Review of major points in P Principles report by Ronald Wyss Nov 6 2012

Managing agricultural phosphorus for water quality protection: principles for progress

Conclusions Strategies to mitigate diffuse losses of P must consider chronic (edaphic) and acute, temporary (fertilizer, manure, vegetation) sources. Even then,hydrology can readily convert modest sources into significant loads, including via subsurface pathways.Systemic drivers, particularly P surpluses that result in long-term over-application of P to soils, are the most recalcitrant causes of diffuse P loss. Even in systems where P application is in balance with withdrawal,diffuse pollution can be exacerbated by management systems that promote accumulation of P within the effective layer of effective interaction between soils and runoff water. Indeed, conventional conservation practices aimed at controlling soil erosion must be evaluated in light of their ability to exacerbate dissolved P pollution. Understanding the opportunities and limitations of P management strategies is essential to ensure that water quality expectations are realistic and that our beneficial management practices are both efficient and effective.

This is a worldwide problem.
170 Anthropogenic eutrophication, the ecological transformation of water bodies induced by nutrient pollution, is a global phenomenon readily witnessed in developing and developed worlds alike

Ag runoff is identified as a major contributor.
170 agriculture is consistently identified as one of the largest contributors of P to surface waters(Duriancik et al. 2008---agricultural non-point sources are often the greatest source of P to eutrophic water bodies

High application rates provide opportunity for increased runoff.
171 At the most elemental level, tackling diffuse P pollution from agriculture begins with identifying and managing P sources at the field scale. Major sources include recently applied P (i.e. fertilizer, manure, dung) and"legacy" P in soils from previous P applications. The high concentrations of P in recently applied sources can elevate dissolved P in surface runoff and leachate to concentrations many fold greater than background,
(Please look at figure 1 --30 KG/HA is safe. 150 and 300KG/HA are not.)

Dissolved P has huge impact.
171---dissolved inorganic P pollution has a disproportionately large impact on eutrophication, compared with sediment bound P derived from erosion.

Higher soil test phosphorus (STP) equals higher P runoff.
171 Phosphorus desorption is correlated with the saturation of a soil's P sorption capacity by past applications of P in excess of crop removal
172 strong relationships have been obtained between dissolved P concentration in surface and subsurface flow and either agronomic soil tests or so-called environmental soil tests

Dissolved P runoff through subsurface drains is larger than previously thought.
173 Subsurface transport of P from agricultural fields does occur, and large off-site loads associated with acute (applied) and chronic (edaphic) sources have been documented.
173 Considerable evidence suggests that long-term accumulation of P in surface soils can produce chronic losses of P to drainage waters. The concept of a soil P threshold to protect drainage water quality is supported by an array of studies

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High STP's occur where high concentrations of animals exist.
174 specialization and intensification of crop and livestock production has yielded gross discrepancies in the local P balances---Because most of the P fed to livestock is excreted in manure, which tends to be applied locally, the counties with P surpluses also possess the highest soil P levels

Modest STP's can contribute large loads.
175 under the right conditions, even a modest source of soil P can contribute to very large legacy loads.
(Please note in this report 78 PPM and 144 PPM are modest, when agronomic production tops out at 40 PPM.)
Broadcast fertilizer on no til can cause stratification and higher surface loads.

No-till can lead to high concentrations at the surface
175 Specifically, the absence of tillage aggravates the stratification of soil and residual fertilizer P in the soil profile

More than 80% of the load can come from less than 20% of the acres.
177 Critical source area management has become the dominant approach to targeting agricultural P practices for water quality protection (Sharpley et al. 2003), justified by studies that identified minor areas within watersheds (<20%) contribute to the majority of P loads in watershed effluent (>80%)

It is more cost effective to manage critical source areas than blanket the entire watershed.
177 Critical source area management is considerably more cost effective than approaches that blanket a watershed with remedial practices

Setting standards that exceed agronomic requirements causes controversy.
177 The establishment of management guidelines for agricultural P in relation to non point sources and water quality impairment can generate considerable controversy, especially when these guidelines extend beyond normal agronomic recommendations.

Above review compiled by Ronald Wyss. All comments in bold italics by Ronald Wyss.