



## FROM THE DESK OF RATTAN LAL Viewpoint 9.2018

1<sup>st</sup> September 2018

### Subject: Drought and Ancient Civilizations

Fellow Soil Scientists,

The demise of some historic and once thriving civilizations has been attributed partly to climate change and to the ensuing drought. The demise of Akkad (ancient Iraq circa 2150 BC) is attributed to clouds which refused to rain (the Curse of Akkad). Drought has been a recurring challenge in the Middle East. The fall of the Indus Valley Civilization is linked to the climate change and the prevalence of meteorological/hydrological drought. The mean annual rainfall in the Indus Valley ranged from 800 to 1000 mm from 6000 to 4000 year before present but declined to 200 to 400 mm from 4000 to 3500 year before present when the collapse occurred. A sharp decline in rainfall over 300 years may have also led to the collapse of ancient Greece about 3200 years ago. A similar problem led to the collapse of the Mayan Civilization of Central America (Mexico). The mean annual rainfall decreased by 40 to 70% during the 800 to 1000 CE compared to the present day rainfall. During the same period, the decline of Tang Dynasty in China is also attributed to weaker Asian summer monsoon rains during the 8<sup>th</sup> and 9<sup>th</sup> century AD. The Ancestral Puebloans, dominant across the Colorado Plateau, collapsed due to climate change around circa 12<sup>th</sup>-13<sup>th</sup> centuries. The famous city of Angkor Wat collapsed in 15<sup>th</sup> century because of extreme environmental conditions. The severity of meteorological/hydrological drought is also exacerbated by sub-optimal soil conditions. Soil-related drought, an insufficient supply of green water in soil at critical stages of crop/plant growth, is intricately interlinked with attributes of soil solum and to properties and processes which determine the plant available water capacity (PAWC) of the root zone. In addition to an effective rooting depth, other determinants of PAWC include soil texture, clay minerals, and soil organic carbon (SOC) concentration. The latter plays an important role in enhancing PAWC of light-textured soils containing relatively low clay and fine silt fractions. An interaction between SOC and clay minerals can alleviate the adverse impacts of drought. Management of SOC, for improving soil hydrological properties (water transmission and retention), can reduce the severity and duration of pedological/agronomic drought. In addition to the properties of soil and landscape, the incidence of pedologic drought may also be aggravated by the projected climate change. Increase in the incidence of forest fires, associated with sizzling summer and widespread heat waves in Europe and the Western USA in 2018, are stark reminders of the adverse effects of global warming. Soil degradation, aggravated by the current and projected climate change, exacerbates the impacts of anthropogenic drought. The soil moisture regime, especially the PAWC, interacts with the atmosphere through evaporation-precipitation cycle. Drying of the soil, aggravated by global warming, accentuates drought and its ramifications in terms of the loss of NPP (Net Primary Productivity) and the attendant decline in SOC stock. **The strategy is to adopt management practices which create climate-resilient soil and the associated agroecosystems. For the sake of humanity, nature and the planet, sustainable soil management is essential to alleviate incidences of drought because enhancing soils anywhere enhances life everywhere.**

Sincerely,

Rattan Lal,  
President, International Union of Soil Sciences

