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Eco-physiological and hydrological responses to pulsed rain and the relationship with landscape position in the Great Sandy Desert, Australia

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Understanding the pulsed ecological and hydrological response to infrequent rain events is key to better designing the rehabilitation of post mining landscapes in arid systems. Here we present the results of two years of heat pulse sap flow, electrical resistivity tomography (ERT) and soil measurements on two hillslope - swale - flat systems in the Great Sandy Desert, Australia. Monitoring revealed that despite the occurrence of high intensity rainfall no significant surface runoff was observed to be shed from the hillslope while at the same time little infiltration was observed too. This suggests the rocky cover was acting to intercept and evaporate a significant proportion of the rainfall. The subdued physiological response of shrubs and trees on the hillslope relative to the flat and swale supports this too. Sap flow measurements also indicated the swale to be a store of plant available water which ERT results suggests is partly derived from subsurface lateral redistribution of water from the hillslope. In addition to landscape positional differences, sap flow measurements also revealed a variety of species specific water use strategies in response to these pulse events. As post mining hillslopes currently lack a swale the challenge for predicting the short term eco-hydrology of these artificial systems will be to identify which plant strategy will be successful at the edge of these hillslopes.