

Soil Conservation and Water Quality

I grew up in Pine County and graduated from the University of Minnesota some 30 years ago. As a young student, I used to fly out of the old Wold-Chamberlain airport, and I can remember seeing almost nothing but cow pastures and cornfields below me. Today, a lot of those fields have gone into a newer crop--homes and suburban shopping centers. From 1941 when I first left, to this year, Minnesota's population has increased by more than a million people. The central cities of Minneapolis and St. Paul have declined in population, but the suburbs around the Twin Cities have increased tremendously.

Material for talk by Norman A. Berg, Associate Administrator, Soil Conservation Service, at the "Land in Transition" symposium, St. Paul, Minn., March 23, 1971.

The growth of suburbia, and of new towns, is happening everywhere in our country. It's one of the many changes that affect all aspects of our lives. In the last decade, Americans have built the laser, begun to solve the genetic code, landed on the moon three times and produced the first drug that may correct defective brain chemistry.

In this same decade--more especially the past two years--many more Americans have come to look at their natural resources in a new way. Today, they are speaking out against polluted air, dirty water and land misuse in farming, mining and building. They are aware that these resources can be ruined almost beyond repair. A newsman has remarked that some lake pollution is so bad almost anyone can walk on water. That's exaggerated, of course, but the whole business of saving, and wisely using, our environmental resources, once viewed as the quaint concern of so-called conservation "nuts" has become a major business of the whole Nation.

As President Nixon said, "The 1970's must be the years when America pays its debt to the past by reclaiming the purity of its air, its waters and our living environment."

The supporters of conservation and pollution control today come in all ages, sizes and flavors. There are the kibitzers, who talk. The faddists, who embrace--and leave-- every new cause. The doomsayers who preach the end of the world. And the great majority, the people who see the problems and work to solve them.

I'm happy to be with the fourth group today. We need large numbers of concerned men and women like yourselves who are willing and able to work for a better environment. The demands on our resource base of land, water, and air are rapidly increasing. There are more Americans every year, and we continue to demand more of our environment--an upgrading of our food and housing, and an increase in the use of water for homes, industries and recreation.

Every year, at least $1\frac{1}{2}$ million acres of land goes from farm to nonfarm use--into new roads, suburbs, homes, parks and so on. Within the next 30 years, our need for urban land will double; our need for outdoor recreation space will also double and our water needs for manufacturing will quadruple.

We need new homes, good transportation, places to shop. We want many of the conveniences and comforts that require water and power. It isn't so much a question of going back to some sylvan yesterday, some preindustrial era when seldom was heard a discouraging word, and the skies were not cruddy all day. The challenge is to go forward to a more rational tomorrow, when 200 million-plus Americans can live in this country--live well and do it with the expectation that their children and grandchildren will also enjoy life because we are planning for all of our needs from the environment--including the need to recycle so-called waste products.

All of us here have a special interest in good land and water use. Sound land use principles and methods have been developed and rather widely used on agricultural land for over three decades. SCS has worked with farmers and ranchers, and we shall continue to do so.

The inner-city environment of slums and ghettos is receiving deserved emphasis today. But inner city areas have been steel and concrete for years, and most of their soil and water uses have passed the stage where SCS can be of assistance.

So it is in the suburbs--the area of changing land use--where SCS is finding new challenges and new forms of service. It is there, as well as the farm areas, where major planning, not later patchup is possible on a significant scale.

It is there that private citizens and professional conservationists are developing, testing and adapting conservation practices to the new "crop" of homes and shopping centers.

Unlike farmlands, construction sites erode mainly during the period between land clearing and land stabilization. But this limited period of heavy erosion can have lasting effects at the site, in local rivers and streams, and on the land downstream.

There have been sediment production experiments in the Scott Run watershed of Virginia during highway construction. Measurements in the streams during and immediately after construction showed that 85 percent of the sediment came from the construction area, which during this period covered from 1 to 11 percent of the watershed. So, 85 percent of sediment came from less than 10 percent of the land. Gross erosion averaged 151 tons per acre per year. This was 10 times the normal amount of erosion from cultivated farmland in the area; 200 times that from grassland, and 2,000 times that from land covered by forest.*

*"Stream Sediment" H. P. Guy and G. E. Ferguson, Journal of Soil and Water Conservation. Nov-Dec 1970

Let's look at some ways to minimize soil erosion and sediment production before, during and after construction.

LIGHTS OUT -- SLIDES READY

1. THE FIRST STEP IS TO CHOOSE SOILS SUITABLE FOR BUILDING.
2. OBVIOUSLY THE SOIL MUST SUPPORT YOUR BUILDINGS...
3. INSTEAD OF TEARING THEM APART, AS THIS SHRINK-SWELL SOIL HAS DONE.
4. SOILS THAT SLIP ARE ALSO POOR. SOIL SURVEY INFORMATION COULD HAVE HELPED HERE...
5. ...AND HERE.
6. SOIL SURVEYS CAN INDICATE AREAS OF HIGH WATER TABLES OR FLOODING.

THIS FLOODED AREA IS IN RUSH CITY, MINNESOTA.
7. THIS BASEMENT EXCAVATION, ON WET SOIL, IS FOR A NEW SCHOOL IN STEARNS COUNTY, MINNESOTA. THE ARCHITECTS AND ENGINEERS MUST TAKE INTO CONSIDERATION THEIR HIGH WATER TABLE.
8. WHEN A BUILDING SITE HAS BEEN SELECTED, WORK TO MINIMIZE EROSION AND SEDIMENTATION.
9. PLANTS AND GRASSES ARE 1 METHOD. SCS HAS ADPATED DOZENS OF PLANTS FOR EROSION CONTROL IN SUBURBAN, SEASHORE AND MINING AREAS.
10. CONSIDER THE USE OF SEDIMENT BASINS TO TRAP ERODING SOILS THAT WILL OTHERWISE CLOG UP WATERWAYS.

11. AFTER BUILDING IS COMPLETED, BASINS CAN BECOME MINI-LAKES, OR GO BACK TO VARIOUS DRY LAND USES.
12. SEDIMENT BASINS ARE EFFECTIVE; THIS LARGE BUILDER USED TWO BASINS TO DRAIN 80 ACRES UNDER CONSTRUCTION NEAR WASHINGTON, D. C.
13. IN 14 MONTHS, THE TWO FONDS COLLECTED 48,000 CUBIC YARDS OF SILT. AFTERWARDS, THE SILT WAS DREDGED OUT, THE OLD BASINS FILLED WITH COMPACTED SOIL, AND ONE OF THEM BECAME A BUILDING SITE, THE OTHER A PARKING LOT.
14. SILT NOT TRAPPED BY VEGETATION OR SILT BASINS DOESN'T DISAPPEAR INTO THIN AIR.
15. INSTEAD, IT RUNS OFF CONSTRUCTION SITES TO CLOG UP STREAM CHANNELS, BECOME MUD IN SOMEBODY'S BASEMENT OR BACKYARD, OR TAKE VALUABLE STORAGE SPACE IN WATER RESERVOIRS.
16. AS AN EXAMPLE OF ONE IMPACT: WE MAY BE LOSING AROUND ONE AND A HALF BILLION CUBIC YARDS OF STORAGE SPACE A YEAR TO SEDIMENT. IF THE AVERAGE COST OF DEVELOPING RESERVOIR STORAGE IS 100 DOLLARS PER ACRE FOOT, THIS AMOUNT OF SEDIMENT MAY REPRESENT A COST IN EXCESS OF \$100 MILLION ANNUALLY FOR DAMAGE TO LARGE RESERVOIRS ALONE.

17. AS A SIDELIGHT, IT WAS INTERESTING TO READ IN THE PAPER RECENTLY THAT EGYPT IS BUDGETING A QUARTER OF A BILLION DOLLARS FOR EROSION CONTROL ALONG THE NILE RIVER AND THE EGYPTIAN COASTLINE, THAT WAS SET OFF BY THE GIANT NEW ASWAN DAM.

18. SO, USING GOOD SOIL, TOPOGRAPHIC, AND HYDROLOGIC INFORMATION TO SELECT A SUITABLE SITE IS A BASIC STEP IN GOOD LAND USE.

19. WHEN CONSTRUCTION BEGINS, USE VEGETATIVE AND MECHANICAL MEASURES TO REDUCE EROSION.

20. COVER EXPOSED LAND WITH GRASS OR OTHER PLANTS. THIS MAN IS SPRAYING A COMBINATION OF SEED, FERTILIZER AND WOOD FIBER MULCH FOR QUICK EROSION CONTROL.

21. YOU MAY NEED TO ADD BURLAP, MULCH, JUTE MATTING OR OTHER MATERIALS TO PROTECT THE SOIL UNTIL PLANTS CAN TAKE OVER THE JOB.

22. WHEN POSSIBLE, RETAIN THE ORIGINAL TREES AND SHRUBBERY DURING CONSTRUCTION.

23. THIS CUTS EROSION. IT BEAUTIFIES THE AREA AT LITTLE EXTRA COST.

24. AND IT ADDS TO THE VALUE OF YOUR DEVELOPMENT IN THE EYES OF PROSPECTIVE BUYERS, WHO PREFER GREENERY TO BARE LAND.

25. A KANSAS CITY DEVELOPER GUARANTEES AT LEAST 4 TREES ON EVERY NEW HOMESITE--EITHER NATIVE OR NEWLY PLANTED. THE COMPANY HAS PLANTED AN ESTIMATED QUARTER OF A MILLION TREES.
26. FINALLY, IN CONSTRUCTION WORK, PUT IN EFFECTIVE STORM DRAINS AS EARLY AS POSSIBLE TO REDUCE SURFACE RUNOFF AND EROSION. SEED IMMEDIATELY TO AVOID EROSION PROBLEMS.
27. AFTER CONSTRUCTION IS OVER, STABILIZE THE AREA ON A LONG-TERM BASIS.
28. SOME AREAS NEED SPECIAL HELP.
29. STEEP SLOPES ARE DIFFICULT TO REVEGETATE, BUT IT CAN BE DONE.
30. A HYDROSEEDER WAS USED ON THIS SLOPE.
31. DON'T FORGET SUCH CRITICAL AREAS AS LOCAL STREAMBANKS. WATERWAYS FILL WITH EXTRA RUNOFF DURING LAND DISTURBANCE. THIS IS ROCK RIP-RAP.
32. I'VE MENTIONED SOIL SURVEYS FOR HOMESITE SELECTION. I'D ALSO LIKE TO MENTION OTHER USES.
33. SURVEY MAPS WILL INDICATE SOIL LIMITATIONS FOR A SPECIFIC PURPOSE. (PAUSE) THIS SHOWS SOIL RATINGS FOR A NEW VIRGINIA SUBDIVISION.

35. HERE ARE RATINGS FOR AGRICULTURAL USE...

36. AND THE SAME AREA INTERPRETED FOR RECREATION.

37. HERE'S DEPTH-TO-WATER TABLE INFORMATION.

38. AND HERE ARE SOIL LIMITATIONS FOR SEPTIC TANK ABSORPTION FIELDS.

REGIONAL PLANNERS IN SOUTHEAST WISCONSIN SAY THIS INFORMATION ALONE
WILL SAVE THEIR PEOPLE \$300 MILLION OVER THE NEXT 25 YEARS.

39. AVOID THIS KIND OF SOIL FOR SEPTIC TANK FIELDS. SEWAGE OUTLETS

FROM THIS \$20,000 HOME IN MINNESOTA INTO A ROAD DITCH. THE SOIL IS
POORLY DRAINED.

40. A SEWER TILE OUTLETING ON A DITCH IN RICE COUNTY, MINN.

41. ABOUT 18 MILLION ACRES IN MINNESOTA HAVE BEEN SOIL SURVEYED. HENNEPIN,
DAKOTA, SCOTT AND CARVER COUNTIES HAVE BEEN SOIL SURVEYED, AS WELL AS
SHERBURNE, WRIGHT, ISANTI AND GOODHUE. ANOKA COUNTY'S SURVEY WILL BE
FINISHED THIS SUMMER.*

42. THIS KIND OF INFORMATION CAN HELP YOU LOCATE GOOD PARKSITES, PONDS,
AND NATURE CENTERS.

*FII: Washington County has an old survey; Ramsey county, no survey.

43. SOILS KNOWLEDGE IS ALSO VITAL TO COMMUNITY LEADERS WHO PLAN, AND LOCATE-- NOT DUMPS--BUT MODERN SANITARY LANDFILLS.

44. SCS HAS WORKED WITH HUNDREDS OF COMMUNITIES ON THIS. I UNDERSTAND THAT MINNESOTA LAW REQUIRES SANITARY LANDFILLS STATEWIDE BY JULY 1972.*

45. SOIL SURVEYS ARE A BASIC TOOL FOR BETTER LAND USE IN URBANIZING AREAS.

46. PLANNERS AND DEVELOPERS MAY ALSO WANT THE NATIONAL ASSOCIATION OF COUNTY'S ORGANIZATION BOOK ON SEDIMENT CONTROL AND THE BOOKLETS "SEDIMENT" AND "CONTROLLING EROSION ON CONSTRUCTION SITES."

47. INFORMATION ON YOUR AREA IS AVAILABLE FROM YOUR LOCAL SOIL AND WATER CONSERVATION DISTRICT, AND THE DISTRICT CONSERVATIONIST.

48. EROSION CONTROL DURING BUILDING CAN NEVER BE COMPLETE. THE REALISTIC AIM IS TO KEEP EROSION TO THE ABSOLUTE MINIMUM AND PREVENT ON AND OFF SITE DAMAGE TO WATERWAYS, DOWNSTREAM LAND AREAS, AND PEOPLE.

49. WITH CAREFUL PLANNING WE CAN HAVE

50. ATTRACTIVE CITIES...

51. BEAUTIFUL SUBURBAN AREAS AND NEW TOWNS...

52. AND THE BEST USE OF LAND AND WATER IN ALL AREAS OF CHANGING LAND USE.

AND NOW, IF I MAY HAVE THE LIGHTS PLEASE

* Duluth News-Tribune Article, Jan. 24, 1971

You've seen some specific actions that planners and developers can take to reduce erosion and pollution. Another conservation action possible for large developers is to keep their area lakes and woods in a largely natural state. Jonathon is an excellent example of this. I'm told the open space in Jonathon connects with the state park system so that, for example, a boy who lives in Jonathon could step out his back door and go all the way to South Dakota without leaving the parks.*

Now, what about conservation and pollution control activities by the Federal government? The Council on Environmental Quality, created by the Environmental Policy Act of 1969, is studying the impact on the environment of all Federal programs and projects. The Environmental Protection Agency--EPA--is an independent agency whose primary function is to establish and enforce environmental quality standards in cooperation with the states and in accordance with congressional statutes.

*Quote by Clyde Ryberg project coordinator for Jonathon, in the N. Y. Times.

Mr. William Ruckelshaus, their administrator, said in a recent speech: "It will be our job in the Environmental Protection Agency to be an advocate for the environment wherever decisions about our common future are made--whether it be in the councils of government, in the boardrooms of industry or in the living rooms of our citizens. That must also become the job of us all. Only the effort of every one of us will insure that the world our children inherit will be cleaner and healthier."

In individual states, there is a trend toward both more general land planning and "fragile land" controls. Hawaii has had statewide planning and zoning requirements for years. Vermont requires state permits for large-scale land development. Maine has another form of state control. Massachusetts holds review power over some local planning. Connecticut, Georgia, Maryland, New Jersey and Rhode Island regulate to some degree the use of their tidewater lands and a regional commission has some control over development along the shores of San Francisco Bay.

In your neighboring state of North Dakota, Governor William H. Guy's annual message to the state legislature included a large number of recommendations affecting the environment, among them that state and local land use planning and zoning work be accelerated, and that the State enact incentive programs to further protect land from soil erosion. Governor Guy's message included this statement: "Our soil conservation districts and our farmers have accomplished much in protecting precious topsoil. The soil abuse by relatively few owners and operators should no longer be tolerated."

In all states, soil conservation districts carry out a wide range of environmental improvement programs.

A district in Maine has helped save that state's second largest lake from severe pollution. An out-of-state entrepreneur tried to develop several hundred vacation homes on an island in a lake which serves as the water supply for Portland, Maine. The local conservation district pointed out that the soils were not safe for use of septic tanks he had planned to use.

The local water district obtained a restraining order and the judge ruled that only lots with suitable soils for septic tank disposal systems could be sold until a complete sanitary waste collection system had been installed. This episode accelerated passage of the Maine Site Location Act, which requires state approval for all new developments over 20 acres. Under the law, developers must make sure their soils are suitable for the proposed uses.

Maryland has a state-wide sediment control ordinance. Maryland law requires that the technical aspects of each county sediment control plan be approved by the local soil conservation district.

Elsewhere, a Tennessee district offers free tree seedlings to local residents for erosion control--if the seedlings are planted within a week.

Kentucky conservation districts work with Area Redevelopment Districts, and SCS is compiling generalized soil maps for use by those groups.

A number of Illinois Districts around the Chicago area work together on compiling natural resource facts for a computerized data bank. Dozens of districts now sponsor "Clean a Stream" projects. And so on.

There are jobs for all of us, whether we build on soil, plant on it, help plan for it, provide technical assistance, or pass laws that affect resource use.

Fortune magazine recently polled 270 chief executives of major U.S. companies on what they considered the ten best and worst U.S. cities in terms of living environment. Sixty-one percent of these top business executives said New York City was the worst--the dirtiest, smelliest, ugliest and so on. They said the best cities were San Francisco, Denver, Phoenix and the Minneapolis-St. Paul area.

You have a lot going for you here. Don't let it get spoiled. You have the time, knowledge, and inclination to plan and build your new developments the right way. Environmental uncommon sense is an idea whose time has come. Follow that idea to an even bigger and better future.
