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Infested Forests and Evapotranspiration II: Developing a Watershed Model, Phase 1

This project represented the first phase of a watershed model by quantifying water in the unsaturated zone of disease infected drainage and a timber managed drainage. It was believed the model would show an increase of flow in the unsaturated zone in the timber managed drainage. Eleven soil moisture sensors were installed in addition to the five already in the study area. A soil characteristic test was conducted for each soil sample. A hanging column test and a pressure plate test were done to calculate gravimetric and volumetric water contents. Data derived from these tests were used to create a soil moisture characteristic curve for each soil sample using the van Genuchten Equation. Results from this curve were used in a hydraulic conductivity equation relative to the matric potential gathered from the soil moisture sensors in the field. From these results, a soil water diffusivity calculation was developed in correlation with the matric potential data. Using these calculations and real time data from the data loggers, a change in soil water diffusivity at each sensor station was determined as well as a total change for each basin. This project found that in the treated basin there was an overall net increase of water diffusing within the unsaturated zone of 138 cm². In the untreated basin, there was an overall net increase of 8,492 cm² of water diffusing within the unsaturated zone. This data illustrates that more water is being stored within the unsaturated zone of the untreated basin. In the treated basin, data illustrates there is more water movement and less storage within the unsaturated zone whether it be to the stream, deep aquifers, or to evapotranspiration.