

## **Investigating transport capacity equations in sediment yield modelling for the Cariri semi-arid region of Paraíba-PB/Brazil**

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**Abstract** In the semi arid Cariri region of the state of Paraíba, Brazil, runoff is of the Hortonian type generated by excess of rainfall over infiltration capacity, and soil erosion is governed by rainfall intensity and sediment size. However, the governing sediment transport mechanism is not well understood. Sediment transport generally depends on the load of sediment provided by soil erosion and on the transport capacity of the flow. The latter is mainly governed by mechanisms such as water shear stress, or stream power. Accordingly, the load of sediment transported by the flow may vary depending on the mechanism involved in the equation of estimation. Investigation of the sediment transport capacity of the flow via a distributed physically-based model is an important and necessary task, but quite rare in semi-arid climates, and particularly in the Cariri region of the state of Paraíba/Brazil. In this study, the equations of Yalin, Engelund & Hansen, Laursen, DuBoys and Bagnold have been coupled with the MOSEE distributed physically based model aiming at identifying the mechanisms leading to the best model simulations when compared with data observed at various basin scales and land uses in the study region. The results obtained with the investigated methods were quite similar and satisfactory suggesting the feasibility of the mechanisms involved, but the observed values were better represented with Bagnold's equation, which is physically grounded on the stream power, and we recommend it for simulations of similar climate, runoff generation mechanisms and sediment characteristics as in the study region.

**Key words** flow transport capacity, physically-based model; semi-arid region