Assessing the Climate Water Balance Model's Ability to Predict Soil Moisture Variability and Species Distribution of a Forested Watershed in the Northern Cumberland Plateau

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Spatial patterns of moisture and tree species have been studied using environmental gradients, often represented by terrain attributes in GIS. With climate change, GIS terrain variables, which are static as long as the elevation remains unchanged, will not reflect alterations in temperature, water cycle, and atmospheric conditions. In this study commonly used terrain variables and climate water balance variables were evaluated and compared for their ability to explain soil moisture and tree species distributions in a forested watershed in the Northern Cumberland Plateau of the Appalachian region.

The results suggest that GIS terrain variables generally perform better than climate water balance variables in this dissected landscape within Appalachia. However, the differences between the performance is not significant for soil moisture or half of the species studied. Topographic position, a terrain attribute not explicitly considered by climate water balance variables, performed well in its ability to explain both soil moisture and tree species distributions. This suggests that the inclusion of topographic position into or in tandem with future iterations of climate water balance variables could be advantageous.