

2.0 | Soil Classifications

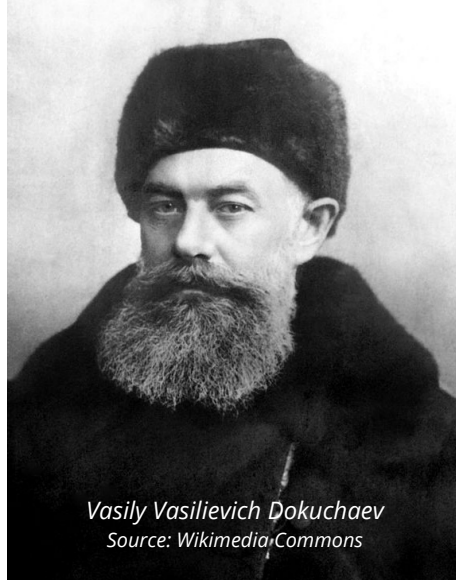
2.1 | History and Approach to Soil Classification

Soil science, just like biology and chemistry, has a classification system and this system of classification has evolved with time. The evolution of soil science and soil classification is directly linked to our ability to better understand soil processes, the realization that soils are living /dynamic systems and not just substrate, our ability to process, depict, and map larger amounts of data, and a better and more detailed understanding of our geologic and climate history. The growth of the field of soil science has been facilitated by the development of classification systems that reduce the use of regional jargon. The development of computer technology, remote sensing, and global position systems has helped to facilitate more accurate and high-quality maps that make it easier to share and depict environmental data.

The combination of an increased awareness of the 5 soil forming factors and the 4 soil forming processes along with the development of a classification system has permitted soil science to expand from its early role of improving agricultural production into a field with an additional focus on environmental and engineering applications to soil science.

In order to understand our future, we must look to our past and review some of the key developments in soil classification. The very early soil classification system used by the Greeks and others was primarily related to the “fertility” or the “infertility” of the soil as applied to agriculture and land-use. Even though

the main focus was agricultural applications and general construction, it was not until the 18th century that soil science started to integrate components of geology, chemistry, engineering, and the agricultural sciences. Most of this early work focused on the idea that the soil was simply a medium or a substrate, like gravel, to be used and not really a living system that could be managed. This early understanding resulted in the creation of the Humus Hypothesis, i.e., that soil fertility was linked to the amount of humus material present in the soil.



Vasily Vasilievich Dokuchaev
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It was not until the mid-19th century that Vasily Vasilievich Dokuchaev, a Russian geologist/geographer, laid the foundation for what we consider to be a soil classification system. It was his hypothesis and systematic approach that soils were not just a passive system, but part of a living and dynamic system that was influenced by geographical location, climate, parent material, time, and vegetation, i.e., the 5 soil-forming factors. He recognized the concept of soil profiles and soil horizons and that these soil horizons form over time and

that the nature of these horizons were directly linked to the 5 soil-forming factors and 4 soils-forming processes. Because of this forward-looking approach, V.V. Dokuchaev has been called the “Father of Soil Science.”

V.V. Dokuchaev used his classification approach to develop a soil map of Russia and this map depicted the regional variations in soils using his concepts of soil zonality. Under this concept, the soils and soil profiles for a region are in dynamic equilibrium with their current environment.

This linkage between soil profiles, soil horizons, and environment permitted a better understanding of how these regional variations could be interpreted to better understand and manage soil fertility and agricultural production. This conceptual approach is the foundational principle for the implementation of sustainable agriculture, developing engineering and environmental soil management approaches, and looking to maintain a healthy and productive soil system.

Dokuchaev's soil-zonality theory influenced later soil classification systems worldwide. This concept became a core part of modern soil classification, especially in systems like the USDA Soil Taxonomy and the World Reference Base (WRB) for soil resources. After the initial work of V.V. Dokuchaev, a combination of Russian, American, and European scientists further refined his concepts, and with time the Natural Body Concept of soils was developed. The natural body concept considers soils as individual bodies that have unique characteristics that can be used to classify / group soils. This approach evolved from an understanding of the concept of landscape, polypedon (soil individual), pedon, and soil profile (discussed later).