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Spatial distribution of electrical conductivity values in Basra Governorate, based on ground measurements and remote sensing data.

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Abstract:

The study was conducted for the purpose of tracking and evaluating the state of soil salinity in province of Basrah, which is located within the arid zone, between latitudes 29°.06' , 31°.18'N, and longitudes 46°.34' , 48°.36'E. The study relied on the results of laboratory analysis of soil samples, that collected from the study area during September 2020 and April 2021, and compared them with the values of salinity evidence for the sample collection sites calculated from space data, of the ETM $^{+}$ and OLI sensors of the Landsat satellite series, which were obtained from US Geological Surveys Website (USGS). Soil salinity spatial distribution maps and area calculations were prepared using the ArcGIS v.10.7.1 program. The results showed that most of the study area's soils suffer from the problem of salinity, as the area ratios of medium, high and very high salinity soils were 51.79, 30.50 and 9.94%, respectively. While the percentage of soils with low salinity reached 1.03%.The values varied according to the location and depth, as the values ranged in the eastern region from low to very saline, and the values increased as we moved away from the banks of rivers towards river basins.The results showed an increase in average values when heading from the north to the south of the study area, and that the salts were concentrated in the surface layers of the soil and decreased with depth. In the western region, the results showed lower average values compared to the eastern region, as it ranged between low to medium salinity. At the end of the dry season.The results also showed, in general, a decrease in the general rates of electrical conductivity values in the cultivated areas compared to the soils of the non-agricultural areas.

Keywords: Soil Salinity, Salinity Index, Remote Sensing, GIS, Basrah Governorate.

1-Introduction:

The spread of soil salinity on a large scale is one of the most important factors of soil degradation that threatens food security and sustainable development, especially in arid and semi-arid regions. Soil salinity is one of the important indicators that determine the quality of the soil, as the increase in the concentrations of dissolved salts in the root zone leads to the deterioration of soil properties, a decrease in the productivity of agricultural crops, and the spread of desertification around the world (Allbed and Kumar, 2013).Salinity disperses soil particles, erodes them, and decreases their productivity. It also affects the mechanical properties of the soil, which makes it less bearable for the weight of the structures built on it (Abuelgasim and Ammad, 2018).

Litalien and Zeeb (2020) showed that soil salinization processes can be classified into two types: primary salinization processes, which is a natural phenomenon that occurs as a result of the physical and chemical weathering of parent materials rich in salts, or by the movement of groundwater rich in salts towards the surface of the soil and its evaporation, leaving dissolved salts to precipitate at the surface, especially in dry climatic conditions. As for the second type, it is the secondary salinization processes. This type is related to human activities. This type is active in arid and semi-arid regions when irrigation water with certain salt concentrations is used in poorly drained soils under conditions of drought and the activity of the evaporation process.Removing the vegetation cover, changing the use of the land, and using a large amount of irrigation water leads to a change in the state of the water balance, the rise in the ground water level, and its evaporation from the surface due to the

[1]Part of PhD dissertation of the first author