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Variability of phosphorus regulation in drains and streams in sandy, agricultural-dominated catchments in southwestern Australia

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Phosphorus (P) is a major nutrient required for plant growth to both provide food directly for human consumption, and for consumption by animals in agricultural production systems. However, P can accumulate to excess in soils and can be then 'lost' to the environment, where, particularly in aquatic environments, it can have negative environmental, social and economic impacts. These anthropogenic impacts on downstream estuarine and coastal ecosystem are an issue of concern on a worldwide scale.

Modeling has suggested that about 40% of the surplus P in sandy catchments (such as in Western Australia) may be stored within the stream network itself- effectively between the "farm" and "catchment" scales – but an understanding of nutrient processing within the actual catchment drainage network is still a significant knowledge gap. Some studies have identified certain factors that contribute to the regulation of P in streams in agricultural catchments outside of Australia, but a single definitive study is still needed to identify the relative importance of each factor.

This project aims to identify the relative importance of in-stream factors that regulate P in sandy coastal catchments in southwestern Australia and to develop more robust, accurate and validated models of P movement through catchments.

This paper describes the early research that has recently been undertaken in the project and describes the variability of drains and streams across the sampling region in regulating P, including particle size distribution within the < 2mm sediment component, P adsorption curves and equilibrium P concentrations as identifiers for variability of P regulation. Of the 13 sample sites over the three catchments (556678 ha), ten of the sediments were sand; the other sites were sandy loam, sandy clay loam and clay. The sand sites acted as a sink for P, the three non-sand sites may act as a source for P or more likely have yet to reach equilibrium after 12 days.