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Modelling effects of land use intensification and soil management practices on field water cycles and water use efficiency in Bangalore, India

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Over the last decades the rapid expansion of the city of Bangalore and the associated population growth led to changes in agricultural management practices, which resulted in an increase in irrigated areas compared to rain-fed areas and enhanced use of mineral fertilizers.

To analyse the long-term impact of this transformation on soil properties and the water cycle, two sets of plot trials (rainfed and irrigated) were established at the University of Agricultural Sciences Bangalore (UASB) GKVK campus. Lablab (*Lablab purpureus* L. Sweet), finger millet (*Eleusine coracana* L.Gaertn.) , and maize (*Zea mays* L.) three crops common to the region were sown and treated with three species-specefic levels of N fertilizer (high, medium, low). A soil moisture network consisting of 216 sensors was installed at the rainfed and irrigated sites at three depths (15, 40 and 70 cm). Soil moisture data has been collected since 2017 and is used to calibrate and validate a 1D Richards-based model HYDRUS-1D. The results of the analysis of variance (ANOVA) of the moisture data indicate significant differences in the water uptake of maize and millet crops in the wet seasons, but smaller differences over dry seasons. The initial modeling results confirm the statisticals findings, with millet plots under higher N treatments having higher water uptake and less evaporation than the low N treatment plots, while the differences in lablab plots are negligable.The modelling will, however, continue over both wet and dry seasons to assess how limited amounts of water would affect the differences between N treatments.