



Effects of biological soil crust development on the hydrological behavior of vegetation-stabilized sand dunes in arid desert ecosystems of NW China

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Approximately 24.5% of the Chinese area locates in arid and semi-arid area in northwest China, which has been severely affected by desertification. An experiment to evaluate the effects of dunes fixation by vegetation was carried out at Shapotou in Ningxia Hui Autonomous Region at the southeast edge of the Tengger Desert using xerophyte shrubs (*Caragana korshinskii*, *Hedysarum scoparium* and *Artemisia ordosica*) planted in straw checkerboard plots initiated in 1956. The artificially stabilized shrub-covered dunes have strongly enhanced the formation of biotic crusts. Knowing if and how local hydrological processes are altered by desert ecosystems restoration is basic to create vegetation-protective systems that control or cease migration of sand dunes.

Accordingly, the main objective of this work was to evaluate the time dynamics of the hydraulic properties and surface infiltration behavior with the general soil formation processes. We compared the soil physical and hydraulic properties, along with infiltration characteristics of soils of vegetated and un-vegetated sand dunes.

Finally, by numerically simulating water flow processes naturally occurring in the area, we investigated if the changes in the surface infiltration behavior, local by nature, have consequences on the fluxes deeper in the soil profile

Key words: Microbiotic crusts, Hydraulic properties, Sand dune migration, Tension infiltrometer method, Numerical simulations