WaterCAST Model for Upland Hydrology - Framework and Philosophy

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WaterCAST is the upland catchment model which has been developed by the eWater cooperative research centre. WaterCAST presently uses a spatial structure consisting of functional units, sub-catchments, nodes and links. Functional units are the smallest spatial unit and are units of uniform hydrologic response. The sub-catchments are areas that are defined from a the digital elevation model (DEM) as have a single link with a pore point (node) at the bottom of the sub-catchment and contain at least one functional unit. The nodes from the sub-catchments are linked together to for a network that ends at the final node at the end of the catchment.

The hydrology is generated by rainfall-runoff models and/or water balance models applied to the functional units. The water, solutes and sediments are transported to the node in a sub-catchment via filter functions and presently use the event mean concentration (EMC) and dissolved water concentration (DWC) concepts.

The modeling framework is being developed to incorporate more processed based hydrology, solute and sediment transport mechanisms. These developments will build on the present structure and allow spatial connectivity at the sub-catchment level by adding an extra spatial construct of area bands within the sub-catchment. Stochastic rainfall surfaces and downscaled of such surfaces will be added as will dynamic linking to water balance, sediment generation and solute generation modules.

The philosophy for the construction of this model is to build the model as parsimoniously as possible while providing enough processed based understanding to make results insightful. To this end the model is developments are restricted by the data that is available to parameterize and test it.