The Discipline of Soil Science: How Should It be Organized?

(A Guest Editorial)

Major changes are occurring in soil science as the discipline adjusts from responding primarily to the needs of crop production to an increasing involvement with the role of soils in ecological processes. This change is a topic of many discussions among soil scientists today. In these discussions, we agree on the kinds of changes that are occurring, and are thinking about what institutional changes and what changes in the discipline will be required in this transition.

It is obviously not a case of dropping our contributions to the important applications of soil science to crop production, but rather of adding major contributions to the role of soil science in ecosystem processes. Various changes in society have made environmental concerns a major driving force for soil science. We have adequate supplies of food, and hence are able to concentrate our attention on other aspects of quality of life. In addition to human health, we are now concerned about the health of other species, which depends on the quality of their habitat. The nature of soils and the processes of cycling and decomposition that take place in soils are important in maintaining the health of that habitat. Continuing deterioration of water quality is now seen as resulting mainly from nonpoint sources of pollution, i.e., from land–water interaction, with soils as a major determinant. Soils as source and sink for \( \text{C} \) are important components of climate change models. These changes in the questions we ask about soils will become more pronounced as we proceed from an era in which our environmental concerns were the cleanup of polluted components of the environment to a perspective where all our economic production systems will be designed to be sustainable, with fewer undesirable byproducts or external effects. This is the change from pollution cleanup to pollution prevention.

The present 10 divisions in the Soil Science Society of America are based on the application of soil science to soil (Divisions S-1, S-2, S-3, and S-9), or on different land uses (Divisions S-7 and S-10). Division S-5 is based on the inherent characteristics of soils. These divisions influence teaching, organization, and hiring in universities and other institutions. We define ourselves through these divisions, and it is very likely other scientists see us in this way, that this is not a good organization to enhance the contribution of soil science to ecosystem processes and our need to communicate with them.

It has been argued that it is the work being done, not how we divide it, that is relevant. But I would argue that institutional organization does matter. It influences how we think about our discipline, how we staff our departments, how we describe problems, and how we solve them.

A possible reorganization could be along the lines of the main processes occurring in soils. They could be divided into the following four groups. These are the same as the four models discussed by Stone (1975).

1. “Biogeochemical and Physical Processes in Soils” include the reactions that result in fluxes of nutrients, air, and water in soils. These are interrelated. Our separate groupings of soil chemistry, soil biology, etc., are 

2. “Land-Water Interaction” would include the important role of soils in partitioning water at the earth’s surface, of runoff and erosion in landscape processes, and the important aspects of water quality as well as water quantity, both surface and subsurface. 

3. “Soil Processes and Ecosystem Functions” include the cycling of C, N, P, etc., and the decomposition of organic matter. This is also interrelated. Our present organization by application (S-1, S-2, S-3, S-9) could be viewed as attempts to study the distribution of soil processes and ecosystem functions. 

4. “Soil Classification and Assessment” includes the processes of soil classification, soil survey, and soil assessment. This is often included in the physical and chemical properties of soils, as well as in land use and management. This is the least interrelated.

In summary, any reorganization of soil science would have to take into account the need for understanding the interaction of soils with other components of the environment, and the need to communicate with other disciplines.