

# AnnAGNPS P Routines

## Upland

The purpose of the P module in AnnAGNPS is to extract P into runoff and output it from a field (a *transport* process). In doing so an appropriate soil mass balance of phosphorus (P) in a field must be maintained on a daily basis by the horizon or computational layer. This is not a detailed chemical model of P in the soil but simulates the effect of P adsorption that control P availability and partitioning into runoff. The mass balance portion of the model is a simplification of the EPIC (Sharpley and Williams, 1990) P model (Sharpley, et al., 1984) and is partitioned into organic P and mineral P (Figure 1). Mineral P is further broken down into: 1) labile P (P readily available for plant uptake, for example fertilizer P; and 2) active mineral P (P that is more or less reversibly absorbed to the soil), and stable mineral P (absorbed P that is “fixed” or relatively irreversibly chemisorbed to the soil adsorption complex or as discrete insoluble P minerals). An empirical distribution coefficient,  $K_d$ , is used to partition P between the soluble and absorbed phases, thus dictating the amount of P available for extraction into runoff. Sediment-bound P is estimated from soil erosion and is assumed associated with the clay-size fraction of the soil and consists of the organic, active and stable mineral P.

## Phosphorus Source Tracking

AnnAGNPS tracks P transport in dissolved or attached states as organic or inorganic loads from fields, channels, and point sources, impacted by surface runoff or subsurface drainage and conservation practices, such as riparian buffers or cover crops, as P loads enter wetlands, lakes or reservoirs and ultimately to the outlet of a watershed.

## Water Bodies

AnnAGNPS is linked to lake/reservoir models, including QUAL2E and CCHE-WQ (Figure 2), to account for temporal and spatial variations of water quality in water bodies throughout the landscape.

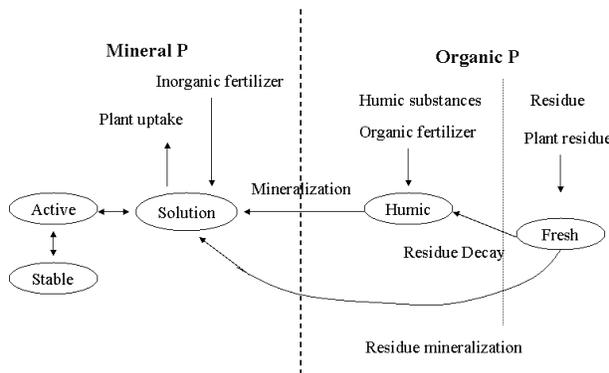


Figure 1. Upland P Processes simulated in AnnAGNPS

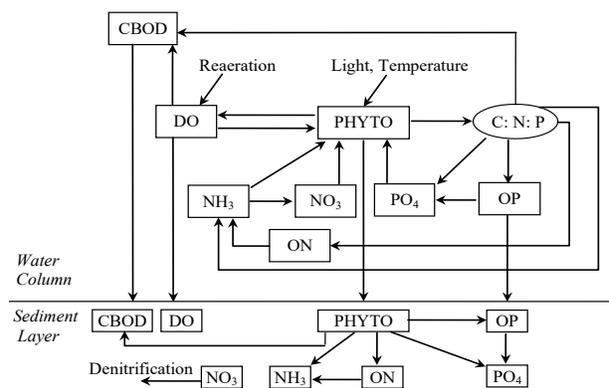


Figure 2. P and bio-chemical processes included in CCHE\_WQ