Trajectories of ecological change at a patch scale in a semi-arid woodland

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Introduction This study is exploring the complex biogeochemical processes which drive ecosystem function in a patchily vegetated woodland . It quantified the differences in functionality which occur at a patch scale and draws management implications .

Materials and methods The sampling was conducted in semiarid red sandplains supporting acacia (mulga) shrublands with perennial grasses in Western Australia (28° 40′ S , 116° 30′ E) . A total of 11 different condition subclasses of patches and interpatches were originally identified based on biophysical features . Six parameters were measured (see Figure 1) on representative individual patches and interpatches from each subclass . Data was analysed using a Principal Component Analysis . Transect data was used to calculate the relative proportions of the patch and interpatch subclasses on a paddock scale .

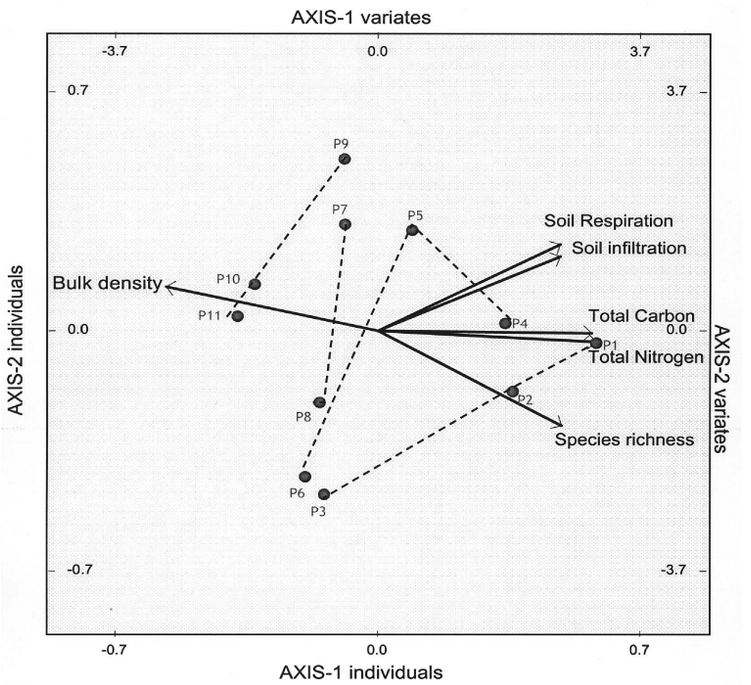

Figure 1 *Differences in patch and interpatch subclasses based on key biophysical parameters (dotted lines highlight the observed gradients between condition subclasses within the same class (i .e . trees and shrubs > 3 m-P1 , P2 and P3 ; trees and shrubs < 3 m-P4 , P5 and P6 ; perennial grasses-P7 and P8 ; interpatch zones-P9 , P10 and P11) .*

Results The results clearly support the hypothesis that different patch and interpatch condition subclasses could be uniquely categorised based on biophysical and chemical properties . High-order patches (e .g . P1 , P4 , Figure 1) were more biologically active , had more than twice the number of perennial species , had 50% higher infiltration rates , and had up to five times higher nutrient content than low-order (P10 , P11) interpatches ($P<0.05$) . Clear condition gradients were established between the different condition subclasses (Figure 1) . Transect results suggest that the proportion of these subclasses in a landscape can be altered by management .

Conclusions Managers should adopt practices which maximises perennial ground cover and biodiversity in mulga woodland by protecting existing high-order patches and promoting the ecological succession of low-order patches and interpatches .