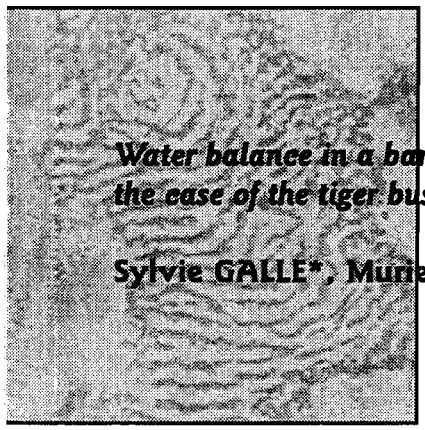

Water balance in a banded vegetation pattern: the case of the tiger bush in Western Niger

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An intensive survey of a bare soil/vegetation system was performed on a banded vegetation pattern (tiger bush) located on a lateritic plateau in western Niger from 1992 to 1994. The global functioning of the system is strongly related to the hydrological cycle, and therefore it is of concern to characterise and quantify its components. The objectives of this paper is to study the spatial distribution of soil water within the bare soil/vegetation system, and to establish the water budget at both the event and the annual time step.

Field measurements involved soil moisture (neutron probe) and local runoff (runoff plot) monitoring. They show that infiltration of water into the soil is strongly related to the location within the system: water storage from the bare soil is low, much higher in the front bush, and very high in the centre bush. This spatial pattern is steady over years. Runoff on the bare soil zone accounts for one half of the annual rainfall depth, and due the system geometry, the bare soil zone constitutes a natural surface water feeding area for the bush that thus benefits of a water amount about 3 times higher than the annual rainfall depth. At the event time step, soil water storage can exceed 12 times the rainfall depth in the centre bush, with an average value of 7 times. As shown on the water profiles, infiltration under the bush is rapid and deep (more than 6 m), probably due to a faunal macroporosity. Estimated to about one time the annual rainfall, deep infiltration is likely to contribute to aquifer recharge.

The water feeding of the bush by the bare soil zone, associated with vegetation dynamics allow to explain vegetation banding. The hydrological functioning describe here (runoff, sediment yield)

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associated with the issues of other recent studies, strengthens the hypothesis of upslope displacement of the vegetation bands over years.