

Minnesota Extension Service Office of  
Special Programs  
Misc. 1971

Proceedings Land in Transition  
Symposium

MN2020 misc 1971

proceedings

Agricultural Extension Service University of Minnesota Office of Special Programs

# Land in Transition symposium

March 23, 1971

St. Paul Hotel St. Paul, Minnesota

Sponsored by: Association of Metropolitan Soil and Water Conservation Districts

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## THE TWIN CITIES' UNIQUE NATURAL ENDOWMENT

John R. Borchert  
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"The physical setting of the Twin Cities is unique among metropolitan areas between the Appalachians and the Rockies. The lakeshore and valleys can continue to be important assets for the life style of a significant and growing share of Americans in general and Midwesterners in particular. But continued and increasing enjoyment requires increasing use and development, hence either increasing management or growing deterioration."

## The Good Guys and The Bad Guys

Stuart Finley

Conservation Movie Producer and District Supervisor of the Fairfax Soil and Water Conservation District, Falls Church, Virginia

I am not going to try to tell you how to run your operation here this morning. Perhaps you would be interested in what we have done or tried to do or failed to do. As far as "The Good Guys and the Bad Guys" are concerned, I really would rather have a good developer than a lousy conservationist. Furthermore many developers, builders, engineers and architects who have been very reluctant, have changed their spots so to speak, and have become some of our biggest boosters. You probably have experienced this. So what we are really talking about is that we have to get organized; we have to get coordinated; we have to function better; we have to provide an improved management scheme. What we are really talking about is management.

I am not going to talk extensively about the Northern Virginia Soil and Water Conservation District, but I have to fill you in on a little background so that you will know what we are trying to do.

Ours is a three-county district and is sort of a bedroom area of Washington, D.C. It consists of Fairfax County, Loudoun County and Prince William County. Fairfax County is closest to Washington and has developed most rapidly. Loudoun and Prince William Counties are further out and farther in the future as far as development problems are concerned but are already beginning to feel the crush of urbanization. I am going to talk to you mostly about the Fairfax work unit and what we call its "urban" functions.

Glenn Anderson, our district conservationist, initiated our urban projects in 1962, at the request of our district supervisors. This was the first totally urban soil and water conservation program sponsored by the Department of Agriculture's Soil Conservation Service. Glenn has developed, between 1962 and now, a wealth of information.

Fairfax County has 400 square miles and 460,000 people. It is represented on the three-county district board with one supervisor and that's me. If you think I know all those 460,000 people, you're crazy. And if you think I know all the problems of that 400 square miles, you're crazy. It is distressing to drive around and look at those problems. However, it is somewhat encouraging to realize that we can peg away at them and do the best we can.

We recently completed our 1970 annual report. When we finished, it occurred to me that we should have put some of the highlights of our activities in the front rather than all that garbage that pertains to administration. Here are six highlights which I think show what the district is doing.

First, our district is subdivided into three parts, as I have mentioned, with one supervisor from each of the three counties. This is similar to what you have in this Association of Metropolitan Soil and Water Conservation Districts, sponsors of today's conference. This way we feel we can service each county better; we can fund each one more adequately; we can provide better focus.

Our second highlight: Pohick site No. 7 in our Pohick Creek small watershed project under Public Law 566 has been completed. It is already full of water. It cost \$180,000. We have seven more water impoundments planned in this project.

Our third achievement: in Loudoun County we have increased the use of the no-till corn planting technique from 3,000 to 12,000 acres in one year. This out of only 25,000 total corn acreage in the county. Loudoun County has been contributing preposterous amounts of sediment to the Potomac River. In the Washington area, the Potomac River is a nice slender and shallow little channel, yet we receive 1½ million tons of sediment every year. If we are not careful, soon we'll be able to walk from the Washington Monument to the Pentagon without getting in over our ankles.

In Prince William County we have a new erosion and sedimentation control program which involves the mix of the agricultural and urban processes. Here also we have a very aggressive school program which not only relates to curriculum but also the school construction program. We have achieved this through one of our district supervisors, Mr. Clay Wood who is on the school board.

Finally we have a new "memorandum of understanding" with the Virginia Department of Highways that will require adequate two-way cooperation between each other. In the past we have been more or less snarling at each other, so we feel this is going to be very productive.

The crux of our urban program then is a closer relationship with builders, developers, engineers, architects, planners, etc. during the land in transition period, which is your symposium theme today.

I am a film maker. I work with the National Broadcasting Company and produce TV programs on conservation frequently. You just saw a film of mine called "Mud," which was produced just a few years ago. I thought it might be useful today to talk to you in more specific terms and to show you some additional film even though it has not been precision edited, not scripted and not scored with music. This film illustrates what we are doing in Fairfax County, particularly in our Pohick Creek small watershed project.

You may wonder what a watershed project has to do with a land in transition movement. In our case, our Pohick Creek project has precipitated our entire urban program. It has capped many years of effort on the part of Glenn Anderson and others. I am going to ad lib the narration of this film, which is a calculated risk, one I shouldn't take. I show this film on our Pohick Creek watershed project because this is the first small watershed project in the history of P.L. 566 and the Department of Agriculture to totally contemplate the urbanization of a watershed.

Getting back to my good guys-bad guys theme, I want to reiterate a couple of points of philosophy. With good management, almost any builder, developer, engineer or architect can become interested and intrigued with the conservation movement. With a lousy management program you can antagonize these guys to the extent he'll hate your guts forever. Once in awhile though, it is worthwhile for someone to hate your guts. I remember a year and a half ago having a long conversation with our district conservationist Ron Anderson about whether or

not we should declare war on a certain developer. This guy had really stunk up the details and we both had gone out into that area to see it. We called a meeting of 15 people out in the county. We all sat around a table and frankly I screamed at people a little bit. The developer wasn't at our meeting so we ended up having to have inspectors go talk to him; our guys had to talk to him; the county development people had to talk to him.

The upshot of this whole thing is that today this guy is extremely cooperative. He voluntarily converted himself from a bad guy to a good guy. So I say we have to be mighty careful about attacking a bad guy because we don't want to break our lines of communication.

I think the thing that serves us best in this connection is what I refer to as professionalism. The average civil engineer hasn't gone to college and spent all his early years studying a lot of other things. He delights in taking a professional viewpoint on things but he sometimes has to be pointed to such things as conservation that don't come natural to him. So our role, in part at least, is that of gentle coercion sometimes; violent coercion other times.

Recently Time Magazine had a very interesting article on George Scott, a man whom I consider to be a fantastic actor. The article said Scott had a "quiet underlying rage." I think all of us have to have a quiet underlying rage in us. Yet generally it has to remain submerged. For example I had a telephone conversation with my county budget director about a week ago that made him into a temporary mortal enemy. I am to have a meeting with him next week and we'll be back on the track again. But you have to have the ability to function forcefully when you need to function forcefully.

What I am saying is that enforcement as such or the passing of ordinances or legislation is necessary but not an end in itself. The effective method of dealing with people is to get them to cooperate with you. And this calls for the spirit of professionalism.

I had an interesting experience the other day with the Fairfax County Federation Citizens Association. Having had my district budget cut from \$32,000 to \$8,000 by a rough snip, this lady from the citizens' group wanted to know what the district was, what it does, is it really worthwhile, etc. and should this money be re-instated. I answered her questions the best I could. But the thought passed through my mind--"shouldn't I have conveyed in some public manner all this material, to all the people on that committee. On second thought, I think the answer is--no. Being in the information business, I am convinced that one thing you cannot convey effectively is administrative material. It seems to me that the most you can get across to your general constituency is the urgency of erosion control measures; sediment control measures, flood control measures, flood plain control measures.

I am a new comer, a novice in this conservation business. My profession and trade lie elsewhere. Think of what I would have to learn to really profess confidence in this area. But I am not frustrated by this. This incident may explain my point.

A couple of weeks ago I took my kids skiing up at a ski resort. They were sliding down the ski slope, "snow plowing", as they call it. Margaret, my wife, and I were sitting inside this picture window in a nice warm room, watching them. I said to her, "This is a learning experience. They are learning how to ski and we are learning that we don't have to learn how to ski."

What I am saying is that perhaps I will never learn all there is to learn about the conservation of soil and water, and perhaps you never will. But little by little we pick it up and work better with it. I thank you for the opportunity I have had to address you. I am not sure my keynote address was a direct hit on your subject but I am sure I will have the opportunity to have a learning experience during the remainder of the day.

## SOILS AS PART OF THE TWIN CITIES ENVIRONMENT

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Level sandy terraces on the bend of the Mississippi River, before it headed west to the confluence with the Minnesota, provided ideal landing sites for river boats in the 1840's. Thus, the specific location of St. Paul, Pig's Eye at that time, was determined by the physical nature of the land. St. Anthony Falls provided the power for saw and flour mills and determined the location of Minneapolis and St. Anthony.

As these three pioneer villages developed into a major metropolitan complex of 1.8 million people over 130 years, the nature of the land continued to play an important role in shaping the design of the city. Location of early trails, railroads and buildings were directly influenced by steepness of the terrain and stability of the soil. Steep hills and the soft soil of wetlands were avoided until their urban use was justified by high real estate values.

To my knowledge, no detailed study has been made of the relationship of urban land use to the geology and soils of the area. We got into this kind of question when staff of the Metropolitan Planning Commission asked some of us in the Soils Department if we could help them predict future growth directions on the basis of "population capability" of land. They asked this in 1963 and we then got started on a study of the soils of the Twin Cities area in relation to urban land use. We published a report of our work in 1965 and the following material is a summary of the main soil groups that we have described in that report.<sup>1/</sup>

We were able to compile a generalized soils map of the urbanized area by using previously published county soil survey reports.

Individual soil types were combined into categories we called Soil Groups. Eight of these were identified for the area. Following is a list and brief description of the eight groups:

### GROUP 1

A sandy soil area including the upland positions in the Anoka Sand Plains in the north and the sandy terrace position soils in Minneapolis, Richfield, Bloomington and other areas along the river.

### GROUP 2

These soils have a medium textured surface but are underlain by sand and gravel similar to those in Group 1. They extend over parts of west Minneapolis and large parts of northern Dakota County. Washington County also has extensive areas of this group.

### GROUP 3

These soils occur in moraine type of terrain and have hilly topography. Soil textures are variable but sand and gravels are common. Rolling areas in north-

ern Dakota County are typical of Group 3.

#### GROUP 4

These soils developed from glacial till which contains a higher proportion of the fine particles of silt and clay than the outwash material of Groups 1 and 2. Topography is often gently rolling with many wetland areas in depressions. Large parts of western Hennepin and northern Ramsey Counties are in this group.

#### GROUP 5

This is a hilly phase of the till soil areas, but otherwise similar to Group 4 soils.

#### GROUP 6

These are soils with a high water table. Three main sub-types of this group are: (a) the peat soils in the Anoka Sand Plain, (b) "pot holes" and marsh areas in Group 4 soil areas, and (c) flood plain alluvial soils along rivers and streams.

#### GROUP 7

Glacial lake deposits were the parent materials for this soil group. The soil texture is dominated by silt and clay. The area is of small extent, the largest of which is in Vadnais Heights north of St. Paul.

#### GROUP 8

Bedrock is shallow or outcrops on the surface in these areas. Again the total area is small but shallow rock presents special problems of urban use.

With some understanding of past relationships between urban development and the land, we should be able to use this insight in avoiding problems in the future.

Following are some brief descriptions of land use relationships with the general soil group categories which have been a factor in determining our present Twin Cities geography.

#### GROUP 1 (SANDY SOILS)

These sandy soil areas have been preferred for residential building areas over a long period of time. Sands provide good foundation and drainage conditions and the level topography minimizes road and street construction costs. Postwar suburban expansion was particularly rapid in these areas. Examples are Crystal, Brooklyn Center, Fridley, Brooklyn Park and Coon Rapids to the north and Richfield and Bloomington to the south.

Although this "sand plain" land provided a lot of homes at relatively modest cost, serious ground water pollution problems developed in a few years. The combination of individual sewage disposal systems and wells on each lot resulted in sewage contamination of many wells. In 1961, Frank Woodward, Director of the Division of Environmental Sanitation, Minnesota Department of Health, reported that 46% of the 63,000 wells tested were contaminated by nitrates or surfactants. These wells served a population of over 250,000 people.

Since then most of these areas have installed public water systems and, to lesser extent, sewers, but the cost has been high. Installation of these services before development could have saved millions of dollars and avoided much of the ground water pollution problem.

#### GROUP 2 AND 3 (SILTY SOILS UNDERLAIN BY SAND AND GRAVEL)

Except for areas of land in St. Louis Park, Hopkins and Minnetonka, most of the large tracts of this soil group are located at some distance away from the core cities. Therefore, suburban development came later--in the mid 60's--than in the Group 1 soil area. Northern Dakota County, particularly Burnsville, Eagen, Mendota Heights and Inver Grove areas have experienced rapid growth rates in the last ten years. Rapid development of this soil group has also occurred in parts of Washington County.

#### GROUP 4 and 5 (GLACIAL TILL SOILS)

Since these soils are developed on slower draining, compact glacial till, construction and general development costs are higher. Soil absorption sewage systems either do not perform well or are more expensive to construct than in sandy soils. Consequently, growth rates in Plymouth and Maple Grove Townships in Hennepin County were slow despite their accessible location. Low density of development is common as wetland and wooded hills are usually bypassed. In retrospect the "resistance of the land" has been an advantage because this forced the installation of sanitary sewers and has left much of the area in a natural state.

Wet basements and shifting of foundations are common problems that homeowners have to live with because of failures to design construction for these types of soil materials.

#### GROUP 6 (WETLAND)

Questions about appropriate use of this type of land bring out a basic conflict between the point of view of the environmentalist and those interested in maximum economic development.

The traditional attitude towards wetland is that it is waste land. The exception would be lakes which have been appreciated for their recreation and amenity value but marshes, flood plains and peat bogs have been filled or drained whenever the cost could be justified. Actually, most of the extensive areas (about 25% of the Twin Cities land) of wetland outside of the central cities remains in a relatively natural condition.

Often high water table suburban locations are used for commercial development. Their location in the midst of a developed residential area makes them attractive for shopping centers. This locational value makes it possible for developers to incur the high costs of site modification for building. Parks are also often located in wetland that has been bypassed by roads and buildings.

Recently a growing interest has developed in protecting wetlands from routine development. Proponents of this policy make a persuasive argument that wetlands are important islands of open space, wildlife and stream water recharge that should not be sacrificed for more buildings and parking lots. In addition, wetlands apparently play an important role as surface water nutrient traps which protect lakes from excessive fertilization.

There are a lot of opportunities to reverse the past trend of trading off our marshes and stream channels for short term gains of a few more acres of urban sprawl. Wetlands can be considered a sizable natural resource in the Twin Cities that has a lot of potential for uses that we have overlooked in the past.

#### GROUP 7 AND 8 (LAKE DEPOSITS AND BEDROCK)

One of the major areas where glacial drift is thin deposit over bedrock is the north side of the Mississippi River in downtown St. Paul. Here bedrock is an advantage as it provides a solid foundation for large buildings.

The other major area of shallow bedrock is in Denmark Township of Washington County. Opportunities exist for a mixture of agricultural and recreational use which would be appropriate for this kind of land.

The area of lacustrine soil in Vadnais Heights (southeast of Lake Vadnais) is largely open land. These high clay content soils have not been used for a dense residential area because of drainage problems. Continued use for vegetable farming is probably an appropriate use.

#### SUMMARY

Compared to cities like San Francisco and Pittsburg, the Twin Cities has few physical restrictions on its development. However, a close look at the terrain and soils of our area reveals significant differences in the land. These characteristics have been studied and classified in the report "Soils of the Twin Cities Metropolitan Area" as well as other reports.

Recent detailed soil survey reports are available from the Soil Conservation Service and the Soil Science Department for some of the counties in the seven county metropolitan area. These are Carver, Scott and Dakota Counties. The Hennepin County soil survey has recently been completed and the published report should be available in late 1971 or early 1972.

Past development has been influenced substantially by the physical nature of the land. Intelligent planning for the future should take these past relationships into account so we can do a better job in the future.

#### LITERATURE CITED

- 1/ Hanson et al. 1965. Soils of the Twin Cities Metropolitan Area. Agricultural Extension Bulletin 320.

## SURFACE AND GROUNDWATER SUPPLY IN OUR TWIN CITY AREA

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Headlines periodically foretell of new problems with declining water levels in wells in the Twin Cities area. From time to time we read or hear of new schemes and proposals to divert surface water from, the St. Croix River, from Lake Superior or from Minnesota Reservoir Systems. In the past there have been varying viewpoints on water availability for the future in the Metropolitan area and most data released to the public have indicated that there are severe limitations in water supply availability for the future in the Twin Cities.

Other headlines point to the growing menaces of pollution, over development of flood plains and myriad instances of destruction of natural areas and filling in of ponds, wetland areas and portions of lakes and streams in the metropolitan area.

Briefly, then, let's look at the Twin Cities area and its water resources. We can start with a general overview of the ultimate sources of the ground and surface waters in the area, the precipitation.

Average annual precipitation for the portion of the watersheds tributary to the major Minnesota, Mississippi and St. Croix Rivers which flows through or past the Twin Cities area ranges from about 24 inches to 29 inches compared to a range of about 19 to 32 inches for the state as a whole.

Although there are local variations in precipitation in the general 7 county metropolitan area one can generally analyze conditions over a long period of time by using the long term precipitation data for the combined St. Paul - Minneapolis weather bureau stations. These records have been kept since 1837 and are among the longest weather records available in the United States.

Average annual precipitation at this station is nearly 27 inches, although extremes during the period of record ranged from a high of nearly 50 inches in 1849 to a low of slightly more than 10 inches in 1910.

Based on the average maximum and minimum annual precipitation which could be expected to occur in 20 percent of the years, the maximum annual precipitation for this 20 year frequency is 30.6 inches and the minimum annual precipitation for the same frequency is 22.3 inches. Slightly more than half of the total annual precipitation usually occurs during May through August of each year. Whereas, most of the precipitation from November through April occurs as snow with the normal annual snowfall in the Twin Cities ranging from about 40 to 50 inches.

Long term evapotranspiration data are not available for the area but potential evapotranspiration<sup>10</sup> estimates indicate an average annual range of 21 to 25 inches for the area. North of the

Twin Cities the evaporation is generally less than precipitation whereas south of the Twin Cities evaporation often equals or exceeds precipitation. So you can see that precipitation is one of the limiting factors in terms of water availability in the area.

The largest supplies of water in the Metropolitan area are contained in the ground water system which occurs in the immediate Twin Cities vicinity and extends over a much larger area surrounding the Twin Cities. The dominant geologic feature which resulted in the underground water system is an ancient sea basin which extends over an area of about 7,000 square miles in east central and part of northeastern Minnesota and a portion of west central Wisconsin. This system, the "Twin Cities Artesian Basin" consists of layers of stratified consolidated rocks including limestones, dolomites, shales and sandstones which are geologically and gently inclined toward a central point within the Twin Cities area and which reach an aggregate thickness of over 1,100 feet in the center of the basin and which then thin out to a feather edge near the northern and western margins of the basin. Directly overlying the marine basin in most of the area are the unconsolidated clays, silts, sands and gravels that are debris left by the several continental glaciers that formerly covered the area and which range in thickness from less than 25 feet to more than 450 feet depending upon the location over the 7,000 square mile area covered by the Twin Cities Artesian Basin.

Rocks in the Twin Cities Artesian Basin can be segregated into three categories based on their potential as sources of groundwater. Aquifers are major water bearing formations which yield large amounts of water to wells. Aquicludes are dense impermeable formations that do not yield water and Aquitards are formations which are relatively impermeable, restrict movement of water and yield very minor amounts of water to wells.

If we analyze the character of the unconsolidated and consolidated rocks of the Twin Cities Artesian Basin we find the system generally consists of a series of surface unconsolidated aquifers and aquitards depending on the particular land area involved. These unconsolidated deposits generally yield moderate to large amounts of water in buried bedrock valleys located throughout much of the Metropolitan Area. The presence of many of the major river valleys can be detected in many areas by surface patterns of streams and chains of lakes. The underlying consolidated rocks in the area consist generally of a series of alternating aquitards often shales or tight limestones, and aquifers sandstones, fractured shales and fractured and cavernous limestones or dolomites. The major consolidated aquifers which generally yield large amounts of water are the Prairie du Chien - Jordan rocks which are commonly referred to as Shakopée-Oneota limestone and Jordan sandstone. These rocks are separated by a series of aquitards and minor aquifers and finally at considerable depths the Mount Simon-Hinckly sandstones occur which yield moderate amounts of water.

Briefly then, we have looked at the Twin Cities Artesian Basin which as previously noted is claimed to be the largest source of water supply for the area. How much water is available from this ground water system on a sustained yield basis? Well, a very conservative estimate indicates that on a continuing sustained yield basis the consolidated artesian system would yield at least 450 million gallons of water per day without involving any actual dewatering of the Prairie du Chien-Jordan and Mount Simon-Hinckly formations. Furthermore, it is very likely that at least 250 million gallons of water per day more could be made available to the Prairie du Chien system by providing additional recharge of water to the ground through infiltration in stream valleys and from water spreading and surface pond seepage in the areas

of highly permeable unconsolidated glacial sands over an area of about 2,000 square miles in and around the Twin Cities. Again using a gross estimate it certainly appears reasonable that potential sustained groundwater yields in the Twin Cities area for water supply should be available in a range of about 700 million gallons per day to 1 billion gallons per day. This estimate, it should be remembered is for optimum development of the ground water system by careful spacing of wells and closely managed pumping and not all of the water may be available in the Twin Cities area proper. Some wells may have to be placed in areas distant from the cities and the water may have to be piped to areas of maximum use.

What of the surface water resources of the Twin Cities Area? There are 3 major streams, the Mississippi, Minnesota and the St. Croix Rivers which converge within the metropolitan area. Their combined watershed area is nearly 45,000 square miles and annual runoff varies from about 1 inch at the headwaters to about 10 inches in parts of the St. Croix Watershed.

The amount of water available in streams depends on the precipitation runoff and ground water inflow to streams and since these factors vary greatly stream discharge also varies through a wide range. The minimum daily discharge for 70 years of record of the Mississippi River in St. Paul was 632 cfs (408 million gallons per day) in 1934 whereas the maximum was 171,000 cfs (110.5 billion gallons of water) in 1965. The average daily discharge is approximately 10,080 cfs (7 billion gallons per day.)

However, the one day in 30 year frequency low flow is generally used in computing the dependable surface water supply available to meet demands. This value for the Mississippi River at St. Paul is about 1,000 cfs or nearly 650 million gallons per day. This amount includes the flow of the Minnesota River and the Mississippi River above St. Paul but does not include the flow of the St. Croix River. The St. Croix River at St. Croix Falls has a one day in 30 year frequency low flow of nearly 3500 cfs or about 225 million gallons per day.

Now that we have briefly discussed and looked at the precipitation, ground and surface water availability and distribution in the metropolitan area, we must now evaluate the water use.

There are presently 88 municipalities in the 7 county metropolitan area which utilize ground water and there are 15 municipalities, including Minneapolis and St. Paul which use surface water. In addition there are 6 private community supplies located in Dakota, Hennepin and Ramsey Counties which obtain their water supplies from wells.

In 1969 it is estimated that average ground water pumpage for the 7 county metropolitan area was about 180 million gallons per day and average surface water pumpage was 124 million gallons per day. By 1980, if the present trend continues it appears that ground water pumpage could be from 225 to 250 million gallons per day and surface water pumpage could be 155 to 170 million gallons per day, average. This would represent an increase of 20 to 30 percent.

Data from the Minneapolis and St. Paul Water Treatment Plants show that maximum pumping and water use during the day is 1.3 and 2.2 times the average use and it is estimated therefore that maximum daily municipal water use is twice the average daily use. Including the doubling of municipal use and adding the industrial use of present and projected total maximum daily water use for the Twin Cities Metropolitan area is about 640 million gallons per day in 1980,

820 million gallons per day in the year 2000 and 1.4 billion gallons per day in 2020.

As previously noted ground water resources including recharge for the area are estimated at about 700 to 1,000 million gallons per day and present use is about 180 million gallons per day. Based on present trends, however, the maximum projected ground water supply needs are 250 million gallons per day in 1980, 300 million gallons per day in 2000 and 400 million gallons per day in 2020. Reducing the total maximum daily water supply needs by the amount of ground water available the need for surface water supply will probably increase to about 390 million gallons per day or about 604 cfs in 1980, 520 million gallons per day or about 805 cfs in 2000 and 1 billion gallons per day or about 1548 cfs in 2020.

Other needs now being served by the Mississippi River are the St. Anthony Falls navigational locks which require a maximum peak daily supply of 226 million gallons per day or 350 cfs.

The potential surface water needs for water supply and navigation for approximately a 110 day dry period would be 1,030 cfs for 1980, 1,140 cfs for 2000 and 1,390 cfs for 2020.

If an extended dry period occurred this year water supply needs for navigational use combined with maximum projected municipal water supply needs of 350 million gallons per day could theoretically exceed the minimum low flows of 650 cfs for the Mississippi River at Anoka, just above the Minneapolis - St. Paul withdrawal point. This is based on the 1 day in 30 year low flow at Anoka, which is approximately 650 cfs. Other similar analysis for 1980, 2000 and 2020 would show even greater deficiencies during drought periods.

Obviously, then, there is a need for a careful analysis and an action program to provide for a well balanced, integrated ground water and surface water metropolitan area water supply system which will provide for careful management of the ground and surface water resources of the 7 county area for the immediate future.

There are of course other problems with our water resources in addition to water supply problems. There is a need for a much better program of observing and recording data on our ground and surface water resources. Although considerable surface water data are available for the larger streams there is a need for much more data on the smaller tributary streams. The Minnesota and Mississippi River Basin in the Twin Cities area contain a number of small tributary streams including the Rum River, Coon Creek, Rice Creek, Elm Creek, Shingle Creek, Phalen Creek, Bassett Creek, Minnehaha Creek and the Vermillion River tributary to the Mississippi River and Carver Creek, Purgatory Creek, Nine Mile Creek, Eagle Creek, and the Credit River tributary to the Minnesota River.

These streams form the veins and arteries of the Twin Cities surface water network and although they are not sources of large amounts of water for water supplies they play a vital role in the life of the Twin Cities Metropolitan area. The streams are all being threatened by man and his unwise development and the quality of life which has been the heritage of the Twin Cities area is being destroyed as each year additional natural areas along the streams and within their watersheds are encroached on and altered by thoughtless development. There is no dispute that changes are inevitable with increasing population growth and the need for an expanded economic base. There is however, a great difference between unwise use and overdevelopment and carefully guided planned resource utilization. Governmental agencies like the Minnehaha

Creek and Nine Mile Creek Watershed Districts, to name only two in the area, were formed to try to provide for necessary management of these surface water and related land resources. Citizen manager efforts have produced some results and have showed some unwise development but there is a great need to accelerate and strengthen this type of program.

It is therefore essential that all communities and citizens of the area, the metropolitan council and the state get together in an intensive joint effort to provide a Twin Cities Metropolitan Water Authority which will refine the analysis of existing data, obtain new information on ground and surface water and provide a balanced total management program. This program must provide the basic elements already outlined in Metropolitan Council Policy including optimum utilization of ground water resources, controlled use of surface water resources protection and preservation of lakes, ponds, wetlands and streams, preservation and improvement of water quality and encouragement of good conservation and utilization of our resources. Our water and related land resources can no longer be taken for granted. Action is needed now at all levels of government.

## SCHOOL SITE SELECTION AND OUTDOOR CLASSROOMS

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In exactly 31 days our nation will be celebrating the first anniversary of Earth Day. In retrospect we see a nation that is "aware." Environmental problems do abound throughout the country. From urban blight to oil slicks, from east to west and north to south we are faced with complex environmental problems. The delicate balance of nature that supports the continued existence of man is being threatened by man himself.

This nation's citizenry has recognized that environmental problems can be resolved through the efforts of individuals who are willing to recognize the fact that procrastination on vital environmental issues will lead to continued and accelerated reduction in the quality of life. A climate of "let's do something now" has developed. "Crash" ecology programs, paper and bottle drives, environmental legislation and increased community involvement in the arena of environmental affairs bear witness to society's concern and sincerity.

Concern for environmental problems has resulted in a general re-evaluation of priorities by some educators. Some think that at least an additional conservation course should be offered. On the other hand, inserting yet another learning unit into the crowded school day would probably result in a teacher uprising for even suggesting that the only free period be filled with a "conservation" course. What is needed is the recognition that environmental education is an integral, inherent component of all education.

A second grader observes plant growth, patterns, and the color of a flower. A senior high student examines socio-economic conditions. All of the aforementioned are, part and parcel, related to "environment." Growth, for instance, is not an independent function of plants; they inherit potential only. The rest is up to its surroundings. Similar comparisons can be made for patterns, color, and economics. All are indisputedly tied to Mother Earth, biochemical-physical "law," and interactions between living things.

Part of the task of educating thousands of students in Minnesota will fall on the shoulders of the teachers in our schools. Will the students who leave our public and parochial schools be able to cope with the 70's, The Decade of Environmental Decision? Those who have a hand in developing a true environment of learning, from the taxpayers to the instructors, hold the key to better understanding.

Environmental education cannot be learned in a single field trip, or teach-in. There must be a conscious effort on the part of those interested in education to investigate and study ecological phenomena whenever possible. We suggest that the best place to study and learn about our environment is not through a textbook or guide, but through actual contact with real situations in the real world. The real world is not confined to the four walls of the classroom but extends from the classroom to the outdoors. At MESFI we choose to call this outdoor classroom "The 21st Classroom."

This classroom might be located in a vacant lot between two buildings or found along a row of apartments situated near an industrial area. It might even be a crack in the sidewalk where only the hardiest of "weeds" can grow. For those who are more fortunate, it might be a shrubbed or wooded hillside adjacent to the school.

Metropolitan areas are growing by leaps and bounds. Land is becoming scarce, and if the economic axiom of supply and demand holds true, available lands will be more expensive to acquire. I want to make the following statement, "Vogt's conclusion" if you will, and then devote the remaining time to building a case for the establishment of outdoor study areas on school grounds.

If suitable lands for learning are to be preserved, the time for realistic planning and a program of active, intelligent land acquisition is NOW ... Schools are truly community rallying points. They serve an ever growing population of youngsters who deserve the best education our communities can offer. To provide adequate and suitable learning sites, additional funds may have to be expended for land acquisition. Instead of just looking for a nice flat field to literally "plunk" a building, sites should be selected that contain marshland, ponds, woodlots or hilly areas where students can study under real conditions.

The creation of virtual deserts around schools is practiced by some planners who have not taken time to acquaint themselves with the real needs of the school community. Cars receive more consideration than people.

No longer can we be satisfied with clearing every tree and shrub around school buildings for the sake of saving one hour's time on a crawler tractor. Natural land features are irreplaceable once destroyed. No matter how many ornamentals are planted, the constituency of a woodlot cannot be man-manufactured. Where trees or shrubs have to be cleared for footings and foundations, equipment operators, planners, and educators should work hand in hand to assure the least amount of damage to residual vegetation.

Adequate playing fields are a necessity but so are trees, shrubs, and wet areas. The mechanics of ecology and social interaction are difficult to teach on school grounds patterned after Fictorian gardens that suggest Man's dominion over Nature. The sterility of a brick and mortar building standing in the middle of a flat field is a terrible epitaph to those who are really interested in creating a true learning environment.

I wish to quote a section from the Guide for Educational Planning of School Buildings and Sites in Minnesota, developed by the Minnesota Department of Education, Section 40.2.

In the earliest planning stages, the selection of a site requires the cooperative effort of the board, school staff, planning committee, architect, site planning consultant, and school attorney. Since the educational program is an active interest of the community, lay members on a site selection team may be valuable.

It might be more appropriate to suggest that lay community leader input for the site selection is not only valuable but essential. For those who are interested, well qualified resource specialists are available from the Department of Natural Resources, Soil Conservation Service, and Agricultural Extension Service to assist in some phases of site evaluation.

Once the preliminary site plan has been developed, the school site planning team should meet with the architects to make sure that as much of the natural site conditions are left undisturbed. "No-touch zones" should be delineated and instructions to the contractors should be explicit. Unique study plots located on the site should be clearly marked to eliminate their destruction during the construction phase of the operation.

If fill from foundation excavation is available, it can be used to create small hills on the site. These can later be planted and seeded by students and used as study plots. Relief adds a special flavor to the landscape and functions as an aesthetic visual and sound barrier as well as a photographic and contour mapping facility.

Small wetlands and ponding areas can be utilized as holding basins for conducting aquatic studies. Diverting part of the drainage from building areas into a holding pond rather than into the normal storm sewer system is advantageous in many respects.

When selecting and planning a new school site, we suggest that you consider the following:

1. Professional educator's architects and lay community personnel should work together in planning and implementation phases of any project.
2. Select sites that are functional and as aesthetically pleasing as possible.
3. Save as many of the natural features as possible.
4. A quality school site may cost more at the outset but remember that thousands of students will be utilizing the site in the future.
5. Look around to see what has been done and think about what can be done to enhance the educational potential of our schools.

Let us now take a look at the "blacktop" schools located in our area. One metropolitan educator once said the following to me: "The best thing that could happen around some of our schools is that if air pollution becomes bad enough, it might disintegrate the paving and children could see what grass looks like." This may be an overstatement, but the fact is that many of the schools are faced with inadequate outdoor facilities of any kind.

If this is the case, the best thing to do is to seek alternative study sites in the immediate area. Consider parks, vacant lots, backyards, etc., and the not to be forgotten courtyard which exists in almost every school. MESFI has found some of the following to be helpful in expanding an outdoor study program:

1. Mini-study plots can be installed by the students and the cost is minimal. All that is needed is time, an ambitious teacher, permission from the administration, and children who, for the most part, are itching to work and study outdoors. Courtyards are especially advantageous outdoor

classrooms because they are usually not used for anything else and access is not a problem. These study sites need not be extensive in size--a few square yards devoted to a variety of experiments is usually sufficient. Trails leading around courtyard developments can be "paved", using wood chips available free of charge from tree trimming companies and utility companies.

2. An old log provides a great place for many insects and saprophytic plants. Temperature and light studies can be performed on different types of substrates e.g. sand, rock, prairie sod, grass. The most important feature of investigations of this type for students is that they have an opportunity to ask the question "why?"
3. A land management site can easily be installed in a school courtyard. This technique involves the treating of three small, but adjacent strips differently. (1) burn one strip each year; (2) plow or roto-till one strip; and (3) allow one strip to remain untouched. Soon different plants and insects will succeed on the sites and a virtual time machine will have been created.

A teacher in Hopkins asked the custodians to leave a small courtyard unmowed over the summer months. When the students returned in September, instead of just finding Kentucky blue grass and dandelions, they found 37 different varieties of grasses and weeds in their experimental plot. The only problem that developed was that some parents thought that over the summer the custodians were slacking off, since the grass was never cut in the interior court. A sign solved the communications problem. It was strategically placed in the school hallway, telling about the "ecological plot" that was outside for everyone to enjoy.

4. Water areas are generally scarce around schools. Postage on biological supplies which are shipped to schools in our state often cost more than the organisms inside the package. Why can't children do a little biological farming on their own? By creating a small depression and lining it with construction grade polyethylene, a mini-aquatic habitat can be created. The pond can be seeded with "genuine pond water", and soon lots of things will be developing in the pond for students to explore. The effects of various pollutants can be tested on aquatic life in the pond and the total cost will probably be less than \$2.00 for materials.
5. Shrub planting and feeders for our feathered friends can become a reality. If money can be invested in furniture, fixtures, bricks, and mortar, a few dollars can also be expended to enhance the many courtyards that stand idle. It has been our experience that courtyards can be improved virtually overnight and for less than \$100.00.

For those schools that have adequate open space but few wooded or prairie areas, do not despair. The same types of mini-plots described thus far can be located on the periphery of the site or along the sides of the building. In addition, aesthetic plantings, shrub color-time lines, animal transect areas, succession models, wildlife food patches, feeding stations, aquatic study areas, and pioneer garden plots can and should be established. By strategically

placing shrub and tree plantings, modular study and creative arts outdoor classrooms can be delineated. Log benches and woodchip "floor" can provide a favorite spot for sunny days.

It is our experience that there are individuals and groups in every school who would love to help develop gardens and plantings and to assist in educating youth in understanding the exciting natural world. Windbreaks can be planted by students to serve as barriers along playing fields and function by providing habitat for wildlife. For large scale tree planting projects, tree seedlings are available free of charge to public agencies from the Department of Natural Resources.

In summary, I should like to say that school site development, courtyard improvements and pre-construction site selection are essential elements for all to consider. Students can become "environmentally literate" through continued exposure to "mini-experimental plots" found near the school and in the community. Scheduling problems and the cost of transportation to more distant sites is minimized.

With rising costs, it behooves us to utilize our existing sites to the best advantage for all concerned. It is now your lot to seize the initiative, take a second step, and begin implementation as soon as possible.

Aldo Leopold once said:

Examine each question in terms of what is ethically and aesthetically right as well as what is economically expedient. A thing is right when it tends to preserve integrity, stability, and beauty of the biotic community. It is wrong when it tends to do otherwise. It of course goes without saying that economic feasibility limits the tether of what can or cannot be done for the land. It always has and it always will. The fallacy the economic determinists have tied around our collective neck, and which we now need to cast off, is the belief that economics determines all land use. This is simply not true. The bulk of all land relations hinges on investments of time, forethought, skill, and faith, rather than investments of cash. As a land-user thinketh, so is he.

## BROADENING CONSERVATION'S CONSTITUENCY

Mrs. Donald E. Clusen  
Director, League of Women Voters of the U.S.  
Chairman, Environmental Quality Program & Projects  
Green Bay, Wisconsin

On behalf of the League of Women Voters I should like to congratulate you upon your choice of theme for your symposium this year. "Land In Transition" denotes a concern and an awareness of the fact that problems of human resources and natural resources are inextricably interwoven. It also demonstrates your view that we can no longer categorize problems, physical and human, as either strictly urban or rural. My organization is pleased to have this opportunity to share with you our thoughts on how to broaden the base of those who seek solutions to conservation problems in an urban society.

The League and Soil and Water Conservation Districts are no strangers to each other. In my travels throughout the country I hear about many examples of cooperative efforts between us in both rural and urban areas and all sections of the U.S.

But that's another story and our purpose in being here together today is to try to explore how we can interest city dwellers in using the considerable expertise of soil and water conservationists and how conservationists can make a greater impact on urban planning.

It occurs to me that there is merit in attempting to identify the blocks which exist before trying to propose solutions. Therefore, I pose the basic question: Why haven't people in cities flocked to conservation's banner? Supported conservation causes in large numbers? Assisted in funding conservation needs enthusiastically? Applied the skill and knowledge of the conservationist to urban environments? I am sure there are many psychological and human factors involved in the response to this question, but in our few moments here together I should like to suggest three basic blocks to the acceptance of conservation's cause by urban leadership and to propose three basic remedies for these blocks.

To my mind, the first and most predominant block is lack of identification on the part of "city people" with conservation groups. Conservationists have somehow failed in semantics and in human contact with those who live in urban areas, failed to communicate real concern for their physical environment and their conservation problems. If you live in an over-populated area with little or no open space, few parks, only an occasional tree--if you are accustomed to the fumes which accompany city life, unable to swim in the closest river, it is difficult for you to relate these problems to the image which is evoked by the work "conservation." To the average urban dweller "conservation" means something which has to do with the Grand Canyon, the deer hunter, the fisherman, and the bird watcher but has little or no relevance to the city dweller and his daily problems of existing in a metropolis. If he thinks about these things at all, it is in terms of making his vacation plans or the amount of his tax dollar that is being spent to support camp grounds, clean up the oil slick off the California coast, or build a dam in the West. It is something "out there," and those who are conservation adherents are, to him, for the most part, almost as alien as a man from outer space. It would never occur to the usual concern for his environment, to seek out the local

chapter of any of the numerous conservation groups in his area. The city dweller simply does not identify the word "conservationist" with himself nor the word "conservation" with his urban physical discomforts.

The second major block follows along the same line. In addition to lack of identification with conservation groups, the urbanite fails to identify his environmental problems as conservation problems. He knows he can't swim in the river at his doorstep because it is polluted--or catch fish in it--or go boating on it--but he fails to make the connection between this fact and the standards last year. He knows the trees on his block are dying--or being removed to make way for a wider street or an urban renewal project--but he makes no connection between this loss of trees and the work of conservation groups with urban planners and city engineers and the state resource agency to save some greenery--some open space--in the city. He knows that when it rains his newly-developed area is a sea of mud, his basement is flooded, his street impassible, but he doesn't think of this in terms of the work conservation groups have done in the establishment of building procedures to prevent soil erosion or to achieve comprehensive planning. The urban man does not regard any of these problems as conservation problems. He sees them as problems of city government, or the price of progress, or a fact of life with which he is so accustomed to co-exist that he ceases to see it at all.

The third block to vital growth in conservation groups from the urban segment is lack of awareness on the part of the latter of the aid--the expertise, the warmth, the helping hand--which is available to him from conservation interests, both public and private. Somehow in the barrage of words from conservationists, we have failed to convey the message that we care for people as well as the national park. We have also failed to give high visibility and priority to the tools and the technology possessed by conservationists to remedy some of the ills of the city. We have not related well the know-how and willingness of conservation leaders to serve the cause of urban environmental problems--nor have we crossed the semantics barrier which exists.

There has been much debate in the past few years about the terms "conservation" and "preservation." To the uninitiated the meaning of either term and the distinction between them is cloudy. In the minds of city dwellers, the issue is no more resolved than it was in the last century. I personally prefer the definition of Dr. Raymond F. Dasmann, Director of Environmental Studies for the Conservation Foundation, who says, "Conservation is now defined as the rational use of the environment to achieve the highest quality of living for mankind." This definition has relevance to urban areas and sets forth a goal and a hope of a quality environment for urban as well as rural areas.

These three blocks then, I see as the major problems --

- city dwellers don't identify with conservation groups
- city dwellers don't see their environmental problems as conservation problems
- city dwellers are unaware of the tools and the willingness of conservationists to assist them.

How to overcome these problems? I am going to propose in explicit and somewhat elementary

terms some possibilities to you, because I believe that this is the point at which we must cease to be philosophical and be practical; this is the point at which we must stop being theoretical and become concrete.

First, conservationists must show a renewed interest in the people and the leaders and get to know those who live in the city. We must go to them--where they live--and speak their language. This power structure will not be the one with which we are accustomed to dealing, and it will not always be either pleasant or polite. There will be resistance and disbelief, apathy and a tendency to regard you as dreamers who live in an unreal world. You will need to seek out, at every opportunity, the leaders of urban groups, the spokesmen for the ghettos of the inner city, the heads of labor unions, the officials of city government. You will need to work to identify the people who are interested in the cities and the people who live in the cities. As in approaching any other new audience, you will need to make new contacts and learn about them in advance. What are their goals? What motivates them? You will need to be prepared for rebuff, for you will be seeking out not conservation's natural allies--as we so often recommend--but its un-natural allies!

Urban dwellers do not automatically care about the same things as conservationists and so the burden of proof is on you--to commit yourselves for the long haul; to prove that you care what happens in the cities; to show that you are willing, indeed eager, to accept these citizens as co-workers and make their causes yours. You will need to work more intensively with the ward politician, the city planner, the urban renewal architect, the businessman's luncheon group, the community action boards.

The mantle of purity and the aura of pristine virtue which surrounds the concept of conservation in the minds of the man on the city street must be blown away. You will need to demonstrate graphically your willingness to identify with the city. An important principle of opinion-building--the identification principle--is involved. To accept an idea or a point of view, the people we are trying to reach must see clearly that it affects their personal desires, their hopes, or their interests. Identification has to do with self-interest. The problems which concern conservationists must be made meaningful to city people in ways that are observable and measurable from the point of view of their lives, in ways they will understand, in ways that will cause them to act.

How do we do this? Mainly it requires the ability to see things as others see them. We must project ourselves into the minds of other individuals or groups whose background and point of view may be quite different from our own. Such projection requires understanding and imagination, but you are imaginative people. Developing this ability to understand the attitudes and emotions of others will make the difference in bridging the communications gap which faces conservationists as they attempt to enlist city residents for their causes.

In order to further identify conservation groups with urban residents, we need to face the second block--that of helping these citizens to see their environmental problems as conservation problems and our goals as relevant to them. Perhaps the best way to achieve this is to try to bring it all closer to home. For example, those who live in the city do care about where their children play; they do want to be able to find a green belt and some open space in or adjacent to the city proper. These are goals which they can understand and can

identify with close to home, and it is with these immediate concerns that conservationists must cope if they are going to reach and motivate this wider base.

People do not buy ideas separated from action--either action by the sponsors of the idea or action which people themselves can take to prove the merit of any idea. Unless a means of action is provided, people tend to shrug off appeals to do things.

Another basic axiom is that people must be involved in the selection of the goal in order to care about its achievement. Therefore, it behooves us, in opening our dialogue with the city, to attempt to find out what not only the leaders but the people want in the regeneration of their city.

When you know what the people who live there want for their neighborhoods, you will know how you can help them take some productive action to get it. One good case history of a small project in a major metropolitan area -- a new park established or an old one saved -- a place for walking, picnicking, relaxing, just beyond the city limits -- a small waterfront area which offers brief respite from a bustling city -- any of these things will do more to bring adherents to conservation from the ranks of the population of that city than thousands of acres added to a national park 2000 miles away.

The need is great for higher visibility to be given to the desire and the ability of conservationists to assist in achieving a quality environment in urban areas. We must devote as much thought, as much creativity, and commit as much personnel and funds to this end as to reaching citizens in other areas of American life. Conservation programs, publications, possibilities for action must be made a part of the program of every organized group in the city if the message is to be extended. A great deal more needs to be done through the schools and children need to be reached at a much earlier age.

Young urban people will determine the environmental decisions of tomorrow. Their attention must be caught today.

Go to the schools, the news media, the power structure, the community organizations, the government in the cities and volunteer your group's ideas, personnel, and funds to help in rejuvenation of this nation's cities--for failure to do so leaves the ultimate resolution of these questions in the hands of people to whom conservation is only a word.

These then are the challenges and choices which I see for conservationists who want to broaden their constituency. The challenges: lack of identification of city residents with conservation groups, lack of relevancy of conservation issues to city problems, lack of awareness of what conservationists can and are willing to do to aid in rebuilding our cities. The choices: to show an interest in urban problems and to meet urban residents on their ground and speak their language; to bring conservation causes closer to home; to make available and to commit with renewed vigor and open-mindedness, conservation's talents and money to these ends.

In our ultimate desire to preserve the future, we cannot afford to neglect the present. Entire generations grow with scarcely the existence of a green tree naturally grown or a cluster of wild flowers in a field. What dreams can we expect of eyes which have known only sooty concrete and steel? Evermore, urban man finds himself a particle of a metropolis but part of no community; alone against all the problems and nothingness a world beyond his ken has devised. And yet it need not be so. Never before in the history of the world has man possessed so much wealth and power, been master of so much technique and knowledge. It would truly be ironic if he could not bond all that experience and strength to the service of the preservation of his chosen home.

There is, in this room today, the imagination and the knowledge to lead the way to a new understanding of the relationship between conservation and the urban community. The continued survival of the new broader definition of conservation may very well depend upon how well the communication gap with this new constituency can be bridged. It deserves your best men and women, your greatest sense of purpose, your highest priority. Knowing you, I believe you will accept this challenge as you have so many others.

## SEDIMENT -- THE MAJOR POLLUTANT OF OUR WATERS

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Sedimentation has been going on almost since the world was formed. Out on our Great Plains, sedimentary formations are several thousand feet thick.

Certainly, the entrainment, transportation, and deposition of sediment is a natural process. There are those who say it is time we stopped trying to interfere with sedimentation or with any other of nature's processes. Rather, we should learn how to come to terms with nature. We are all nature lovers at heart, and the idea of coming to accord with nature initially makes us feel good.

But nature can be terribly brutal.

Earthquakes, floods, droughts, pests, and pathogens have been unmerciful on man in his hard march down through the ages. The ultimate result of completely accepting nature's terms is that the environment for man reverts to savage jungle. There, nature holds full sway. I assume that there are those who would prefer to follow a way of life completely dictated by nature. Others would be delighted to come to accord with nature provided they could also have hot and cold running water, color TV, a well-stocked deep-freeze, and two cars to explore the countryside.

How did man climb the rocky road from the savagery of nature's children living by the spear in hunting wild game, and by the eye in searching for edible roots, fruits and nuts of wild plants to a stage which we may call civilization?

Braidwood, the distinguished anthropologist, has discussed this climb in several of his papers. He states:

"Historically oriented anthropologists agree that the one absolute necessity for the appearance of civilization (in a fully meaningful sense of the word) would be full, efficient food production. Subsequent appearance of other attributes of civilization are contingent upon the original appearance of food production."<sup>1</sup>

Braidwood also analyzes these first difficult steps towards food production. He emphasizes that man first had to learn how to control and manage nature. He learned to select grasses with fat

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<sup>1</sup>Braidwood, Robert J. 1954. Food gathering to food production: From cave to village in Iraq. Agr. Hist. 28: 41-43.

seeds, and to plant them in protected areas to avert the natural ravages of wild animals, birds, and locusts. He learned to tame and manage goats, and to use them for food, clothing and shelter.

The history of Mesopotamia provides eloquent testimony to support Braidwood's theses. The fabulous cities with magnificent buildings that the Sumerians constructed in the third and second millenia B.C. were made possible by full and efficient food production from an irrigation agriculture that was based on a brilliantly engineered canal system.

Basically, nature caused the downfall of this civilization.

Flood waters coming down the Tigris and Euphrates carried high levels of sediment picked up by erosion in the upper reaches of the watershed. Even with vast supplies of slave or indentured labor, the Sumerians had difficulty in coping with sediment deposition in the canals. This siltation eventually destroyed the canal system and buried their great cities.

The Sumerians had no concept of the need for drainage in irrigated fields. Consequently, soluble salts accumulated in the surface soils over the centuries and efficiency of crop production was seriously impaired.

Some historians have indicated that the high level of civilization in ancient Mesopotamia was destroyed by the vicious raids of Mongols led by Hulagu Khan in A.D. 1258. But recent evidence indicates that Hulagu and his horsemen found nothing but desolation when they invaded the region. Archeologists Jacobsen and Adams<sup>2</sup> found that by the twelfth century the natural phenomena of floods delivering sediment into the irrigation waters had caused far greater devastation to the irrigated land, and thus to the food supply of the cities, than any invading hordes could possibly have brought about.

In 1945, archeologist Dorothy Mackay<sup>3</sup> traversed this section of Iraq where the Sumerians had developed their extraordinary civilization. Her report states:

"From Kish our little party of five... passed for a mile or more between an ancient canal, dry since the days of the Caliphs, and a field of barley fed by a runnel of water made the previous year. It was the first time that a crop had been grown on that particular field for a very long time past...probably many centuries...and the shortness of the straw bore witness to the salting of the soil that follows long periods of drought and disuse. Beyond the limit of the 'cultivation,' we seemed to plunge all at once into a strange new world where all was mirage and unreality. Around us an immense flat waste of fine grayish-yellow alluvial soil was bounded by an unbroken horizon, shimmering like a vast circle of quicksilver,...

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<sup>2</sup> Jacobsen, Thorkild, and Robert M. Adams, 1958. Salt and silt in ancient Mesopotamian agriculture. *Science* 128:1251-1258.

<sup>3</sup> Mackay, Dorothy. 1945. Ancient river beds and dead cities. *Antiquity* 19:135-144.

above which here and there, long, low islets seemed to float in the sky. No vegetation was to be seen except an occasional low thorny scrub, against which the driving desert winds had piled dune-like heaps of fine grey sand. Low mounds and ancient canal banks, at first glance, all exactly alike, were all that broke the monotony."

In essence, Dorothy Mackay was saying that the land that had spawned the fabulous civilization of the Sumerians had now come to terms with nature. But we need not go to Mesopotamia to learn our lessons. Let us look in our own backyard.

Eugene Hilgard now stands out as one of the giants in the history of American Agriculture. In the decade before the Civil War, he was State Geologist for Mississippi. In later years, he became Professor of Soil Science at the University of California and Director of the California Agricultural Experiment Station. In August 1860, Hilgard published a book that is now recognized as one of the real classics in our agricultural literature. It was entitled "A Report on the Geology and Agriculture of the State of Mississippi." In this report, Hilgard laid the foundation for the science of soil classification.

In evaluating the soils of La Fayette County, Mississippi--Oxford is the County Seat--he stated that they were the most fertile cotton producing soils in the South. But he warned that these soils were very subject to "running," and that unless proper "husbandry" practices were followed, the soils would wash off the fields and down into the stream channels.

Soon after Hilgard's report appeared, our country erupted in a violent holocaust. All thought of soil conservation was forgotten. During the years of Reconstruction and for over half a century thereafter, the economy of the South was sorely afflicted. That which Hilgard warned might come to pass, did come to pass. These once-fertile lands were ravaged with enormous gullies. I have been in gullies in LaFayette County that are now 75 feet deep and 300 feet across. Sediment delivery to streams often attains 600 tons per acre per year. Stream channels become filled with sediment. Water moving down the streams is heavily burdened with silt.

But we need not pick on Mississippi.

One can find an abundance of active gullies in the Piedmont of Georgia and Alabama, the Cross Timbers areas of Oklahoma, the corn fields on the deep loess soils of western Iowa, and even in the fertile valleys of California. One can still see tremendous sediment delivery from the Blacklands of Texas and the rolling Palouse country of Eastern Washington. We can find wheatlands in Northeastern Montana where all of the top soil has been eroded away to add to the silt pollution of the Missouri River system.

The Mississippi River system drains 795 million acres of watershed including the Great Breadbasket of the U.S.--the Central Prairies and the Great Plains. The water is seldom crystal clear. Of the average annual runoff from contiguous U.S.--one thousand, three hundred and seventy million acre-feet;--one-third--(455 million acre-feet) --goes out the Mississippi to the Gulf of Mexico. The sediment delivery of this river is 435 million tons in the average

year, the equivalent of 435 thousand acres of topsoil. This annual sediment load carries some 5 million tons of plant nutrients absorbed on its surfaces. Traces of pesticides are found on the sediment. The river also carries annually a massive burden of dissolved salts including nearly 50 million tons of plant nutrients. Much of this derives from land runoff.

I shall not mention the fact that the Mississippi system also serves as a sewer for thousands of towns and cities.

We must recognize the fundamental fact that when water runs off a sloping field, it is completely non-discriminate. It will pick up and move anything that is movable. It matters not to the hydraulic forces whether the material is soil, manure particles, plant residues, salts, plant nutrients, pesticides, or infectious organisms.

President Nixon noted the seriousness of water pollution from land runoff in his message of February 5, 1970. He stated:

"Water pollution has three principal sources: municipal, industrial, and agricultural wastes. \*\*\*\*Of these three, the most troublesome to control are those from agricultural sources: animal wastes, eroded soil, fertilizers and pesticides. Effective control will take time, and will require action on many fronts: modified agricultural practices, greater care in the disposal of animal wastes, better soil conservation methods, new kinds of fertilizers, new chemical pesticides, and more widespread use of natural pest control techniques."

All of you are aware that Lake Erie has become "Exhibit A" on what a horrible mess a major lake may become through pollution. The recently issued "Lake Erie Report" states that 50 percent of the pollutants are reaching the lake in runoff from agricultural land. Most of this is sediment.

People ask: If farming and ranching are known to contribute pollutants to our environment, why do we not take steps to stop such pollution?

In meeting this question, we must first consider some of the harsh constraints that weigh upon our stewards of the land. Tweeten points out that 75 percent of our farmers have annual labor incomes of \$3,000 or less. Some of them have other sources of income, but their return from farming is strictly at or below the poverty level. Only about 3 percent have good labor incomes--\$12,000 plus; and only about 10 percent have \$6,500 plus.

Our top producers have an average investment of \$300,000 in relation to their average net income of \$17,400. The great mass of farmers have very modest investments indeed.

This means that most farmers are too poor to do much on their land that would benefit only offsite conditions and people.

Appalachia, the Ozarks, and the Lake States cut-over areas are particularly afflicted with

rural poverty. Average gross income per farm is less than \$5,000. These marginal farmers often try to eke out a living from impoverished crops on droughty and eroded soils.

Even in the Great Plains, the farms and ranches are not overburdened with prosperity.

Senator Dole has pointed out that the average farm in Kansas had a net income of only \$5,200 in 1967, \$2,200 of which came from Federal payments. Average income from farming per se was at the poverty level.

If you folks were wearing the shoes of the average Kansas farmer, would you oppose Federal assistance? Would you use available technology to try to boost your income? How much expense would you go to on your land solely for the benefit of urban people miles downstream in the drainage basin?

There is much public concern about urban poverty. There should be. But net income of farm people has always lagged far behind that of nonfarm folks. Many of our rural families know nothing of the meaning of affluence.

In fact, there are hundreds of thousands of small farmers who completely lack the means to control runoff that carry sediment from their lands.

What about the top echelon of farmers who make reasonably good incomes from their farms and are enabled to have nice homesteads?

Two years ago, Executive Magazine published a chart showing that the rate of increase in all other phases of the economy. Since this chart shows the average for all farmers, it is obvious that the top producers have attained a truly remarkable rate of increase in efficiency.

In 1950, each farm worker produced enough for 15 persons. Today, he produces enough for about 45 persons. This tremendous average change is due to about 20 percent of our farmers who are most efficient.

This great increase in efficiency in production occurred because of rapid increase in mechanization, more effectively meeting soil fertility needs, much better control of crop pests, and use of better varieties.

Crops are planted with 8-row equipment precisely dropping superior seed, needed plant nutrients, and pest control chemicals in one fell swoop.

Statistics on our corn crop show the trend. Acreage of corn harvested has dropped from 88 million acres down to about 60.

Yet, total corn production has increased from 2.4 billion bushels in 1940 to nearly 5 billion today.

Average yields per acre have rapidly risen from 27 bushels in 1940 to about 80. The latter part of this curve reflects the maintenance of better soil fertility for our superior hybrids.

And the price to corn purchasers has shown a steady downward trend for the past 30 years in terms of 1968 dollars. Who would be benefited by low efficiency in corn production?

However, use of 6 to 12 row equipment has incurred a constraint on land treatment practices.

There are indications that highly mechanized agriculture on an extensive scale has the effect that the soil conservationists in State Conservation Districts, State agencies, and the Department of Agriculture must run as hard as they can to keep the endeavor from going backward.

The old system of erosion control using contour terraces with their point rows and meandering terraces is out.

Where mechanical treatments for erosion abatement are necessary, parallel strips must be adjusted to size of field machinery. The terraces should be broad based so as to incur minimal interference with machine operations. Grass back slop terraces may be necessary on steeper lands. Outlets must be effectively protected.

Sediment is by far the major water pollutant in terms of mass. The mass of sediment loadings in our streams is over 500 times the mass from sewage delivery.<sup>4</sup> Over four billion tons of sediment move from the land to watercourses in the average year.

Cooperative research on experimental watersheds at Treynor, Iowa, is showing that level bench terraces are highly effective in curbing sediment delivery. Unterraced lands deliver 20 tons of sediment per acre per year as compared to 1 ton on the terraced watershed. Although surface runoff from the terraced land is only one-sixth of that from the unterraced, downstream water yield is not affected by terracing. This finding is important to downstream water users.

We can still see potatoes planted with rows running down the slope in northern Maine. There is often tremendous soil erosion down the rows, with fertilizer and pesticides going off with the soil. Most of the vast potato acreage in Aroostook County is protected by conservation farming. Runoff is effectively curbed and the scene is mighty easy on the eyes.

Tobacco is still grown in Maryland with rows running down the slopes. Runoff water carries a whole array of pollutants from such fields. Tobacco is also grown effectively under sound soil conservation methods that minimize land runoff.

Fifteen years ago, Carroll County, Georgia, was characterized by eroded fields and rundown farms. A watershed protection program on the Little Tallapoosa River has now converted many of the impoverished fields into Bermudagrass pasture that produces fat, sleek cattle.

The once-fertile Brown loam soils of Mississippi show some of the worst erosion damage and sediment delivery in the country. Good soil conservation measures that include the stabilization of gullies have restored productivity and curbed sediment delivery.

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<sup>4</sup>Senate Select Committee on National Water Resources. 1960. Water Resources Activities in the United States: Pollution Abatement. Comm. Print No. 9, 86th Congress, 2nd session, 38

Highly technical American agriculture using big equipment may have incurred an increased degree of water pollution from cultivated land. But there has been a tradeoff. The relative cost of food to the average family has gone down continuously over past decades even though sophistication in preparing and packaging retailed food has increased. There is no law requiring our average housewife to allocate only 17 percent of spendable income for food. She has a right to spend 40 percent of her budget for food. This happens in other countries. Going back to horse and buggy technology on the farm will do it here.

Let us not forget that conservationists concerned with agriculture have made great contributions towards controlling sediment delivery, improving the quality of runoff water, and bettering our overall environment.

People who are so concerned today about silt pollution from land runoff and soil blowing are sometimes unmindful that conditions were not perfect in former years.

### CHANGE RINGS

Let us look backward a hundred years. When pioneers were crossing the Great Plains and 60 million buffalo roamed these grasslands, the harsh environment did not provide for the utmost in clean water. F. G. Roe in his delightful book on the American Buffalo, quotes from the diaries of pioneers crossing the Plains a century ago. The diary of one explorer who crossed Kansas in 1869, records that he "found not one drop of water that was not yellow and putrid from the wallowings and excretions of buffalo."

Even though the "woolies" were a colorful part of the American scene and we deplore their near extinction, it is doubtful if the stench from a buffalo wallow was any more attractive than that from a barnyard.

Some of you can recall the harsh times in Oklahoma and Kansas during the dust storms of the thirties. Crops not devastated by drought and soil blowing were devoured by grasshoppers. Livestock perished from lack of food and water. Soil conservation measures had not yet been applied. Human misery and destitution of the people was appalling. Their physical and mental anguish knew no bounds. The tremendous and horrible dust storms that arose in the Plains and plagued our country was air pollution at its worst. Stream channels were filled with wind blown silt.

When one flies over Oklahoma and Kansas today and looks down on regions where soil conservationists have been at work, he will see not only a pictorial countryside that well emulates the talents of an impressionistic artist, but also that these soil conservation measures go far toward avoiding air pollution from dust, and water pollution from silt and other material in farm runoff.

-- Drive through the millions of acres of Texas rangelands where past over-grazing has denuded the soil of protective grass and given rise to ugly shrubs, excessive runoff and sediment delivery.

-- Compare this to Bermudagrass pastures in Texas where the brush has been

eliminated and the cattle are fat and sassy. Good grass cover eliminates sediment delivery.

Last year the Soil Conservation Service provided technical guidance for the production of crops under some degree of minimum tillage. Rows may be planted directly in stubble with no plowing or harrowing.

Rows also may be planted directly in grass sod with no prior tillage. An application of herbicides is necessary to kill the grass and weeds.

Studies at Coshocton, Ohio, show the dramatic effect of minimum tillage completely eliminating sediment delivery from cropped land. Even more striking was the protective effect of no tillage farming at Coshocton during July 1969--a month of very heavy rainfall. This protective effect of surface mulch needs to be more widely used on construction sites.

-- The millions of farm ponds that have been constructed in the soil conservation movement serve to detain farm sediment from moving downstream. These conservation ponds are welcomed by wildlife. They also provide fishing and recreation.

These farm ponds are effective in detaining runoff water and to trap sediment and other agricultural pollutants from direct entry into stream courses.

Agrostologists and agronomists have developed grasses and crop management that give complete protection to agricultural watersheds, particularly above the conservation pools to insure high quality of water.

I'm sure most of you will agree that a rural scene dominated by excellent conservation farming attains the quintessence of environmental beauty and quality in addition to abating runoff of polluted water. Let us not forget that, ideally, the job of soil conservation will not be done in these United States until every stream runs clear and uncontaminated. We in the Department of Agriculture are anxious to help in any way possible to curb unwarranted sediment delivery.

## SOIL CONSERVATION AND WATER QUALITY

Norman Berg, Associate Administrator  
Soil Conservation Service  
St. Paul, Minnesota

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.

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 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 per cent of the sediment came from the construction area, which during this period covered from 1 to 11 per cent of the watershed. So, 85 per cent of sediment came from less than 10 per cent 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.\*

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

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

Lights out and 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 adapted 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 various dry land use.
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 ponds collected 48,000 cubic yards of silt. Afterward, 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 tapped 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)
34. 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 outletting on a ditch in Rice County, Minnesota.
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.<sup>1</sup>
42. This kind of information can help you locate good parasites, ponds, and nature centers.
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.<sup>2</sup>
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 ...

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<sup>1</sup> FYI: Washington County has an old survey; Ramsey county, no survey.

<sup>2</sup> Duluth News Tribune Article, Jan. 24, 1971

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

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.<sup>3</sup>

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. 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."

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<sup>3</sup> Quote by Clyde Rybert project coordinator for Jonathon, in the N.Y. Times.

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, 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 to 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.

## COORDINATION FOR CONSERVATION

Harry M. Major, State Conservationist  
Soil Conservation Service  
St. Paul, Minnesota

The pattern used by the Metro Association of Soil and Water Conservation Districts in setting up this symposium is a guide for local people, local entities of government, and others, to use in determining the organized approach to urban-suburban land use planning.

Number one -- you need to know what your resources are that you can work with. You need an inventory of the natural resources, such as soil, water, and climate. You need to know the human resources that can make the decision. You need to know the political resources available to determine and set rules, regulations, authorities, and provide economic resources.

Number two -- you need to have an inventory of the environmental problems present. This can be done by multi-county, community, watershed, or other size area or on all of them. This inventory needs to be made by local leadership with the assistance of technical agency people.

Number three -- you need to know what are the technical resources available to search out alternative answers to problems. These are present in your private planning groups, developers, consultants; in local, state, and federal agencies that can provide information, technical knowledge, develop alternative solutions and provide guidance in implementing sound land use plans and regulations.

When the resources available are determined, the extent and complexity of the problems sought out, and amount of technical resources needed are compiled, the choice of how the land is to be used is up to you.

This is a social choice. The local people, through their leadership, need to weigh the alternatives and make their decisions. On these decisions hinge the future of the environmental complex that we will live and work in.

Decisions that influence the use, development, and care of a given parcel of land are being made by planning commissions, councils of government, and other public bodies elected or appointed by local people.

As you provide guidelines to these entities, make sure that an integral part of the planning program includes consideration of the natural resource needs. These needs and opportunities should include decisions to be reached on conservation and use of water, power, forests, minerals, soil, air, open space, fish, wildlife, and recreation resource potentials.

The solutions to land use problems and the opportunities for development do not stop at individual property, town, county, or even state lines. We must join together to solve the problems.

Local governments should:

1. appoint a task force to
2. determine their problems
3. inventory their resources
4. find out what state and local laws exist regarding water, land use, pollution, etc.
5. determine if these laws need to be changed or strengthened for their use.
6. decide how local governments and private industry can best cooperate in carrying out a program.
7. develop a system of regulations, laws, permits, and inspections to insure that development and construction activities do not cause erosion and sedimentation, control pollution, provide for the best type of environment possible.
8. secure the necessary legal authority to plan, zone, adopt regulations and secure financing to carry out this program.
9. learn where help (both technical and financial) is available and solicit and use this help -- state and federal.
10. finally, adopt land use ordinances that make conservation and development of the natural resources mandatory.

The State government should:

1. provide enabling legislation to permit counties and local governments to manage soil and water resources.
2. set sedimentation standards. When water quality standards have been adopted, sedimentation standards should be included.
3. provide financial and technical assistance to local programs to control sediment, study watersheds, make soil surveys, carry out capital improvements.
4. information program to keep all agencies and groups informed on state laws and their interpretations, state guidelines, state assistance available, and planning programs and other state activities.

State government con't.:

5. develop training programs in sediment and pollution control techniques and conservation development principles.
6. develop and enforce a sediment control program and environmental development program on all state projects such as highways, state lands, state building projects.

The Federal government should:

1. promote national recognition of urban problems.
2. contribute to technical and non-technical research programs concerning urban environmental problems.
3. continue and improve upon financial and technical assistance programs.
4. develop and enforce a federal sedimentation and pollution control policy on all federal projects, federally sponsored projects and on other projects carried out with federal contracts or funds.

Recommendations and actions needed are numerous and complicated. We all must work at them to save what we have, improve the environment we have disturbed. We are all charged with these responsibilities. Let each and every one of us help in arriving at wise land use decisions to avoid the tragedy of being engulfed by the mistakes of the greedy, the inept, and the exploiters.

By working together we can have a metropolitan area that is a healthy delightful place to live

## Contractors Problems and Responsibilities in Resource Conservation

James O'Neil

Rauenhorst Corporation, Minneapolis Suburban Contractors  
Minneapolis, Minnesota

It is impertive that we stop progress immediately, if we are going to conserve what remains of our natural resources now, that is a pretty startling statement but think about it for a minute. If we continue to uproot trees, remove top soil, level hills and drain swamps, distroy animal habitat and pollute water and air, you will end up with a pretty sterile environment. Now you and I know that stopping progress is not a very practical solution. But it is my way of informing you of the problems the industrial developer faces today.

I am not here to tell you that I have all the answers, but rather to explain the problems and suggested some solutions that could be construed as food for thought for the government official, planner, contractor and conservationist there in the audience today. If I can leave you with one meaniful thought or idea that can be used in implementation of a plan to conserve natural resources, it would be most gratifying.

Since World War II we have experienced a tremulous growth in the population in this area as well as the nation. To accommodate this growth it was necessary to construct a large volume of housing units rapidly. With the availability of the GI and FHA loans the trend for individual homes prevailed. As the growth accelerated and it became apparent that the vacant land in the core cities would be consumed rapidly, the developers looked beyond the core, cities to the suburan areas.

Ideally the large flat areas in the suburbs are the best suited to the expeditious development of single family units. The competition was keen to aquire these level areas and especially the areas that contain a granular sub soil. Since the majority of the suburbs were small and lacked the bonding power to install utilities, the presence of the sandy sub soil allowed the installation of cesspools and wells for each house and, as the suburbs grew in population most of them initiated a utility program with the ultimate goal of providing municipal utilities for their particular suburb. As the growth continued, and demand for sewer and water, streets, curb and gutter, parks and schools increased, it became apparent that the tax for these services could be overwhelming.

In an effort to provide a balanced tax base, the competition to entice industry to locate in their community became intense to some other communities it became apparant that they had over-built residentially and had literally created a bedroom community, with very little if any land left for industrial development. In other suburbs they have indeed reserved land for industrial development. In other suburbs they have indeed reserved land for industrial development. But it is a fact that much of this land was swampy, hilly and wooded terrain that previously had been the least desirable land for expeditious residential construction. In many communities today, the industrial developer is faced with this residual land condition uprooting trees, grading hills, draining swamps, which is in direct contrast to what the conservationist and colleges are attempting to achieve today. It is extremely difficult and costly to even attempt to design industrial facilities to conform to an uneven terrain; in fact it is most impractical. Industry is determined that the multi-story warehouse and manufacturing plants are so ineffiecient that their operating costs increase to such a degree that in order to be competitive and stay solvent, they demand the large single story structure. The prerequisite for building this type of facility is a site that is relative flat. However if the only land left in the community that has not gone residential is hilly, it is obvious that the industrial

is hilly, it is obvious that the industrial developer must grade the hills, cut down most of the trees, and generally reshape the terrain. If the industrial zoned land happens to contain swampy areas, inevitably the soils conditions are substandard and not suitable for building. This then means that to make the land usable for industrial construction the swamp must be drained and you either have to drive piling to support the building or the substandard soil must be removed, replaced and compacted, with suitable soil. In the process we are destroying wildlife habitat. And by the way where do you think the suitable soil for compaction comes from? Probably another hill.

At the risk of infringing Mr. Engstrom's presentation on land use regulations and density, I will continue to explore this problem a little further. You know the example I have given you may sound quite severe and you may think the industrial developer is looking for compassion, which he is not. It is a fact that this is a problem today. This is not to say that all level land should be zoned for industry and all uneven wood and swampy terrain should zone residential. What I am suggesting is that much more consideration should be given to the utilization of these natural amenities without completely destroying them.

And what about tomorrow? Are we going to perpetrate these problems into the future? I think not. It appears that we are on the right track. Major strides have been made to avoid these problems. As most of you know, only a few short years ago it was a relatively simple procedure to receive spot zoning from an old community. Most communities today are adopting comprehensive land use plans which consolidate the large users of utilities, nine ton streets, etc., and segregate the residential from the industrial. And as a result the industrial park concept involved. Now we have the opportunity to control the quality of waste water by treating it in a central location as it leaves the industrial park. We have the opportunity to control the runoff and remove the sediment, using a holding pond before it enters the rivers system. We have the opportunity to provide adequate power to the heavy users, without running helter-skelter through a community where industry is creating heavy demands promiscuously. We have the opportunity to provide processed water and water mains large enough to accommodate sprinkler systems in a consolidated area, rather than attempting to guess where these large mains might be required throughout a community.

Let's go on step farther. I know that most of you are concerned with urban sprawl. In an industrial park where we have already disturbed the natural resources, we have found that there is a tendency in most zoning, to restrict the density and limit the developer to a certain percentage of building to land ratio. Is it practical to restrict this land and force the industrial development into an additional virgin areas, or should we allow more density and make more use of the already disturbed land for buildings and parking lots? Do we really need those little twenty and forty-foot side and yard setbacks which will eventually grow up in weeds from lack of maintenance? I think not.

The pollution agencies have made some progress with the industrial plants in controlling pollutant-emissions in the water and air. Pittsburgh is a good example of what coordinated effort can do to correct the horrendous situation that existed at the Golden Triangle. But continued surveillance is necessary to maintain control. Today at the inception of a major development we now find that it is imperative to consult with the local town, state and federal governmental agencies, prior to the start of the development. In addition to this we consult with the power companies, gas, telephone, railroads, in an effort to inform them of our plans and to give these agencies an opportunity to plan accordingly and to coordinate our efforts, to avoid as many problems as possible. I sincerely believe that herein lies the

solution, the secret to our future communication and coordinated comprehensive planning. Industry and residents can coexist, must co-exist and with proper attention to coordinated planning will produce a palatable environment for all. I may be accused being in an eternal optimist, but on a broader scope from time immemorial we have been using our natural resources to build from the pyramids of stones, clay and water, to concrete and water, trees from our forests and steel from our ore pits of today. It is difficult for me to believe that a nation blessed with, as Mr. Berg stated, enough advance technology to put a man on the moon, we won't come up with an advanced synthetic building material to conserve our natural resources and with a new source of energy that will eliminate the internal combustion engine that is polluting our air, that will provide this nation with the livable environment it was originally intended to have.

## The Impact of Local Land Use Regulations on Density and Open Space

Robert Engstrom, Vice President  
Planning and Design, Pentom, Incorporate, Minneapolis Developers and Builders  
Minneapolis, Minnesota

Thank you, Mr. Major. What you didn't say was that I grew up in northern Minnesota and I have a lot of relatives in the state of Minnesota in a lot of the small towns. It is fun to go back there because what you see is something like this: people can walk around town, you have small houses next to big houses, you even have mobile homes sprinkled in around regular homes. You've got old houses and new houses and set back from the street like five feet or what have you, and you even have such grotesque things as apartments above the commercial! But, as the city gets larger of course you try to legislate that sort of thing out. Well, nevertheless going to these smaller towns in Minnesota still gives you a lot of inspiration because you think, if you can create that within our big metropolitan area, in lots of pockets around this area how good it would really be. And of course this is one of the things we have been trying to do but it is not easy, because we do have regulations that keep us from doing this sort of thing.

Now, I am not going to try and talk about zoning and regulations. There is a book I recommend to you--"The Zoning Game" by Richard Babcock--which covers the subject quite well. I will, however, give you a quote from William White, who as you know is one of the really foremost conservationists in the country. In talking about "The Zoning Game," he quotes from the book, "stripped from all its planning jargon, zoning administration is exposed as a process, under which isolated social and political units engage in highly emotional debate over the use of land, most of which is settled by crude tribal adaptations of a medieval trial by fire and a few which are concluded by confused ad hoc conjunctions of bewildered courts." That is just one of the few things that come out of this book but I am sure this is a familiar book with you. This quote was on one page--if you go to the next page--(there are a lot of things in here)--in talking about zoning he says, "large lot zoning does not save open space--it squanders it. By forcing developers to use large lots for little houses, the community forces them to chew up much more of the open landscape than they have to. Instead of several tightly knit subdivisions, housing will be splattered all over the place." The true purpose of large lot zoning of course is to keep people away or at least people with incomes lower than the majority. So there is a lot that has been said about zoning and as you can imagine you try to spend time getting your work done and your planning, and designs and everything going but in actual practice it takes a lot of time to educate a lot of people.

Now as you know regulation has been encouraged by the government ever since the U.S. department of Commerce encouraged the states to enact zoning regulations and then the states passed that on to the municipalities and the regulations keep creeping up and piling up. The more populated and the more sophisticated the municipality is, the more staff and the more regulations there are. So what are some of the consequences? I think you have a tendency to have a surplus in the family zoned land, you have waste land, you have a shortage of apartment land, so you create an artificial high price for apartment land, thereby forcing people that can't afford to buy a home to pay a higher rent, in the interest of health, safety, and welfare. Then of course, you are probably aware of mobile homes. In the past anyhow, the prime consideration was to move farther out. So that is where you selected your location for people to live. This has created a rather monotonous uniformity of subdivisions which everyone says they don't like. It has some disastrous effects.

I did a little calculating last night knowing who the audience was going to be today and here is the impact of some regulations as I see it from a one-inch rainfall. Now if you assume that housing is going to be built in this decade, according to projections and if you can just take the standard thirty-five foot municipal setback and reduce it by ten feet, to twenty-five feet, the hard surface area that you would save in terms of the metropolitan area save 9 hundred thousands gallons of runoff in a one-inch rain. Now if you assume that those homes will also be built on streets that are about five feet wider than they really need to be, you get another 2 million to 150 thousands gallons of water from a one-inch rain. And then if you assume that there are twice as many streets as you need in the first place, you then have an additional 2 million 300,000 gallons from this one-inch rain. So all told, about 5 million, 5 hundred thousand gallons of runoff from a one-inch rain, just because of creating additional hard surface area. This is one of the implications of over-regulation. In addition I think that we will all acknowledge that as we sprawl out our mass transit becomes economically less feasible. Also we have to build more freeways to get the people in to town. All these are side-effects of spreading out and over-regulation.

I don't always like to say that everything is so gloomy. I think that there is one area where we do have some potential and we have seen some progress. It has occurred in the last four or five years. One of these areas is in the "planned unit development" type of development and that type of ordinance. Now I don't want to hold this out to be a panacea for all of our problems, but I would like to pass on to you some of the things that I have observed working within the framework of developing the planned development ordinance, so you can see that where you don't have too much regulation, things can be accomplished.

(Seems to be a 10 second gap in the tape here)

Our first involvement with planned development ordinances was back in '65 when we started talking about townhouses. At that time, this was the stereotype that the planning commission the people who live nextdoor and the council etc. had of townhouses--typical Baltimore robots. So it took a lot of meetings and lot of people contributing their share in order to make things work and in one particular case it was a site without any trees, and by creating some great changes, creating a few ponds, etc.--I think we were able to create a community that is very livable for people. This took a lot of doing, a lot of planning commission meetings, to write an ordinance that would work, that was flexible, that deviated from all of these setback requirements, etc. but yet there were people that were there that were willing to take a chance. Then of course once you can do something one place, it is easier for people to look elsewhere. One of the side benefits that you get is you can economize on the things that you put underground--the utilities, etc. then you can afford to spend the money on hauling in trees and doing something about improving the exterior environment. Well then, as long as things were selling well and we were competing in the market place, it seemed like this is the sort of thing to continue, and create something and expand it a little bit more. So we got involved with a one hundred acre parcel--where we had townhouses, homes, multi-family units--all within the same area. It doesn't seem so complicated but yet it is not being done. So here we ended up with density that was far more than double the standard subdivision density but yet considerable more open space at the same time. Now I really think that the message I would like to leave with you today in one point is you can have higher density and more open space at the same time.

One important thing here--the smaller the community the easier it is to work with a planned development ordinance, because if there is one person in that small community who has the feeling for what you are trying to accomplish then they are willing to go along with the flexibility. For instance, in a progressive community they allow you to go out and stake the buildings and if there are trees in the way or you have to make some adjustments, as long as it doesn't deviate too far from the preliminary plan, this is acceptable. So you see having that sort of flexibility is really very important. And by being able to do that you then can preserve a lot of the existing terrain, ground cover and so on. As you know the principle of ownership here is, that people own their home and the land underneath it, and the gardener is the symbol of the maintenance of the exterior grounds which are owned by the homes association.

One of the things I think was new for this state is that we have executed an open-face easement on all of the open land that is owned by the homes association, which really assigns the way the development writes. So somewhere down the line the open space cannot be developed without the municipality's expressed consent, regardless of the zoning law. So you see you really have worthless land as far as development is concerned, but because of the lack of uniformity and directing the assessors how to assess, it is not simple to hold open space land on the tax rolls. By being able to save on some of the utility clause you are able to provide the exterior amenities that really make the area more livable for the people, and by being able to concentrate density again and in surrounding areas you can do things like putting in a golf course where you create a value that flows back to a large area because as you are probably aware golf courses are not a very economical operation in our northern climate. This is just a reminder for me to talk about scale and as you can see the wood blocks that originally came from the streets of St. Paul in a nice wooded setting like this work out quite well. It also starts to suggest that the smaller the street, the smaller the sidewalk, the more interesting it becomes.

One of the other significant things that I would like to pass on to you is that within the framework of a total planned development of this type, you can create a diversity of prices and of living types that are side-by-side and there is no real reluctance on part of the buying public to buy a thirty thousand dollar home next to a fifty thousand dollar home. Now this is something you can't do with the individual lot on the standard subdivision.

Another interesting observation is that we have had a number of municipal people out and they always ask, "How long has this play sculpture been up?" Then we say two years and with the intensive use like it has gotten, they really marvel at it because there are no initials, no vandalism and I say that's because kids got a piece of the action and they own a portion of it.

Sometimes with regulations you say that with townhouse for instance don't put more than four in a row or five in a row or some other arbitrary number. This building was built for space. This has nine townhouses in one building! But they turn a ninety degree angle and up and down and what have you and nobody can figure it out how many there really are unless you stop to count very carefully. It was deliberately done this way to be able to demonstrate that there is no arbitrary regulation for the number of units in the building.

Then of course the Post Office Department has their regulations and to do something a little

different takes some time. Now what you are looking at beyond the mail boxes is a fifteen foot setback from the street right of way. So you've got the street, fifteen foot boulevard, then a fifteen foot setback. So we try to come as close to the street as we can and then in the next area you go back and create the illusion that there is more space than there really is. But in how many places can you really get by with a fifteen foot setback from the street in the Twin Cities metropolitan area? Just very very few. Of course this is kind of what it is all about, regardless how much work you put in the development, how much engineering, financing, legal, landscape architecture, etc. that go into it, it is when the people move in that makes it all worthwhile. There is this extra dimension that you get when the people are there and seeing them enjoy themselves in a little bit better living environment.

Now I mentioned that from our observation, there is a surplus of regulations. Hopefully in this session of the state legislature we are going to see a mandatory state building code adopted, something that will create some sort of uniformity by which you can plan, rather than a hodge-podge of various regulations for a given municipality. I would like to suggest that, given the flexibility of the planned developed ordinance as suggested, there is a lot of potential there. The trouble is, as the municipality becomes more and more sophisticated, with the fire marshall, the right-of-way engineer, the sewer engineer, the water engineer, etc., everybody trying to do a good job. I am not criticizing people for trying to do a good job but they all take a little bit of a wack at you.

The last thought I would like to mention to you is, in our day of regulations there is one area in the country that doesn't have any zoning and that is Houston. I don't see anything worse down in Houston than you see around here. On the other hand they have a lot of things that are not so good too. But I would like to suggest that, if you had an overall density, for instance of, say, six units to the acre, which you know is roughly three times what you get out standard subdivision, so that you could take a parcel of land, look at the natural features and decide what your going to preserve, decide what works best as far as housing type is concerned and then not need to worry about whether or not if you can get the apartment zoning or if you can get this sort of zoning and etc. If you were just allowed to put a reasonable density in the land you wouldn't create some of these artificial inflated prices, you allow people to put more money back into the land rather than wasting it on things that really don't contribute to conservation or livability of the people.

## Open Space and the Planner's Role in Urban Resource Use

Ben Cunningham, Architect  
Jonathan Development Corporation  
Chaska, Minnesota

I always enjoy this role because it is rewarding, after years of drought, to find that it is fashionable to be interested in our environment, interested in how we live. It nurtures us to see that mass media, the magazines and all over the United States people have suddenly become very concerned. To people like yourselves and to people like this panel here, who have been involved with it for a while, at least hopefully we can think that the road home is getting a little clearer. I am sure that it is and from time to time there seems to be some light at the end.

I would like to echo one thing that Bob said having to do with people trying to take a shot at you when you try to do the good job. I have been amazed for a long time at how the small communities who have very nice things--small roads, no curbs, lots of trees and leaves and natural things--always acquire what I call "the big city syndrome" when development begins to approach them and they decide they need forty feet wide roads and great high curbs and certainly make sure the houses are back 35 or 40 feet. They wake up one day and find they have lost the nice thing they had. So I want to reinforce Bob's statement.

I have been asked to discuss "open space and the planner's role in urban resource use." I am going to go quickly through this and hopefully we will have more time for some questions. I think I don't need to expand too much on what the problem is. We have been through a period of some 20 years now of rather explosive, random, uncontrollable growth. This has helped contribute perhaps to an understanding of the problem but at the same time it has created an awful lot of undesirable situations for people. We are looking at urbanization of probably 25 million acres of land that will be urbanized in the next 20 years. We are much concerned with that. I am going to restrict my remarks primarily to that land which is going to be urbanized. There is a broader war of course to be fought and that is the space ship we are riding on. But the 25 million acres that we are going to urbanize, I think, are certainly a short term and an immediate concern. Certainly the planner will play some role in what we do with that. The planner's role is to be concerned with the erosion of our natural resources. Hopefully he will be concerned. His role is to use these resources wisely. That is the role. I could almost stop right there. How is he going to go about this? What does he have to do?

I have talked to a lot of people in the design profession. Everyday they come to see what we are doing. We go to see what they are doing. We get ten books a day more than what I can read. I may get one of them a month read. I think the first thing the planner has to do today is probably to educate himself. I am always amazed at how smart I was when I graduated from college in 1951. I seem to be losing that brilliance steadily and, as a matter of fact, in 1970 I am somewhat amazed that I am able to find my way home. We have an awful lot to learn. I am always a little annoyed by the professional who is in his office some place with great wisdom, waiting for someone to come and let him tell him how to do it. I think to start with, a planner today, more than ever before, or anyone in the design professions has to be involved in a continuing process of educating himself and relearning what he thought he knew already.

I would suggest that the planner must become involved. I have the picture of the complete professional, again in his office waiting for people to come and hear the word. That day

is long gone. If any of you for example have read Toffler's Future Shock, or the Greening of America, I think you will understand what I mean. We must be involved. The planner today, depending on his own individual talents, wants, direction, he has got to be the developer; he has to become the municipal official. He has to be the politician. He has to be the entrepreneur. He has to be the advertising man, consultant, and conservationist. Maybe one or as many of these roles as he is willing to tackle but he must be involved. He can't wait on his haunches for someone to come to him, because that is not going to happen.

We are in a different world, a world that moves very quickly, a world in which decisions are being made by people with an MBA from Harvard (God bless them all) but in the decision making process we have to have the man who is trained in the areas you and I are concerned about. He has to go out there and do it because I'll guarantee he's not going to be invited very often. He has to become involved. He must support vocally, with money, with the resources at his command, all the programs that lead toward a better understanding of our ecosystem. He has to be identified as one who is interested and involved. He has to give more than lip service--he has to do it. Again, I am tired of the people who wait for someone else to do it, but yet seem to be full of a great deal of criticism. These people have to go out and do the job, supporting these systems. Now when we get down to the application of what we are going to do; when we are in a clean slate situation--(no existing development--a clean slate), certainly the primary role of the planner is to identify the existing natural resources and use them. I am not going to expand on that. I think we know what they are. I think this group knows very well what we are talking about. Jim and Bob have touched on it. The planner in the clean slate situation must identify those natural resources that exist. He must honor them in a way they have never been honored before. It is getting very difficult for me to rationalize the losing of a forty year-old oak tree because we would save 8 thousand dollars in the construction role. We can always find the money but we can't always find that tree. This is his primary role: to identify those natural resources and to protect them! In situations where we have existing urbanized areas, a varying scale, all the way from the interesting old parts of St. Paul and Minneapolis which are great cities, out through the mess we've got in the first ring out, we have to be concerned with reintroducing natural features, nature and re-establishing the relationship between man and those features.

Now this of course is the tough nut. This is the hardest thing to do because you have capitol investment, you've got people. You know, people themselves are sometimes --well, maybe you remember Steinberg's cartoon that said, "People are no damn good." Well sometimes they aren't and sometimes people don't really want those good things. There is an old saying I hear occasionally, "Have a lot of committees but don't let anyone vote if you really want to get something accomplished." I am inclined to think that sometimes that may, in fact, be good advice. But the planner's role has to be, in the existing urbanized areas, reintroduce nature, re-establish relationship between man and his features. I think I will end this very simply by saying we have come to a time when we really have to change direction. There is no doubt about it. And we are going to have to start modifying our thinking to fit nature's situation, rather than modifying nature's situation to fit our plan.

## Constraints in Municipal Management of Natural Resources

Tom Van Housen, Architect  
Urban Planner and Municipal Official, Progressive Design Associates  
St. Paul, Minnesota

Being the last speaker of the day offers one the distinct advantage of being able to glean the wisdom of those that have gone before. However it also offers the disadvantage that your bottoms have become very weary of the plastic covered chairs and therefore your mind may have difficulty in absorbing any municipal management constraint my lips may utter.

I play the role today of the bad guys Mr. Finley told us this morning and I have the good guys around me. That is extremely difficult, being a municipal official and serving in many areas in my community. Primarily because I am trained as an architect, urban designer, I am concerned with our environment. But some of the things that Ben and Bob and Jim told you today need to be dealt with. There must be some degree of levity offered between these problems, because what is good for one probably in the end result, with proper design and planning and the use of our resources, could be good for all of us even us bad guys.

Without question I am sure you realize the number one constraint for any type of municipal management today is money, money, money. The lack of it makes whatever is the second constraint far down the list of municipal priorities. Every municipal official I know, when weighing a municipal problem, regardless of all the in between talk that goes on, always comes back to the problem and the question, "how much does it cost and where does the money come from?" Our past and present governors and legislature, mayors, councilmen etc. devote many, many hours to this money problem, tax disparity problem, and the solutions thereof. I am not naive enough to believe I have the answers to that problem. Therefore let us dispense with the number one constraint, money, and pass on to other constraints we may be able to do something about.

We hear much about planning for the future, the year 2,000 AD and we hear today about various population projections, our depletion of natural resources, etc. While the year 2,000 is important, we must first survive the problems of the 1970's. We must begin to solve our problems today. We must talk together as we are today. We must understand each other's problems, as we hopefully will today. As conservationists, developers, architects, planners, educators, we must plan for today as well as tomorrow. We can no longer play the old army game of "never do today what you can put off until tomorrow." Today is very important to all of us.

The League of Minnesota Municipalities, composed of municipal officials, both state and metrosection, have seriously addressed themselves and committed themselves to the solution of the environmental program. They resolved that, "the quality of life of residents in the state is directly affected by the environment. Causes of pollutants to this environment must be reduced to the lowest possible level." That is a resolve. I think you could capitalize on it. They go on to explain the problems and seek the cures for the usual problems: air pollution, water pollution, noise pollution and of course what I call visual pollution, all of which have been referred to in some form today by wiser men than I.

While all the pollution problems are important, I contend that the one pollution we should be deeply concerned with and which bears on all the others is the visual aspect of our natural

resources. We should not slight it as the least priority of all the pollutants as explained by Representative Barr in the defeat of the underground utilities bill just a few weeks ago. Let me cite a few examples, air pollution. We see the smoke or filth exuded and yet we fail to act until it physically disturbs us in some way. We could act on sight, because we know what it does to our health in time. Our research has told us this and our experience has told us this. We saw examples this morning, from Mr. Finley, Dr. Borchert and others: large areas of land erosion. We saw those examples: water pollution, reserve mining's contamination of Lake Superior was I believe a visual sighting first. We know through our able sponsors today that the end result will be what it will be if we tarry too long. We will have an "Erie-Superior." Yet if we take our optimistic twenty-twenty 1971 vision and we improve upon the surprise and delights of our beautiful Minnesota; if we give back in meaningful measure more than we take; and if we cherish it dearly, then we can pass on as the wise old poet who wrote, "I shall pass through this world but once. Any good therefore that I can do, or any kindness that I can show to any human being, let me do it now. Let me not deter, or defer, nor neglect, for I shall not pass this way again."

There are other constraints that we must deal with. We must seek out a uniformity of standards, zoning laws, if you will, and building codes, so that all parties may work and understand our objectives today. We must work for a consolidation of the many diversified natural resource departments, districts etc. It is impossible for a simple soul to come into a natural resource department or municipality and get a simple straightforward answer. For example, last week you may have read about the planned unit development concept prepared over in Hudson, Wisconsin. I don't wish to get into whether it is right or wrong, but it took many, many agencies for this particular developer to go through and come up with a "no go" process. Standards, codes, development guides or whatever must be simply written and understood by all parties.

Each of you receives volumes of mail per week in your respected areas of endeavor. Let me tell you, the municipal official is inundated with mail that even a speed reader can't cope with. He is expected to have the answers for every problem. In part he is supposed to be a 'know it all'. Most small municipal officials must work an eight-hour day to survive and then devote extra hours, many without pay, to municipal problems. One doesn't need a psychiatrist to predict the end result: an over-worked, dedicated and oftentimes ineffective municipal official! I am not being critical of any municipal official. I am simply stating a fact as I have experienced it. A fact that must be understood and must be resolved.

Let me be so bold as to suggest that you must educate public officials to your problems. You must take the problems to them. I recommend to you that you could set up a joint council meeting - planning and zoning - building department meeting in any village at perhaps a normal or even a special meeting. Produce a fifteen to twenty minute well organized, well presented visual information session. Then allow some time for questioning. I think you would be surprised. The Metro Council looked at this with reference to their planned unit development a few weeks ago for which Gbria McGregor has put together a very excellent article on planned unit development. I think it would be worthy of your time to read this particular situation. It was resolved after that meeting that we would go out as concerned people and present this to a number of the municipal people so that they could fully understand what the planned unit development concept is. It would be helpful to our developers who are here today also.

To exemplify several brief points I have made today, I would like to take you on a helicopter ride over the Lino Lakes, Minnesota area, a northern suburb of our seven-county metro area. The purpose is to show you potential natural resource problems and the many people that are involved in it. The metro-council has proposed a 67 acre metropolitan park in open space in the village of 23,000 acres. I do not fault the Metro-Council in any way. It's ration of this park is not only sound; it is bold and it is to be commended. However the village of Lino Lakes has many problems, the Anoka County area has many problems, and the people affected by this land transaction have many problems. They are all very real problems even municipal mangement problems.

This is the metropolitan highway plan around the entire area as basically the ring road system around the entire city; downtown Minneapolis and downtown St. Paul. This is the Lino Lakes area. This is the park proposed for Lake Elmo-Lebanon Hills Park, and Anderson Lake Park: four that are supposed to be before the legislature this year for the setting aside and the land acquisition.

The highway problem creates many problems for a village this size. Here we have 35W going up the line, we have 35E at this point, we have a lake system in this area bisected from another lake in the Rice Creek Watershed District that goes on up. We have a community to-tally divided into three basic sections, all of which makes it very difficult to administer. Here is an area where the municipal officials have never seen what the village looks like from the air, yet they are making major decisions all the time, based on two dimensional planning and not three dimensional planning of the area. Here again we see 35E, 35W, the lake situation, weaving all the way down, certainly an area to be commended for a metropolitan park system. All of the land that you see here -- 6,700 acres: 2,500 acres of it a lake, 2,000 acres of it are basically marginal land and 2,000 acres of it are good land.

Just quickly, almost all of the land through these areas, in the Rice Creek Watershed District, going on up into the lakes systems here, is again bisected. The highway engineers have come right through here; they have not been concerned that the conservationist be involved on the planning work; landscape architects have not been involved. It has not been a team approach to good land planning in a community, or the conservation of our natural resources.

Here again you see an area from the opposite direction, Lake Rushing which was developed under the planned unit concept by Mr. Emil Jandrick of United States Lakes and Development. Here we have been late in getting a proposal like this before the people, but yet the planning concept is not a bad concept. The only problem many of you may have is that there was a dredging of the lake in this area, again a constraint that municipal management, and municipal people are very unfamiliar with. They must come to people like yourselves for that information.

Here again the freeway coming right through the small community of Centerville, going to the basic park system. Certainly in large areas, of recharge areas, of water areas, every description of water fowl, animals, deer are found and we look at this and we say 6,700 acres of land! But if we really look at this as a tax problem and the loss of revenue in this area, it really isn't so great. The municipal official then must have the creative thought and the foresight to begin to look at higher densities, to gain back some of that tax loss. And it can be done.

Man really hasn't been so dumb. He has developed all the good land, and most of the marginal land as you see throughout the whole area has been preserved. He hasn't built on it because the water table in this area is very high. The sub soil in this area holds a great deal of water. Many of those lakes are very shallow. There is a heron rookery in this area that holds a great deal of interest to wild life people.

We even get into conflicts with the Rice Lake area. Here is an area where prevailing winds are from this side to this side, so they have constructed a sea plane base on it. But again all of these lakes are inter-connected. There is approximately a one foot lake level difference here. This is a high lake and it flows down through this system into this area, and the heron rookery area is basically over in here. Now possibly the sea plane base can be good for a park system. That has yet to be determined. The concept of the park system is good.

Now the other municipal problem is dredging out of the lake. Many of you may have been involved with the problems of this lake. I got into the picture with these people after the fact and not before the fact. But here is a lake they want to develop with single-family housing directly on the shores in many cases and some townhouses in conjunction with it. Truly a planned unit development concept. Now that concept isn't bad. It developed with the golf course and all the amenities etc. and I think the unit density on something like that is around the figure that Bob mentioned; about six dwelling units per acre as a total. That is not bad planning. You might just look at what you call, at this stage, the raping of the land, if you will, but I think in a long term, this can be good to the developer, to the owner and to the municipality.

And of course we usually get into the badly designed trailer courts along the shore, polluting the shoreline and in this case we also have a water pumping station that comes on down into the St. Paul water system and much of this land is also controlled by the St. Paul water system.

Then great areas of recharge. Here again man has built on the good land and left the excellent trees and the recharge areas as they are. He can not afford to build there until the density becomes so great in that area that he can justify the cost. It's really a beautiful community. It has been preserved but I am afraid the influence of the highway system is going to make this a challenge to every developer to immediately come out here and do something. We have to be, as a municipal government, creative enough to see the potentials and to put them to uses for all of us. We have suggested to the Metro-Council that they continue on up and that highway work be done in this area so one can continue to pass through this area and continue on up the Rice Creek Watershed District.

Again, just a review of where we are in relation to the highway system. I think you as resource people must have much more input in it than you have had. Of course we are all very bright people in this room and we all know in which direction we are going.

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January 6, 1972

TO: The Librarians of our Public and College Libraries  
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FROM: The Association of Metropolitan Soil and Water  
Conservation Districts

Dear Friends:

Did you know that:

1. Soil is the greatest pollutant, by volume, in water in Minnesota?
2. Over half this soil comes from the urban areas as cities expand?
3. There is an increasing concern among environmentalists about this?

To make information available to people coming to your library looking for facts on this subject, we hereby present to you a copy of the "proceedings" of a Land In Transition Symposium held in St. Paul in 1971.

Sponsor of this conference was the Association of Metropolitan Soil and Water Conservation Districts. The "proceedings" were assembled and printed at considerable cost. We hope that you will make it readily available to those interested.

Further information or additional booklets on this subject may be obtained from this agency:

State Soil and Water Conservation Commission  
St. Paul Campus, U. of M.  
St. Paul, Minnesota 55101  
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