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The Sensitivity of Electrical Geophysical Methods for Mapping Salt Stores within the Soil Profile

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Abstract : Soil salinization is one of the most hazardous phenomenons accelerating the land degradation processes. It either occurs naturally or is human-induced. High levels of soil salinity negatively affect crop growth and productivity leading land degradation ultimately. Thus, it is important to monitor and map soil salinity at an early stage to enact effective soil reclamation program that helps lessen or prevent future increase in soil salinity. Geophysical method has outperformed the traditional method for assessing soil salinity offering more informative and professional rapid assessment techniques for monitoring and mapping soil salinity. Soil sampling, EM38 and 2D conductivity imaging have been evaluated for their ability to delineate and map the level of salinity variations at Second Ponds Creek. The three methods have shown that the subsoil in the study area is saline. Salt variations were successfully observed under either method. However, EM38 reading and 2D inversion data show a clear spatial structure comparing to EC1:5 of soil samples in spite of that all soil samples, EM38 and 2D imaging were collected from the same location. Because EM38 readings and 2D imaging data are a weighted average of electrical soil conductance, it is more representative of soil properties than the soil samples method. The mapping of subsurface soil at the study area has been successful and the resistivity imaging has proven to be an advantage. The soil salinity analysis (EC1:5) correspond well to the true resistivity bringing together a good result of soil salinity. Soil salinity clearly indicated by previous investigation EM38 have been confirmed by the interpretation of the true resistivity at study area.

Keywords : 2D conductivity imaging, EM38 readings, soil salinization, true resistivity, urban salinity
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