Understanding Freshwater Quality Problems in a Changing World
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Field to watershed-scale water quality adaptations to address a changing world

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Abstract Limited input data per desired simulation area challenges watershed models capabilities. Weather input is essential for accurate modelling of hydrological processes, yet many world regions do not have these data readily available. The Agricultural Policy eXtender Model (APEX) offers a spatial weather generator to assist these data scarce regions. APEX can also simulate small landscape to large scale watersheds with steep rainfall gradients. The APEX weather generator creates daily weather values that are correlated in time and space, based on monthly weather statistics using a probabilistic method, that are then linked to flow, water quality and soil properties. Recent developments in APEX on streamflow routing methods include the addition of two new routing methods: Storage with Variable Slope and Variable Storage Coefficient. These methods improve flow and in-stream water quality simulation results by incorporating the diffusive momentum in streamflows and channels that are mildly sloped or affected by flashy floods. The alterations in routing allow for proper accounting of the new algorithms in development for contaminants of emerging concern (CEC) including hormones, metals and insects/pests, in addition to improving wetland/riparian zone impacts on these constituents. The CECs are being linked to soil physical and chemical properties (i.e. metals linked to soil saturation and clay content). Carbon, nitrogen, and phosphorus pools have also been altered.

Key words water quality; water quantity; APEX; EPIC; SWAT; model; simulation