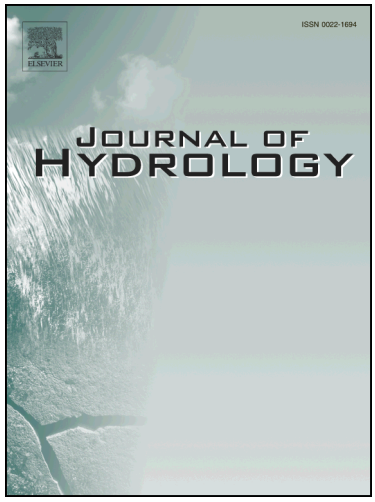

Research papers

Evaporation from bare soil: Lysimeter experiments in sand dams interpreted using conceptual and numerical models

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Evaporation from bare soil: Lysimeter experiments in sand dams interpreted using conceptual and numerical models

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Abstract

Unlike evaporation from open water, the magnitude of evaporation from bare soil decreases as the water table falls. Bare soil evaporation studies have included field and laboratory experiments, mathematical formulations and semi-empirical models. However, there is only limited field information, especially concerning evaporation from bare sand. The semi-empirical approach of the FAO[1] Irrigation and Drainage Paper 56, which contains guidelines for computing crop water requirements, can be adapted for bare soil evaporation with a three stage process. The suitability of the FAO 56 approach for bare sand evaporation is investigated by installing lysimeters in sand dams. Sand dams are shallow groundwater storage systems, which are designed on the assumption of reduced evaporation as the water table falls. The field results from the lysimeters are simulated adequately by a water balance model based on FAO 56 with an additional component to represent both the difference between the variable saturation with depth, which occurs in practice, and the assumption in standard water balance models of a sudden change from dry to fully-saturated conditions at the water table. This study demonstrates and quantifies the reduction in bare soil evaporation compared to open water or cropped areas and confirms the validity of the three stage FAO semi-empirical approach.

Keywords

Evaporation, lysimeters, sand dams, bare soil

1. Introduction

[1] ETo - Evapotranspiation

FAO – Food and Agriculture Organisation

REW - Readily Evaporable Water

TEW - Total Evaporable Water