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Iowa Natural Resources: Issues in the 80's (A Symposium at the 1982 Annual Academy Meeting)

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Iowa Natural Resources: Issues in the 80's (A Symposium at the 1982 Annual Academy Meeting)

This symposium was originally conceived in an organizational meeting at U.N.I. on September 10, 1981. At that time the prospective topic was designated merely as "resource depletion", so as to attract contributed papers from as wide a cross section of I.A.S. members as possible. Partly because of my backgrounds in mining and metallurgical engineering, I was later drafted to organize the symposium. Hence, I began to seek colleagues who could outline the shortage problems being anticipated by the U.S. for critical strategic metals. Professor O. Norman Carlson of I.S.U. was invited to speak on that subject (see abstract below). I also contacted Jean C. Prior of the Iowa Geological Survey who invited State Geologist Donald Koch to speak about the depletion of Iowa's mineral resources. As his abstract indicates, he would emphasize water as a natural resource.

It was only as an afterthought, prompted in part by concerns aired in the news media, that I decided to stretch the traditional view of a natural mineral resource and seek a speaker who would discuss Iowa's topsoil inventory a natural resource one for which conservation measures are in order, especially in connection with avoiding soil

erosion. I called upon Ken Frey of Agronomy at I.S.U. who recommended Gerry Miller as the invited speaker. Dr. Miller reviewed the soil erosion problems across Iowa and discussed no till farming as one means of suppressing soil loss due to erosion.

The call for contributed papers elicited three responses of which two in soil reclamation were accepted (see abstracts below). A third paper on solar energy was rejected by the organizer because of a time shortage and my opinion that solar energy is not commonly thought of as a natural resource commodity in the same sense that material substances are.

I wish to thank all those who helped me arrange this symposium either by recommending invited speakers, accepting our invitations, or by offering to contribute their abstracts and papers for our consideration.

John W. Patterson
Materials Science and Engineering
Iowa State University, Ames

A. Availability of strategic metals for U. S. technology.

O. N. CARLSON

Department of Materials Science and Engineering
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Ames, Iowa 50011.

The paper examines the technological importance and availability of the ores of four metals that are of critical importance to the security and technological preeminence of the United States. The quality and reliability of foreign sources of the ores of chromium, cobalt, nickel and titanium, together with the prospects for new domestic sources will be evaluated.

B. The View of the Iowa Geological Survey

D. L. KOCH

Iowa Geological Survey, Iowa City, IA

A general overview of the status of Iowa's mineable minerals will be presented, based on data collected through the Iowa Geological Survey. Coal, gypsum, sand, gravel, and clay for ceramic and brick production will be among the mineable materials surveyed; but the primary focus will be on current and anticipated problems with Iowa's ground water, its quality and supply. The need for increased monitoring and permit regulation for water use will be discussed.

C. Depletion of Iowa soils

G. A. MILLER

Dept. of Agronomy, Iowa State Univ., Ames, IA 50011

Iowa has the greatest amount of soil erosion on cropland of any state in the nation. According to the 1977 USDA National Resource Inventory, the annual average sheet and rill erosion on cropland in Iowa is 261,253,000 tons. This is equivalent to 9.88 tons per acre per year. Approximately 12 million of the 27 million cropland acres in Iowa are eroding at rates exceeding 5 tons per acre per year. During the past 80 years 75% of Iowa's land has been in cropland. 1970 row crop, corn and soybeans, was 16.2 million acres, up 5.5 million acres from 1950. Between 1972 and 1981 an additional 5.22 million acres were planted to row crops. The major increase of row crop acreage occurred in west-central, southwest, and northeast Iowa. These regions have a greater percentage of slopes exceeding 9% gradient than other areas of the state. An analysis of increased row crop acreage by slope class for 14 western and six southern Iowa counties indicates that soybean acreage between 1967 to 1979 increased at greater rates than corresponding increases in corn acreage on 5 to 9, 9 to 14, and 14 to 18% slope gradients. These data suggest potential soil erosion on steeper slopes was not considered in farmers' decisions to increase row crop acreage in southern and western Iowa.

D. Corn yield and root response to tillage on reclaimed soil

G. PEREGRIM and S. J. HENNING

Agronomy Dept., Iowa State University, Ames, IA 50011

A major problem encountered in reclaimed land is soil compaction. The breakdown of soil structure during transportation and storage and from the repeated high pressures from reclamation vehicles leads to high soil strength which can reduce root penetration and growth. The research conducted was designed to study the effects of tillage on reducing compaction associated with reclamation. Plant yields and rooting data were collected over six tillage treatments and compared with an unmined control plot. Root data were collected using a fiber optic system in conjunction with mini-rhizotrons. The mini-rhizotrons consist of clear plexiglass tubes which are inserted at a 45° angle under the corn row. As the roots grow, they intercept the mini-rhizotron and may be photographed and counted with the aid of the fiber optic viewing system. Corn yield data provided evidence that deep moldboard plowing and slip plowing produced higher grain yields than the control. Root data showed deeper and denser root distributions on slip plowed soil. The unmined control plot produced significantly higher corn yields and deeper and denser root systems.

E. Row crop response to topsoil restored on borrow areas.

S. J. HENNING and H. D. DOLLING

Agronomy Department, Iowa State University, Ames, Iowa 50011, and Roadside Development, Iowa Department of Transportation, Ames, Iowa 50010.

Borrow areas are created where soil is needed to provide fill for construction projects. This research evaluated (1) the changes in row crop productivity resulting from removal of soil for highway construction in Iowa and (2) restoration methods which included: depth of topsoil, subsoil tillage, manure application, and two years of legume growth prior to row cropping. The research was carried out from 1977-1981 at four locations. Corn and soybean yields from borrow areas have been below, equal to, and greater than yields from undisturbed, neighboring farmland. Little or no yield increase was noted from restored topsoil at coarse textured sites. At finer textured sites, a marked yield increase of both crops occurred after the addition of 6 inches of topsoil but little added yield increase resulted from restoring 12 inches of topsoil. Subsoil tillage has shown little or no beneficial effect on crop yields. The manure treatment has resulted in a corn yield increase but only in the first year after application.