Most Common Sources of Environmental Impairment in Massachusetts

Most Common Pollutant Causes and Sources of Environmental Impairment:

Excessive Nutrients (Phosphorus and Nitrogen) causing algae blooms and submerged aquatic plant proliferation – From **wastewater treatment plants**, **stormwater** runoff, combined sewer overflows, excessive lawn/turf/crop fertilization (and sloppy application of fertilizer i.e. on sidewalks, roads and driveways), stream bank erosion, stream buffer loss and poor manure management from farming areas.

Bacteria – From pet and wildlife wastes in **stormwater*** runoff, illicit sanitary waste (illegal wastewater cross connections) in **storm sewer** discharges, sanitary sewer overflows, combined sewer overflows, treatment plant and pump station malfunctions, and poor manure management from farming areas;

Heavy metals, oils & grease, nutrients (Nitrogen and Phosphorus from vehicle exhaust and leaking fluids), sand, and chloride/road salt – From cars and trucks, deposited on driveways, roads, and parking lots, and washed off by urban/suburban **stormwater** into nearby streams, ponds, or estuaries.

Most Common Non-Pollutant Causes and Sources of Environmental Problems:

Repeated Wash Out and Channel Erosion of Urban Streams – From urban **stormwater** runoff washing aquatic life out of urban tributary streams during frequent small storms and repeatedly scouring the stream beds destroying benthic habitat;

Loss of Stream Connectivity – Caused by old dams preventing aquatic life, wildlife and nutrients from moving up and downstream, outdated/inadequate/damaged culverts;

Excessive Water Withdrawal – Caused by direct intake pipes, diversion of flow, or excessive water withdrawal from wells near a river for water supply, athletic field watering, or agricultural uses, all of which depress groundwater base flow, leaving too little water in the river or stream at critical times of the year for aquatic life.

Trash – Although not a chemical pollutant that is directly toxic to aquatic life trash in streams (often washed in from parking lots and roadways with **stormwater**) makes streams rivers and estuaries unappealing and is a sign of public apathy and ignorance of how what a person does affects others (or eventually themselves and future generations). Plastic (such as thin plastic bags) can choke aquatic mammals when ingested. When plastics break down into microscopic particles in estuaries or the ocean the smallest particles either sink or get eaten. Microplastics at sea are hazardous waste. They absorb pollutants and cycle through the marine food web. Microplastics can be found in fish flesh and contaminate our marine food supply hence the push to eliminate unnecessary use of plastics or recycle them. Trash and littering is being addressed by public education and stream clean ups by local groups in a few places like New York harbor specially designed trash pick-up boats patrol the harbor.

*Note the frequency with which **stormwater** appears as an impairment cause or contributor.

Recent Progress in Eliminating or Controlling Sources of Environmental Problems:

For the last twenty-five years, work has been underway at local, state and federal levels to improve and pay for <u>wastewater</u> sewer collection in order to eliminate or treat sanitary sewer overflows and combined sewer overflows. Dam removal from rivers and streams, where feasible, is being encouraged. Better regulation of water withdrawal based on good science has been worked on. The science and techniques for proper water withdrawal management, including the determination and preservation of "aquatic base flow" and "the natural flow regime" are known, although unfortunately not always practiced.

The Next Steps to Water Quality Improvement

1) The next major increment of water quality improvement will come to streams or estuaries experiencing cultural eutrophication (algae blooms/excessive plant growth) like the Taunton when wastewater treatment plants (WWTPs) remove nutrients from their discharges as part of the treatment process. With a permit schedule requiring **removal of P (freshwater discharges) and N (salt water discharges and WWTPs upstream)** to the necessary level, improvement could be seen in watersheds like the Taunton River where 66% or nitrogen is from WWTPs as soon as five or six years from permit renewal. The TRWA website has a table of the Taunton watershed major WWTP compliance schedules.

2) The other major issue for Massachusetts water quality improvement is **stormwater control**, addressing both the frequency and volume of discharge as well as pollutant load. This effort will take 15 to 25 years to complete, similar to the combined sewer overflow effort. The recently signed stormwater permit for Massachusetts concentrates on the following actions: thorough illicit discharge detection and elimination; detailed mapped assessment of the existing storm sewer system and contributing impervious area (e.g. pavement, roofs) by catchment (sub-drainage) area; a high degree of control of storm water from new construction and redevelopment (so the problem doesn't get worse); improved pollutant source control through well-timed street sweeping and public education efforts on pet waste and lawn fertilization; and, identification of a minimum of 5 permittee-owned properties that could potentially be modified or retrofitted with BMPs designed to reduce the frequency, volume, and pollutant loads of stormwater discharges to and from its municipal separate storm sewer system (MS4) through the reduction of impervious area.

New development adds impervious cover to the extent that a new impervious area is connected to the storm sewer system. However, if new development design disconnects impervious cover or adds a best management practice that includes infiltration, then the new development/stormwater control has the *effect of reducing* impervious cover. (This positive effect occurs even if the stormwater BMP is only designed to accommodate the more frequent, small storms (e.g. a 0.2" to 0.5" storm). Stormwater managers can track this addition and subtraction for each storm sewer system catchment or sub-drainage area with a simple Excel spreadsheet and calculation tools based on New England's rainfall pattern. EPA Region 1 has worked out the credit given for various infiltration BMPs (based on their design-storm volume) for pollutant, flow volume, and effective impervious cover reduction, and has made this information available on line (see links below).

In order to evaluate the most effective-at-least cost combination of stormwater BMP location, size and type, EPA has developed an optimization tool which uses a straightforward Excel based spreadsheet tool (Opti-Tool) to help communities and their consultants get the most benefit for their stormwater abatement cost investments.

<u>Reference Materials</u>:

The Stormwater permit signed April 4, 2016 (effective ~~July 1, 2017~~) can be found at:
https://www.epa.gov/npdes-permits/massachusetts-small-ms4-general-permit
This page has the draft permit history, links to the permit and some helpful technical documents. TRWA is currently one of 11 watershed groups that have filed a lawsuit against Scott Pruit and EPA for delaying the effective date of this issued permit in a manner which violates the Administrative Procedures Act (see TRWA website blog for additional information)
http://savethetaunton.org/

The NPDES Stormwater Permit Program page can be found at:
https://www.epa.gov/npdes-permits/npdes-stormwater-permit-program-new-england
This page has some stormwater permit program information, a BMP cost optimization pilot report and links to some BMP design tools at the bottom of the page.
A large amount of stormwater technical information is available EPA's website at:
https://www.epa.gov/npdes-permits/stormwater-tools-new-england