What changes in nutrient inputs to urban land can be expected in the future ?

Tom Schueler and Norm Goulet

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Review of Current Nutrient Inputs to Urban Land

	Impervious Cover	Pervious Cover	Construction
Acres in Watershed [1]	1,269,030	3,398,732	84,500
Average TN Load [2]	15.5 lbs/ac/yr	12.4 lbs/ac/yr	26.4 lbs/ac/yr
Average TP Load [2]	1.93 lbs/ac/yr	0.55 lbs/ac/yr	8.8 lbs/ac/yr
Key Inputs	Air Deposition Build-up/Washoff	Air Deposition Fertilizer [3]	Air Deposition No Fertilizer

[1] Acres as reported in most recent CBWM version 5.3.2

[2] Average values, as reported in Tetra Tech 2014a and ESC EP, 2014 (construction sites), although actual values are regionally variable

[3] Unit fertilizer input of 43 lbs TN /ac/yr and 1.3 lbs TP/ac/yr applies to all pervious acres

Research Review

- Trends in air deposition of N
- Trends in lawn fertilizer inputs
- Construction site fertilizer
- Organic matter loading from pervious land
- Discovered nutrient discharges from grey infrastructure

1. Trends in Future N Air Deposition

Long term Bay-wide and regional declines in air deposition loads for N (and to a lesser extent P) over both pervious and impervious land are forecasted due to more stringent air pollution controls.

By 2020, total annual N loads deposited over the Bay watershed are projected to decline to 66 million lbs/yr, which represents a 42% drop from 1990 levels (114 million lbs/yr -- Linker et al, 2013).

Reinforced by NADP monitoring at 24 Bay stations

Implications

- The encouraging drop in nitrogen deposition is welcomed …but how will the decline in nutrient inputs affect future N build up and wash-off from impervious land ? (i.e., will the surface runoff loads decline in direct proportion to the reduced inputs, or is some other manner ?).
- The same question also applies to pervious land

2. Changes in Future Lawn Fertilizer Inputs

- Changes in N and P fertilization rates due to state-wide lawn fertilizer laws are expected to change the nutrient content of fertilizer applied to pervious land, especially for TP.
- According to the UNM expert panel, this should result in a 60 to 70% reduction in P inputs to fertilized pervious areas (and a smaller decline in N inputs).
- Improved urban fertilizer input statistics are critically needed to confirm whether the presumed nutrient reductions are real and are sustained in the future.

3. Construction Site Fertilizer Inputs

- Version 5.3.2 does simulate fertilizer inputs that are applied to construction sites to rapidly stabilize the exposed soils with grass and other vegetation.
- Construction site fertilization rates are extremely high at 115 lbs N /ac/yr and 75 lbs P/ac/yr. (ESC EP, 2014)
- Include these in next version of CBWM (and reduce loss from nutrients attached to soil)

4. Organic matter loads from pervious areas

- This is a “new source”, although it may have been implicitly simulated during past calibrations
- Significance of the organic matter subsidy produced by fall leaf drop (and to a lesser degree, pollen and green fall during the growing season).
- Nowak (2014) indicated that the potential nutrient subsidy during leaf drop alone could be a considerable portion of the urban nutrient budget -- 28.8 lbs N/acre/year and 2.95 lbs P/acre/year in Baltimore (exceeds current urban loading rates for both pervious and impervious land)

Needs More Research to Define

- The unresolved issue at workshop is how much of the leaf drop moves through the urban landscape and is actually delivered to the urban stream corridor.
- Street Cleaning EP may make some estimates this Fall

5. Nutrient Discharges from Grey Infrastructure

- New nutrient source. Although may have been implicitly simulated in past calibrations
- Nutrient discharges from grey infrastructure include, illicit discharges to storm drain, sewer exfiltration and sanitary sewer overflows).
- Expert panel concluded that there was strong evidence that these discharges increase N and P levels in dry weather urban stream flow, and may collectively account for as much as 20 to 40% of the annual nutrient load in urban watersheds

Discussion (15 min)

- Alternative views and opinions ?
- Other key points to assess ?

- ARE WE IN CONSENUS ON THIS QUESTION ?