTA

Forests

Introduction

The vegetation occuping the site is dictated by either past management of the site or by the presence or lack of moisture. There are three distinct areas of vegetation. These are described in more detail under the heading Vegetative Type Descriptions. About half of the area is wooded, one-quarter open, in a borrow situation, and one-quarter would be considered a wetland or swamp.

In a commercial sense, there is little or no value in the wood present. The area displays other amenities which have already been discussed in this report such as wildlife habitat, fisheries protection, stormwater retention, and aesthetics.

Vegetative Type Descriptions

Borrow (I)

This is a borrow or fill area probably left over from site construction of the school. Vegetation is scarce and only a few of the hardiest plants can survive the poorest of growing conditions (Figure 10).

Mixed Hardwood (IIa)

This area is dominated by the maples. Red maple persists in the overstory along with scattered cherry and occasional other hardwood. The understory is made up of scattered red and sugar maple along with a variety of brambles, spicebush, viburnums, and dogwoods. The

stocking of the overstory is erratic but generally is low (see Figure 10). There is a small pocket of hemlock between this area and wetland/swamp area (III).

Mixed Hardwood (IIb)

This hardwood area is also dominated by red maple. Stocking here is adequate to high. The dominate trees are 6 to 10 inches dbh (diameter at breast height). This area is slightly drier than IIa, hence the ground cover is made up of a different plant community (see Figure 10).

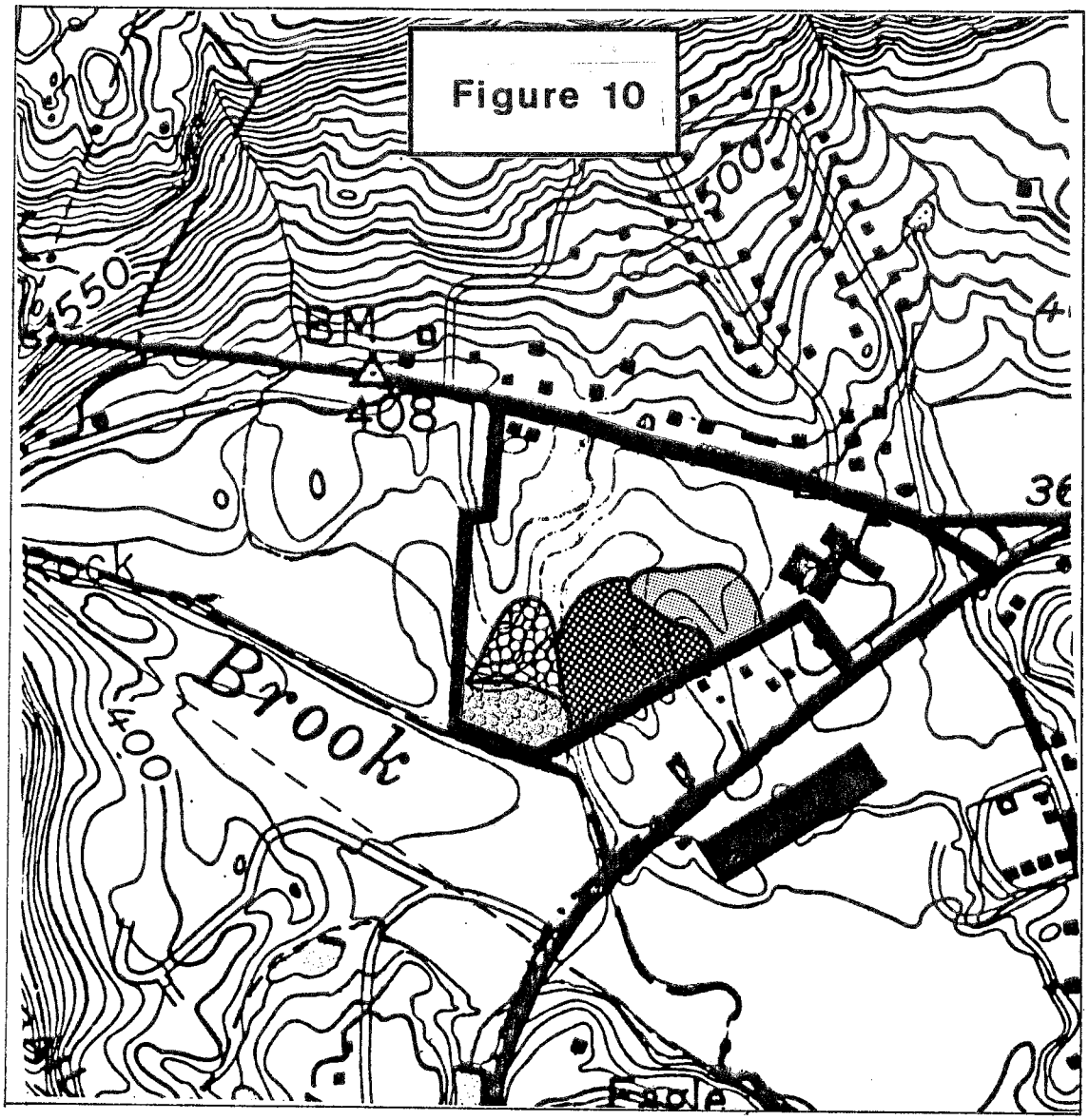
Wetland/Swamp (III)

This is an extremely wet area. It is practically inpenetrable due to thick "brush" and very wet conditions (see Figure 10).

An Environmental Education Program

A common response to educating people about the value of our woodlands is to make a list of wood products we use from the forest, emphasizing how much we depend on our forests for many products. Many times this application can drive home the point but may leave the impression that every tree should be grown for wood products such as 2 x 4's.

Another approach is a forest appreciation approach. This is where the value of the forest is evaluated. Wood products are looked at as essential but the need for our forestlands to provide soil stabilization, water conservation, wildlife habitat, clean and cool air, or scenery should be stressed to students.



BORROW AND FILL AREA (I)

MIXED HARDWOOD (IIa)

MIXED HARDWOOD (IIb)

WETLAND/SWAMP (III)

OUTDOOR NATURAL SCIENCE LAB

THOMASTON, CONNECTICUT

DISTRIBUTION OF VEGETATION

King's Mark Environmental Review Team

0 660'

N

Historical development of our woodlands can be viewed as past management activities. The fact that most of our forests were cleared at one time or other is often not known. Many people are under the impression that the forests have always been here and always look as they do now. The past history and an ever changing landscape can be interesting and enlightening.

Interesting programs centered on broad questions can be a good learning experience. How did these trees get here? Why is this particular species here? This can lead into concepts of ecological succession, forest soils, moisture, forest regeneration requirements and past management activities.

Wildlife

Wildlife Habitats

The proposed outdoor natural science laboratory site may be divided into three wildlife habitat types. These are: (1) mixed hardwood forest; (2) open field, and; (3) wetlands.

Mixed Hardwoods

This wildlife habitat type consists of a variety of hardwoood species including red maple, sugar maple, cherry, elm, ash, and red oak. There are pockets of aspen and hemlock along with scattered cedar and apple. Understory vegetation consists of blackberry, raspberry, elderberry, sumac, autumn olive, ash seedlings, morning glory, purple vetch, grape, Virginia creeper, poison ivy, virgin's bower, arrowwood, yellow sweet clover, deptford pink, false Solomon,

jack-in-the-pulpit, and winterberry.

Wildlife species typically utilizing such habitat include white-tailed deer, turkey, grouse, gray squirrels, flying squirrels, and numerous non-game species such as owls, accipiters, red-tailed hawks, common yellow throat, chipmunks, and a great variety of passerines.

Openland

This wildlife habitat type consists of one reverting field dominated by autumn olive. Other species include clover, lillies, sumac and various herbaceous species. Much of the site consists of stony, bare ground.

Wildlife frequenting such sites include killdeer, song sparrows, kingbirds, and numerous other non-game species.

Wetland/Swamp

The wetland/swamp wildlife habitat consists of small scattered bodies of open water along with seasonally flooded red maple. Vegetation within these areas include red maple, willow, alder, birch, dogwood, cottonwood, cattail, skunk cabbage, spirea, multiflora rose, tussock sedge, jewelweed, duckweek and sedges.

Wildlife species utilizing such habitat include white-tailed deer, woodcock, raccoon, skunk, mink, woodpeckers, passerines and various amphibians and reptiles. When flooded, forested wetlands provide suitable habitat for woodducks.

Discussion

Since Connecticut is a densely populated and growing state, available wildlife habitat continues to decline. It is therefore critical to maintain and enhance existing wildlife habitat. The following practices will help to improve conditions within the various habitat types as well as provide a basis for environmental education.

Forest Guidelines

* Create a diversity of habitat by making small irregularly shaped openings (1/4 to 1 acre) in an east to west direction (to obtain maximum sunlight). This will encourage fruit producing shrubs valuable to many types of wildlife. Edges of openings should be feathered (gradually blended into the forest type).

* Pile brush along edges of openings for small mammals and birds.

* Maintain 5 to 7 snag trees per acre since they provide nesting and escape cover.

* Encourage the release and expansion of aspen clumps; the buds are a preferred food of ruffed grouse.

* Release, prune, and fertilize existing apple trees.

* If a timber harvest is planned, these practices should be followed to improve wildlife habitat:

    a. Encourage mast producing species (oak, hickory, beech);
    b. Leave 5 to 7 snags per acre;
    c. Exceptionally tall trees are utilized by raptors for nesting and perching and should be encouraged;
    d. Trees with vines (berry producers) should be encouraged;
    e. Create small openings with feathered edges;
    f. Construct small brush piles;
    g. Release aspen clumps;
    h. Release apple trees.

Wetland/Swamp Guidelines

* Leave buffer strips (100 feet) of natural vegetation along wetland areas to help filter and trap silt and sediments which might otherwise reach the site.

* The wetland site could have potholes (small open water areas) to create permanent year round water for wildlife.

Openland Guidelines

* Bluebird boxes should be erected at field edges.

* Mow every 3 to 5 years to maintain early successional stage vegetation.

* Maintain a shrub component (i.e., autumn olive, sumac), while minimizing the total shading out of a diversified understory.

Environmental Education Opportunities

A trail system along with an accompanying informational pamphlet could be developed. If any of the wildlife management guidelines are carried out, they should be added to the pamphlet (i.e., small openings, brush piles, aspen releases, bluebird boxes). Discussion could focus on vegetation succession and its importance in wildlife management. The trail could also use brushing back 10 to 20 feet to create a feathered edge.

Habitat development projects could also be used to provide excellent educational benefits for youth groups. A few are described below:

* Install bluebird boxes along with cataloging yearly nest box results.

* Numerous studies to document wildlife diversity and abundance according to habitat types such as: (1) bird transects; (2) live trapping small mammals; (3) amphibian and reptile sampling, and; (4) vegetation transects and photographic plots.

* Have youth groups do some aspen releases, trail clearing, construction of brush piles, or placement of bird houses.

Fisheries

Introduction

The area to be used for the outdoor natural science laboratory is very fortunate in that it has an excellent diversity of aquatic habitat in such a small area. The fact that both lentic (i.e., standing waters - lakes, ponds, bogs) and lotic (i.e., running waters - streams, rivers) ecosystems exist side-by-side greatly enhances the usefulness of the area as a teaching environment and lend it to conducting both contrast and comparison studies of the aquatic environment.

Fish Habitat and Populations

Branch Brook can be considered suitable trout habitat throughout. Most of this area of the river consists of short shallow riffles and pools. The substrate appears to consist of gravel and cobble with instream boulders providing "holding" areas for trout. The DEP has been stocking brook trout and brown trout throughout this entire stretch and public access is excellent. Other fish species that would likely inhabit this area are white suckers, fallfish, longnose dace, blacknose dace, common shiner, and tesselated darters. This part of the river may serve as a breeding (in spring) and nursery (in summer) area for white suckers and fallfish moving up from further downstream.

Largemouth bass were observed spawning in the ponds adjacent to the brook during the field review. Along with white suckers and common shiners other expected species would be bluegill sunfish,

pumpkinseed sunfish, rock bass, and possibly carp.

Environmental Education Activities

Other activities besides those previously discussed might be a comparison and/or contrast of the different ecosystems and their aquatic organisms. Some animals to look for and possible topics might be fish, how are they important in the food chain (predator-prey relationships); their body form, how it is suited for their particular habitat or mode of feedings; amphibians such as frogs, salamanders, toads, etc.; reptiles such as turtles, and water snakes; aquatic insects and anything else associated with the aquatic environment. The physical and chemical limnology of the lake and pond could be investigated for such things as the concentration of dissolved oxygen and pH, and the phytoplankton and zooplankton could be sampled. Also, a miniature environ could be established in a classroom using an aquarium and organisms actually collected in the field. Some of these activities could also be tied into discussions on current topics in science and politics such as acid rain and pollution.

The following two inexpensive books make excellent references:

Reid, George K. Pond Life - A Guide to Common Plants and Animals of North American Ponds and Lakes. New York: Golden Press (Library of Congress #67-16477).

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APPENDIX A

SOURCE GUIDE FOR ENVIRONMENTAL INTERPRETATION

SOURCE GUIDES AND BIBLIOGRAPHIES

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2. Bachert, Russel E., Jr., Environmental and Outdoor Education Materials, Environmental and Outdoor Education Materials Company, Dowling, Michigan, 1973.

3. Brown, William E., Islands of Hope, National Recreation and Park Association, Arlington, Virginia, 1971.

4. Carvajal, John; Munzer, Martha E., Conservation Education - A Selected Bibliography, Interstate Printers and Publishers, Inc., Danville, Illinois, 1968.

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1. "Travertine Nature Center/Platt National Park, Environmental Film List," Sulphur, Oklahoma, 1971.

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1. Neal, Arminta, Help For The Small Museum, Pruett Press, Boulder, Colorado, 1969.

2. National Recreation and Park Association, Grist, Trends, Guidelines, Design, Park Practice Program, Arlington, Virginia.

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2. Shomon, Joseph J., A Nature Center for Your Community, National Audubon Society, Nature Centers Division, New York, New York, 1962.

3. Edwards, R. Yorke, "On Planning and Building a Nature Interpretation Centre," Canadian Wildlife Service, Ottawa, Canada, 1972.

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2. Van Matre, Steve, Acclimatization, American Camping Association, Martinsville, Indiana, 1972.

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3. United States Forest Service, Conservation Tools for Educators Putting Conservation to Work, Pacific Northwest Region, Portland, Oregon, 1968.

4. Dasman, Raymond F., Environmental Conservation, Wiley Publishing Company, New York, New York, 1968.

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3. Western Interpreters Association, Coyote Hills Regional Park, 8000 Patterson Ranch Road, Fremont, California, "The Interpreter," Zink, Robert C. (ed.).

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APPENDIX B

LIST OF ENVIRONMENTAL EDUCATION ACTIVITIES

Environment - Woodland/Wetland

Features
Soils, various tree and shrub species, existing trails, plant succession, rocks, wildlife/habitat, ground covers

Potential Learning Experiences/Projects
Soil studies/
PH; texture; infiltration
Erosion
Suitability and limitations for various land uses
Establish sample forest management plot
Tree and shrub identification
How a tree grows, uses
Increment borings
Determining tree height
Board feet, cords of wood
Leaf collections
Plant Succession
Plant communities
Forest/fire protection
Animal tracks/
Identification vs ex. habitat vs habitat needs
Predators
Game laws
Bird houses
Bird counts

Wetland/Marsh

Features
Soils, various wetland vegetation, man's encroachment, wildlife/habitat

Potential Learning Experiences/Projects
Pond or ponds
Deep water for fish
Shallow to attract waterfowl
Wetland vegetation identification
Values of wetlands
Soil studies vs woodland soils
Water samples and testing
Pond vs stream water collection
Organism collecting and study
Wildlife inventory and identification
Plant succession in a pond or marsh

Stream

Features
Water, aquatic life, stream flow variations

Potential Learning Experiences/Projects
Collect and study of aquatic insects, salamanders, etc. found in water
Test water for various qualities
Measure stream flows before and after rainfalls
Determine stream capacity
Erosion control on streambanks
Discuss adverse actions by man effecting streams
What is a watershed and effects on water (quality and quantity)
Sediment yield
The water cycle

Playfields/Grassland

Features
Soils, altered soils.

Potential Learning Experiences/Projects
Soils and management for grasses (pH, fertilization, adapted grass mixes vs uses)
Grass and weed identification
Weed control
Rainfall runoff vs woodland vs impervious areas
% slope measurements
Soil erosion vs bare soil areas

Parking areas, Buildings

Features
Impervious areas, dimensions, paving lines and patterns

Potential Learning Experiences/Projects
Runoff calculations vs grass areas vs woodland
Area calculations
Geometric calculations

Environmental Education List
Prepared by the Litchfield
County Conservation District

DIRT FOLDER

SOIL TEACHING PACKET

GRADES K-6

Fifi Scoufopoulos
Windham County Soil and Water
Conservation District
Brooklyn, Connecticut
in Cooperation with the
Soil Conservation Service
Storrs, Connecticut

1984

ACKNOWLEDGEMENTS

In 1983, the Windham County, Connecticut, Soil and Water Conservation District, in cooperation with the Soil Conservation Service, participated in an environmental education program conducted for elementary school students in the 15 town District area. The purpose of the cooperative agreement was to help strengthen and broaden the soils and conservation education aspects of the program.

The idea for this packet evolved from the District's involvement with the Ragged Hill Woods 4-H Environmental Program. "DIRT FOLDER" is composed of lessons and procedures tested in the field. It has been compiled for use as an education aid to teachers.

Dear Teacher:

This soil education packet contains lessons that are easy to use, effective and fun to do. You can teach your class basic information about soils and integrate this material with your other subjects.

Included are:

- a soils fact sheet
- seven lesson plans
- an idea expander
- a bibliography for additional references

The lessons require only a few simple materials, no special training is needed to teach them, and they are adaptable for several grades. They have been successfully used by the Windham County Conservation District with grades 1-6. Won't you try them and add your own special touch?

Please reproduce and distribute this folder at your pleasure.

SOILS FACT SHEET

Soil is a "natural body of the earth's surface having properties due to the integrated effect of climate and living matter (plants and animals) acting upon parent material, as conditioned by relief (slope), over periods of time."

Soil importance to man: produces food, fiber, shelter, fuel
provides surface for building, transporting, walking

Soil composition:
(1) mineral matter (from rocks and weathering)(45%)
(2) organic matter (dead and living plant and animal material)(5%)
(3) air (25%)
(4) water (25%)

Soils are combinations of sand, silt and clay particles classified by size:

(a) Sand - large, gritty, minerals resistant to weathering (i.e. quartz)
(b) Silt - smooth, much smaller size, slightly slippery, fine textured
(c) Clay - smallest size, particles very porous and hold water, slippery, sticky, extremely active chemically. Clay test: Hold a moist ball of soil in your hand. Squeeze and try to form a flat ribbon of soil between your thumb and finger.

Soil is a dynamic medium which has evolved over time and continues to do so. Physical, chemical and biological processes work to break down parent material (from original rock) into soil. Weather forces, lichen and other plant excretions and animal activities all play a role in transforming mineral and organic matter into soil. In the northern states, glacial activities had a major influence on soil development and topography.

There are thousands of different kinds of soil. Factors which cause soils to differ from each other include color, texture (sand, silt, clay), stoniness, wetness, slope, amount of organic matter, and soil permeability.

Over time, soil forms layers (horizons) in the following broad categories:

TOPSOIL - organic matter is concentrated here, very important to plant growth, dark, nicely textured.
SUBSOIL - below topsoil horizon, has accumulated elements from above layer with minor amounts of organic matter.
PARENT MATERIAL - unconsolidated rock material in lower horizon.
BEDROCK - solid rock.

Nature takes up to 500 years or more to make 1 inch of topsoil. Organic matter, in decomposing, forms HUMUS - a stable and long lasting material. Humus improves the soil by improving aeration and improving water and nutrient retention capacity.

The elements necessary for plant growth, such as nitrogen, phosphorus and potassium, are released from decomposing matter and dissolving minerals. The nutrients available depend, in part, on the composition of the parent material.

SOIL DETECTIVE GAME

Can we live without dirt? Stop and think for a moment. What did you have for breakfast this morning? Where did it come from? If you trace it back far enough you'll find that no matter what you had for breakfast, it started with a green plant growing in soil.

Soil is a complex mixture of minerals, organic plant and animal remains, air and water. It is the home for many living organisms, which play an important role in breaking down the organic material.

Rocks provide the minerals. The combined effects of heating, freezing, wind and water slowly break rocks down into small particles.

SOIL SLEUTH WORD SCRAMBLE: Circle the following eleven words in this block of letters. They may be located vertically, horizontally, diagonally or backwards. Once you have found all the words, place the leftover letters on the blanks below, in the order that you find them in the block. What's the secret message?

S O L A R E N I M O

I R L W E A T H E R

E R O S I O N E A G

N I M C P O N A R A

T A N T K I I T R N

N G R E H S L I E I

D I E S N I T N T C

I N N A O N Y G A R

E U C S I D N I W P

S E G N I Z E E R F

EROSION
FREEZING
HEATING
MINERAL
ORGANIC
ROCKS
SOIL
SUNSHINE
WATER
WEATHER
WIND

Secret message:

_____: __ _____

_____ __ ___ _____

By Sandy Tosi

Grade K-6
10 + minutes

DID YOU EVER EAT A PINE TREE?

Objective: Students will be able to state the importance of the forest and other plant communities as a source of food for humans and other animals.

Activity: Invite your class to brainstorm a list of foods people eat. (Don't forget to include water!) Then discuss:

Which of these foods comes from plants?
Which of these foods comes from animals?
What do the animals who give us food eat? Where does the animals' food come from?

Then, ask your students to create a mural or bulletin board display illustrating sources of food. Link the sources, for instance beef/grass, to form a food web. Ask the students to describe the importance of the forest and other plant communities as a source of food for humans and other animals.

Variation: Take your students to a grocery store to look for and then list items which are edible and are derived from forest plants, such as trees and berry bushes. Another way to do this is to ask students to bring from home labels from packages and cans which contained foods from the forest and other plant communities. Use this list, or the labels, as part of a mural or bulletin board. Discuss:

Which food items are used to produce other food items? For example, corn is fed to cattle.
What do most of the animals we eat, eat? (Answer: Plants!)
Where do the plants get their food? (Answer: They make it from soil, water, air, and sunlight.)

Ask the students to bring to class direct evidence that animals use plants for food - for example, leaves chewed by insects. With the students, use these items to create a bulletin board showing what plant products animals, including humans, eat. Discuss with students how animals depend upon plants.

Relate all of food being dependent on soil. Try asking students what is in a lunch box - let's look. Make sure to discuss origins of their own favorites i.e. junk food, coke, candy and the relation to soils.

Vocabulary: food web, herbivore, carnivore, omnivore, photosynthesis, carbohydrate, self-sufficiency, interdependence

Adapted from PLT #50

Grade K-6
20-60 Minutes

SOIL COMPOSITION

Objective: Through examination and recording of observations, make students aware of qualities of and differences in soils.

Materials:
dissecting microscope (optional)
hand lens (nice)
trowels
rock hammer and safety goggles (optional)
measuring stick

Procedure: Students can work in groups. Each group should dig up an area about 5 inches square up to 5 inches deep (depending on age of the student, time and energy). Examine the soil and record observations and measurements. Do <u>different</u> sites if they are available - variables may be moisture, stoniness, vegetation cover, etc. Students should try to determine the role of each component, i.e. rocks → minerals → nutrients; roots → aeration → decay → nutrients; animals → aeration → structure → decay → nutrients.

Students can then attempt to duplicate soil (make it!) by using any natural materials. (Use the rock hammer and goggles for crushing stones.) <u>Emphasize safety</u>.

This activity can be done inside with young children. Ask them to draw a picture of soil and include things that are found in it. Have them bring soil into class and put it on desks. Discuss components, importance, etc. They may wish to add to their pictures afterwards. You may bring more than 1 soil and ask them to compare. Discuss uses. They may wish to combine different soils in varying proportions.

Vocabulary: minerals, organic matter, humus, topsoil, profile, horizons, structure

Grades 2-6
30-60 minutes

CHOCOLATE CHIP COOKIES

Objective: (1) To understand that rocks are composed of mineral ingredients
(2) To understand the forces which create rocks

Materials: Chocolate chip cookies - 1 per child
Recipe card
Hand lenses
Rock collection
Safety goggles
Rock hammer
Rags
Rocks from school grounds

Simple Guide: Rocks & Minerals A Golden Nature Guide by Herbert Zim and Paul Shaffer

Procedure: Discuss how chocolate chip cookies are made - ingredients and steps taken. Examine cookies with a hand lens, looking for each ingredient. Which do we see? Which can't we see? What happened to it? How has the cookie changed since we began making it? What caused the changes? Eat the cookies. Ask how rocks were made. Direct answers and questions to discuss the earth's forces and compare the process and ingredients (minerals) to those of cookies. Explain igneous, sedimentary, and metamorphic to older kids. Look at a rock collection and discuss. Kids love rocks! Go outside, have each student find a rock he or she would like to examine more closely. One at a time children may wrap the rock in cloth, wear safety goggles, and crack it with hammer. Emphasize safety. Then compare rocks with each other and with rocks in the collection. Compare then to mineral components in soil.

Vocabulary: igneous, metamorphic, sedimentary, volcanic

By Ellen Hobby

Grade K-8
30-60 minutes

EROSION LESSON

Objective:

(1) to understand factors influencing and creating soil erosion i.e. water, wind, slope, soil type
(2) to consider methods for controlling and preventing erosion

Materials:

2 shovels or trowels
8 stakes
2 pieces of plastic about 2' x 2' or bigger
2 plastic gallon jugs filled with water
1 large heavy cardboard 2' x 4' (or several small pieces) (optional)

Procedure:

Explain the importance of soil, especially topsoil, for plant growth. Discuss what may happen when you lose topsoil. Cause erosion to occur. Choose two sites - as different as possible in slope and drainage characteristics. Mark off an area about 1' x 1½' with stakes. Dig this up - chewing up and disturbing the soil surface to a maximum. (You may wish to use tools other than a shovel for this job - drag stones, logs, or run kids over and over it to simulate a bulldozer, logging operation, or trail erosion). When the surface is ready, assign two kids to secure the plastic at the lower end of the disturbed site and hold it so as to catch water and soil that will run off. Slowly pour water from a jug at the upper end to simulate rain. Experiment with amounts and intensity of simulated rainfall. Use both jugs. Observe until erosion occurs! Feel and weigh the eroded soil in your hand. Oh how terrible - look at all the soil that eroded! What can we do to prevent this? Get everyone's ideas. Try covering the soil with rocks, grass, sod, leaves, twigs, etc. Repeat the simulated rainfall and collect the runoff. Compare the soil collected this time with the soil collected previously from the rainfall on bare soil. You can also compare results with those from a control plot.

Repeat at a second site. Compare with site one.

Variation:

Create wind erosion using a cardboard to fan the soil or by having kids create a stir.

Vocabulary:

erosion, runoff, slope, drainage, permeability, stabilize, sod, till, mulch

Grades K-6
30-60 minutes

DECOMPOSING LOG

Objectives:
(1) to understand the role of decay in nature
(2) to see the diversity of life
(3) to see natural recycling

Materials:
a rotten log
forceps or tweezers
hand lens (optional)
newspapers (if done indoors!)
glass dishes or covered jars
field guide to insects: Golden Guide (optional)

Procedure:
Go for a walk in the woods or bring a decaying log into the classroom. Discuss what it looked like before (seedling, mature tree, dead standing tree, etc.) and the functions it performed during those stages of growth. Describe its present appearance - plant (fungi, mosses, etc.) and animal life on it. Carefully dissect portions of the log - make the kids aware that you are destroying someone's home - talk about respect for other life forms and the reasons they may exist, services they provide, etc. Pick out life forms you find - examine, identify, record, discuss. Record observations and life observed around the log also. Discuss nutrient recycling, diversity, special habitat, and the interdependence of all life. Decide on the most sensible way to dispose of log (return to original site). Why?

Vocabulary:
nutrient, niche, habitat, diversity, decompose, recycle, fungus, microorganism

from PLT and Earthwatch

Grade K-6
10 minutes
preparation

DECOMPOSITION JAR

Objectives: (1) to examine the process of decomposition of organic matter
(2) to understand natural recycling processes

Materials: wide-mouth jar with lid
soil
3-5 tablespoons food scraps (including citrus peelings)
a few ounces of pond or creek water (or puddle in a pinch)
30 leaves (not black oak)

Procedure: Fill jar half full with soil. Add food materials. Crumble the leaves and add to jar. Then mix everything, but leave some things next to the glass for easy observation. The mixture should be moist but not wet. Add pond water as necessary (pond water will contain microorganisms not available in tap water). Put the lid on the jar tightly and leave it in a dark corner.

The students can make charts to record what happens - start with daily and then weekly observations.

Vocabulary: organic, decompose, decay, recycle, humus, microorganisms

Supplementary Activities:

(1) Write a story telling what happens to plants and animals when they die.
(2) Take a walk on the playground. Search for vegetation that is beginning to decay.
(3) Prepare compost at home or school. Put your food scraps in a milk carton. Use the compost on a plant.

from Missouri Dept. of Conservation

Grade K-6
30 minutes

SAND/SILT/CLAY AND AIR

Objective:
(1) to see differing soil particle sizes and compare the composition of different soils
(2) to understand that different composition makes soils suitable for different uses

Materials:
collecting cans or bags for soil
cards or heavy paper (1 per jar)
glass jars with good screw caps
long handled spoon or scoop
paper towels or newspapers if indoors

Procedure:
Collect different soil samples from different sites. Fill jars 2/3 full of water. Pour in the soil until the jar is almost full. Cover well and shake vigorously. Place in quiet spot and leave undisturbed. Allow plenty of time for particles to settle because the small particles settle slowly.

Then hold a card against the side of the jar and draw a diagram showing the different layers. Label each (clay, sand, silt) and mark the thickness of each layer. Do this with the different soils. It's nice if each child has his or her own jar. Compare jars and charts.

Variation:
Now very carefully try to scoop out each layer separately and set it on a separate wad of paper. After it dries feel the soil and describe it. Describe properties of each layer i.e. sand - coarse, water moves through fast; silt - feels like flour, smooth; clay - sticky. Discuss different uses you would want each particle size for i.e. sand box, bike path, baseball field, garden, etc.

Collectively try making your own ideal mixture for growing plants or use each separate layer and experiment with growing one type seed i.e. radishes in sand.

To demonstrate that coarse soils have pore spaces that can be filled with finer soils, try the following. Fill a jar 2/3 full with pebbles or marbles. Put sand in a measuring container and then pour the sand on top of the marbles until they are all covered. Tap the jar on the table as you add the sand to be sure all the pores are filled. Check how much sand you used.

Vocabulary:
sand, silt, clay, pores, composition, loam, droughty, dense, permeable, drainage, coarse, compact

Adapted from Teaching Soil and Water Conservation

IDEA EXPANSION POSSIBILITIES - UNIT ON SOIL

We see - awareness
We understand - appreciation
We care - attitude (stewardship)
We do - action (responsibility)

1. ART

   Rock creatures: Make creations

2. LANGUAGE

   Write about soil
   - One word, name of object, event
   - Observation using five senses
   - Feeling about the item
   - Observation of the item, using one of the senses not previously used
   - One word, synonym

3. SCIENCE
   - Make Rock Collection - label
   - Make Soil Collection - label
   - Dig up Queen Anne's lace, smell roots, collect and plant seeds.
   - Place acorns in moist towels in covered plastic containers and set in dark, warm area. Roots begin growth in about one week.

4. LANGUAGE/GRAPHICS

   Make Bulletin Board

   SOIL IS

   _____

   _____

5. LANGUAGE

   Complete the thought and sentence:

   What I like most about soil _____

   What I like least about soil _____

   When I hear the word soil I think _____

   When I hear the word soil I feel _____

   The most worthless part of soil is _____

   The most priceless part of soil is _____

   The most meaningful part of soil to me is _____

Adapted from Ethel Records

REFERENCES

Background Information:

Life in a Bucket of Soil - 1972
Richard Rhine
Lathrop, Lee and Shepard Co.
New York, NY

Simple, clear, good for elementary.

Soil Ecology - 1973
William A. Andrews, ed.
Prentice Hall, Inc.
Englewood Cliffs, NJ

Simple, clear, high school level text on soils is useful for background material.

A Connecticut Soils Primer - May 1969
Stanley Papanis, Walter Washko
Cooperative Extension Service
College of Agriculture & Natural Resources
University of Connecticut, Storrs, CT

Excellent, clear, concise introduction to soil science.

Cobblestone - Vol. 4 No. 12, December 1983
Cobblestone Publishing, Inc.
28 Main Street
Peterborough, NH 03458

Magazine for young people. Special issue about soil: Making and Breaking the Soil - Getting Down to Earth - The Living Soil - etc. Excellent for background, activities and references.

Activity Guides:

Conserving Soil
USDA-Soil Conservation Service
P.O. Box 2890
Washington, D.C. 20013
prepared by the Communications & Education Group - Mazer Corporation

Grades 6-12
Available from local Soil Conservation Service office

Multidisciplinary approach to studying a variety of topics from basic soil science to current conservation problems. Student activities.

Exploring the World of Plants 4-H
National 4-H Council
7100 Connecticut Avenue
Chevy Chase, MD 20815

Manual 1, Leader Guide; Unit IIB, Leaders Guide & Members Manual
Available from local 4-H office

Good demonstrations and class activities.

OBIS-Outdoor Biology Instructional Strategies
Delta Education, Inc.
Box M
Nashua, NH 03061-6012
developed by University of California Berkeley

Elementary Grade 4-9
Soil Lessons:
Natural Recycling in Soil
Cardiac Hill
Trail Construction
Trail Impact Study
Holding a Hill
Super Soil

Covers a wide variety of topics, presented through participatory activities. Each activity is written up separately and includes background information, materials needed, suggestions for follow-up activities.

Project Learning Tree
American Forest Institute
1619 Massachusetts Avenue, NW
Washington, DC 20036

Supplementary Activity Guide K-6
Supplementary Activity Guide 7-12

A collection of participatory activities.

Soil and Water Activities for Scouts-1971
USDA-Soil Conservation Service
PA-978

Available from local Soil Conservation Service office

Good demonstrations and class activities.

Teacher's Guide for Environmental Education, ed. Irving Leskowitz & Dale Hartford
Contact: The Center for Environmental Education
269 Oak Grove Street
Manchester, CT 06040

Elementary

Information and activities to supplement and expand elementary science curriculum.

Teaching Soil & Water Conservation-1957 A Classroom and Field Guide USDA-Soil Conservation Service PA-341	Available from local Soil Conservation Service office

Good demonstrations and class activities.

ABOUT THE TEAM

The King's Mark Environmental Review Team (ERT) is a group of environmental professionals drawn together from a variety of federal, state, and regional agencies. Specialists on the Team include geologists, biologists, soil scientists, foresters, climatologists, landscape architects, recreational specialists, engineers, and planners. The ERT operates with state funding under the aegis of the King's Mark Resource Conservation and Development (RC & D) Area - a 83 town area serving western Connecticut.

As a public service activity, the Team is available to serve towns and/or developers within the King's Mark RC & D Area - free of charge.

PURPOSE OF THE ENVIRONMENTAL REVIEW TEAM

The Environmental Review Team is available to assist towns and/or developers in the review of sites proposed for major land use activities. For example, the ERT has been involved in the review of a wide range of significant land use activities including subdivisions, sanitary landfills, commercial and industrial developments, and recreational/open space projects.

Reviews are conducted in the interest of providing information and analysis that will assist towns and developers in environmentally sound decision-making. This is done through identifying the natural resource base of the site, and highlighting opportunities and limitations for the proposed land use.

REQUESTING AN ENVIRONMENTAL REVIEW

Environmental Reviews may be requested by the chief elected official of a municipality, or the chairman of an administrative agency such as planning and zoning, conservation, or inland wetlands. Environmental Review Request Forms are available at your local Soil and Water Conservation District, and the King's Mark ERT Coordinator. This request form must include a summary of the proposed project, a location map of the project site, written permission from the landowner/developer allowing the Team to enter the property for purposes of review, and a statement identifying the specific areas of concern the Team should investigate. When this request is approved by the local Soil and Water Conservation District and King's Mark RC & D Executive Committee, the Team will undertake the review. At present, the ERT can undertake two (2) reviews per month.

For additional information regarding the Environmental Review Team, please contact your local Soil and Water Conservation District or Keane Callahan, ERT Coordinator, King's Mark Environmental Review Team, King's Mark Resource Conservation and Development Area, 322 North Main Street, Wallingford, Connecticut 06492. King's Mark ERT phone number is 265-6695.