

## Oral presentation Session II

### Bayesian networks for the analyses of tree functions trade-offs in tropical agro-silvopastoral systems

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#### Abstract

Natural system produces several resources and processes, known as ecosystem services (ES), which contribute to human wellbeing. Frequently, different ES are interlinked together, which translates into positive or negative covariation between ES. However, despite its capital importance, very little is known about which are the functions that regulate the different ES, about the effect that different management practices can have on the capacity of natural systems to produce ES or about the trade-offs between different ES.

Groups of species with similar attributes can be linked to specific effects on other organisms, which consequently affect ecosystem functioning and the provision of ES. In this study, we explored the use of Bayesian Networks (BN) to represent the probabilistic relationships between effect traits of trees in a seasonally dry agro-silvopastoral system and three service provision functions (grassland productivity and soil properties under the trees and fodder quality of trees). Based on physiological and phenological traits (for grassland and soil) and chemical components (for fodder quality), we classified trees in functional groups (PFG), estimated the linkages between these groups and the studied functions and evaluated the influence of environmental characteristics on these linkages. The BN approach allowed us to assess the trade-offs between different ecosystem functions.

We found that different PFG can have very different effects on different functions, and that these effects can be strongly modulated by environmental features. For example, there were marked differences in the productivity of the understorey vegetation between different PFG both within and across environments, which indicates that the attributes of trees play an important role determining the effect of trees on understorey vegetation. These results contrasted with those observed for the effect of trees on soil properties, which was generally positive and independent of the effect on understorey productivity, suggesting the absence of trade-offs between these functions.