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SOME THOUGHTS ABOUT STUDIES OF SOIL IN K-12

F.D.Hole. 9/17/92

Justification. The goal of soil studies in K-12 is to give youngsters the experience of exploring soils which are hidden beneath our feet. Soil science and astronomy are somewhat alike in that both disciplines focus on realms that only in a limited way are actually visited by human beings. In each discipline, therefore, there is a need to supply the young with images of the unfamiliar world. The goal is to show youngsters how to enjoy soils. We wish to teach that all terrestrial life depends on soils. We take our young on soil walks as well as on bird walks! (We could found a Jenny Society, comparable to the Audubon Society.)

Because soil supports us and our buildings, highways, farms, ranches, and wilderness area, we have plenty of soil material around for us to sample and explore. There is no need for us to send off kits of soil the way "Vast plants" programs do. The genetics of soils is not something we can bottle and ship as plant specialists can with their live material. The genetic controls of soil reside on the landscapes every where in the guise of parent material, landscape position, climate, organisms and time. We can lead young people through the steps of mapping and classifying soils. We can observe processes by which soils are formed and maintained. We can include interdisciplinary experiences, as our pupils write soil poetry, soil songs, perform soil dances and soil plays.

We all walk on soil or its modern substitue (rugs, linoleum, sidewalks) each day. Thousands of years ago the soles of our feet of our ancestors learned how to sense the nature of the ground.

By studying soils, our children can lay claim to life-supporting landscapes on this planet. By enjoying those landscapes, these youngster will arrive at adulthood as friends of the soil, ready to insist on its defense against destruction.

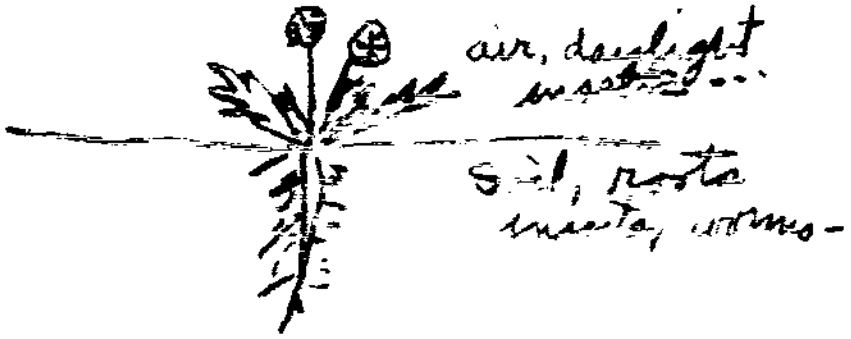
Some possible components of K-12 curriculae.

(1) Getting acquainted with a weed and its soil. With spade and shovel dig up for each student one dandilion plant (or other weed), placing it, soil and all, into a small carton. Cover the disturbed spot with hay and make plans for replanting that spot promptly. Carefully dissect soil from dandilion root. That will be the assignment for each child.

Use microscopes, if these are available. Do rootlets hold tightly to soil particles? What is the soil like? Sandy, stony, silty, clayey, peaty? Are there any creatures moving about.

Mount the plant on a pice of cardboard, tying it on or wiring it. Mark on the cardboard the ground-line. Lay newspapers on the foliage and weight it down for some days to press the leaves flat. What part of the plant is attracted by light. What part avoids light and prefers the darkness and moistness of soil?

Make a sketch of plant and soil



(2)Getting acquainted with an old soil to a depth of 3 to 5 feet. The class works at a fresh roadcut or available pit face and each child puts into a small carton "discoveries"... structural units, colorful materials, root masses, nests. Later there is "show and tell," each child in turn showing discoveries and asking questions. A sketch is made of the soil profile; and /or a miniature profile is glued to a square of cardboard. How old is this soil?

The class might plant seeds in pots containing a single soil horizon material to see differences in growth of a particular plant.

(3) Inserting cubes of enriched soil in different horizons and landscape positions and observing different rates of dismemberment of the soil inserts by biota. This is a lot of work. A bucket of subsoil is passed through a sieve. Alfalfa meal is mixed in, 5% by weight and the two materials are blended in a moist condition. The mixture is then pressed in molds to make cubes 2cm in diameter (after drying). These are the units of enriched soil that are inserted in quantities in different horizons and landscape positions, and removed at regular intervals to monitor the rates of their dismemberment by organisms. (Garner reported work of this kind in Science in the 1950s)

(4) Monitoring the microdynamics of the soil surface by means of large nails placed in rows(10 nails, spaced 2 ins. apart, pressed into the soil flush with the surface). The rows of nails are observed at regular intervals and the burial or exposure of the nails by micro-erosion and sedimentation is noted.

(5) Sampling the population of surface soil animals by means of traps (small cups without covers).

(6) Observation of soil colors, and recording of them with the aid of the Munsell color chart. Mottles. Colored clay films on peds, and on the walls of channels.

(7) Discovery of buried soils in landscapes. These are common in depressions.

(8) Mapping of distribution of earthworm casts in landscapes. Relate to weather (episodes of rainy periods).

(9) Feeding earthworms different kinds of leaves (maple vs. oak).

(10) Mapping of distribution of ant mounds.

(11) Reviewing the literature on the lives of cicadas (mostly in soil).

(12) Review of the literature on scarab (dung)beetles/ tumble bugs) ... that make balls of animal manure, bury them and lay eggs in them.

(13) Why stones "grow" up to the surface of the soil in Wisconsin.

(14) Why some desert soils become protected by a desert pavement(mulch).

(15) How do soils corrode pipes laid in them.

(16) How do soils befriend plants? (Soils provide anchorage, protection of roots from dessication and bitter cold; supply water, nutrients)

(17) How do plants befriend soil? (Root mats hold soil particles against moving water and air; canopies of leaves shelter soil from direct rain drops and greatest gusts of wind.)

(18) How do soils move plants? By shrink-swell heaving; by freeze-thaw heaving; by creep of soil down-hill.

(19) How to plants move soil? By expension of rootmass; by tipping of trees in wind storms.

(20) How much animal life is in soil? (Numbers of individuals;species; sheer weight... equivalent to 12 horses per acre, said Jenny)

(21) At a writing worshop, write "conversations with Terra Mean (see examples by F.D.Hole); soil poems; soil puppet plays.

(22) Make soil jewelry (acorn cups may be used)

(23) Make cardboard and paper mâché miniature landscapes, and draw on them the soil maps that have been published.

(24) Go on a soil walk with a soil scientist who has an auger for sampling . Take along egg cartons to save the soil samples for later display.

(25) Take "meditative" (heightened awareness) walks, focusing attention on the sensing that the soles of the feet do of the ground as one walks.

(26) Sing soil songs.

(27) Select a county or township or school campus soil. Study soil maps and their legends. Campaign for favorite soil candidates. Hold the election. Make T Shirts celebrating the winner. Make posters and other displays of the selected soil.

IN 1985 the Nat'l Widlife Federation produced "Soil, we can't grow without it", an audio-visual presentation. The educator's guide proposed these activities by students:

(28) Make an earthworm farm.

(29) Study earth-houses (such as built by Pueblo Indians)

(30) Grow the same plants from seed in different kinds of soil. Note differences in growth.

(31) Study soil erosion and its control.

(32) Survey soil. Make a soil map.

(33) Start a school garden.

(34) Map in detail your school yard. Locate places where erosion is going on. Do something about it.)

(35) Practice conservation in your home garden)

The Nat'l Wildlife Federation offered these references:

"Making and Breaking the Soil" in Dec.'83 issue of Cobblestone(periodical)

"Fighting Pests with Pests"Jan.1978 issue of Ranger Rick.pp.9-13.

"Soil Conservation", Nov./Dec/'83 issue of Sierra.

"Soil, the miracle we take for granted", Feb/Mar'85 issue, Nat'lWildlife.

"Acid Rain Education Kit, 1982.Nat'l Wildlife Fed.,

"Conserving Soil" USDA, SCS, Washington,D.C. 20013.PO Box 2890