SWAT P Routines

Upland

SWAT uses a modified version of the soil P pool structure defined in the EPIC model (Figure 1). Two versions are available, one uses fixed pool ratios and the other uses variable ratios based on the total P content of the soil. The labile (solution), active, and stable pools interact independently within each soil layer. Fertilizer application may be surface or mixed into lower layers. Plant uptake occurs from layers within the designated rooting depth. A surface soil layer (10mm) is designated to interact with surface runoff. P leaching from this surface layer is allowed in all versions of SWAT, in more recent versions leaching between layers lower in the profile is also allowed. Soluble P concentration in runoff is based on a soil adsorption coefficient (Kd) approach. Particulate P (often called "Organic" in EPIC derived models) is based on predicted erosion and soil P pool magnitudes.

Instream

The primary version of SWAT uses instream P kinetics derived from the QUAL2E model. It contains soluble and particulate P forms in dynamic equilibrium with an algal pool and an unlimited benthic source (Figure 3). An alternative instream model is available in some branches which is based on deposition and scour of the streambed with EPC soluble P kinetics (Figure 4). Stream bank erosion in all versions is based on eroded sediment mass and user defined P concentration in banks.

Reservoir

SWAT uses a reservoir P model based on a collective settling rate for both particulate and soluble forms.

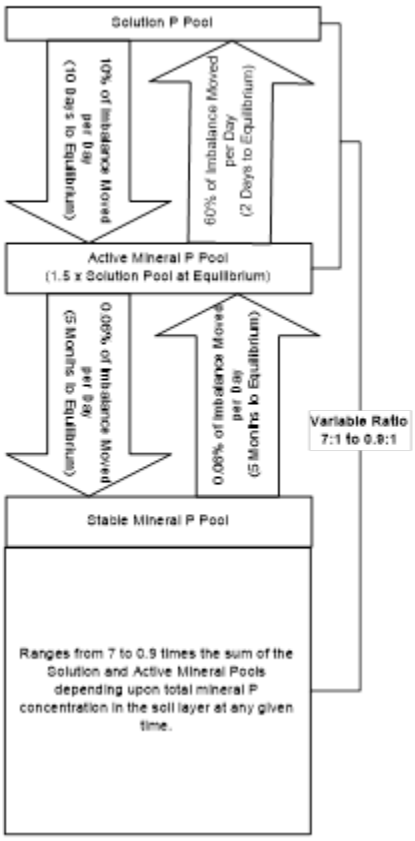

Figure 1. Soil P Pools

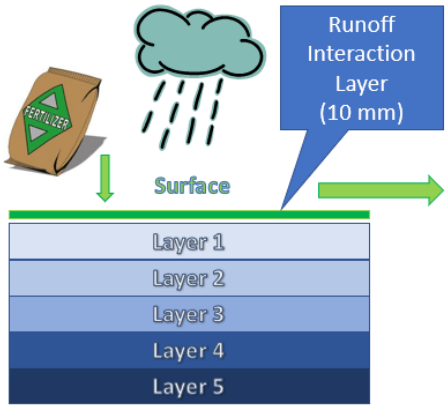

Figure 2. Soil Layers

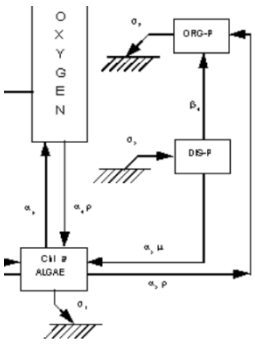

Figure 3. QUAL2E structure

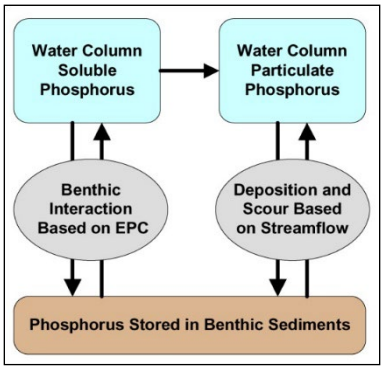

Figure 4. Alternative EPC Model