

# Legacy Phosphorus – Have We Fallen Asleep at the Wheel?

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Reducing nutrient loss from agricultural landscapes using management practices in Australia has long been advocated to improve water quality. Water quality, i.e. phosphorus (P) concentrations are commonly used to measure the effectiveness of management practices at the paddock level. However, the effectiveness of paddock scale management practices is often not reflected at a catchment scale, in part due to levels of implementation, but also due to the equilibrium effects of legacy P. The average equilibrium P concentration ( $EPC_0$ ; the concentration where no P was retained or released) of stream sediment in agricultural catchments of the south coast of Western Australia was compared to median P values of historic water quality data from the mid 1990's and late 2000's. The 8 sample sites were located in the southern region of the Wilson Inlet catchment and the mid to northern regions of the Oyster Harbour catchment. Stream sediment (both <2mm and >2mm size fractions) are currently net retainers of P, contributing to legacy P stocks. The catchment scale effectiveness of paddock-based management practices will therefore be influenced by the  $EPC_0$  dynamics of stream sediment, which under some circumstances will be net retainers of P, and in others net contributors of P. This concept of legacy P and  $EPC_0$  is directly applicable to soils, and assists to understand the dynamics of paddock-based P loss. To illustrate the legacy P and  $EPC_0$  concepts, differences in the dynamics of P loss from disparately sized (30 ha and 4000 ha) sandy catchments to which P binding soil amendments were applied will be provided. Communicating the notion of legacy P to broader stakeholders, including the public and politicians is required so that expectations around management practice effectiveness, along with the time required to achieve water quality targets is clearly understood. In some countries, depletion of legacy P stocks in soils and sediments are estimated in hundreds of years. We could expect a decadal time horizon for the Swan Coastal Plain given the sandy nature of its soils. Reductions in nutrient loss at a catchment scale can be made by implementing management practices at a paddock scale, but expectations over the timing of improvements need to be realistic given the influences of legacy P and  $EPC_0$ .