Land Use Impacts in the Chesapeake Bay Watershed: Patterns, Problems & Solutions

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Changing Land Use Patterns

- From forests and farms to:
  - Industrial farms
  - Suburbs and cities
  - Factories and strip malls
  - Roads, parking lots and rooftops

Source: http://www.city-data.com

The land surface is rapidly being converted from soft and absorbent to hard and impervious.

Growing Out from Cities

- Pattern of growth from cities is called “sprawl”
- Much of sprawl is suburban growth to accommodate neighborhoods away from urban centers
- Unless the trend changes, cities will keep growing out until they merge with other cities

Source: http://egsc.usgs.gov/currentscienceprojects.html
Impacts Associated with Land Use Conversion

- Increased water discharges
- Flashier streams
- Frequent flooding
- Greater erosion
- More water pollution

Water Pollution: Point Source vs. Nonpoint Source

- Point Sources
  - Usually a discharge point
  - Regulated (or “permitted”) by EPA / state / locality

- Nonpoint Sources
  - a.k.a. Stormwater Runoff or Polluted Runoff
  - Diffuse source
  - Usually unregulated

Regulated Point Sources

- Industrial discharges
- Wastewater treatment plants
- CAFOs – concentrated animal feeding operations
- MS4s – municipal separated storm sewer systems
- Construction sites
Polluted Runoff

- What are the mechanisms that create polluted runoff?
  - Erosion
  - Impervious surfaces

Sources of Runoff:
- Agriculture
- Urban/suburban stormwater
- Septic systems
- Forestry

Hot Topics: Pick a Problem
- Endocrine disrupting compounds
- Intersex fish
- Fish kills
- Acid Rain

Bay Stewardship & Solutions
- For every problem, there is a solution
- The issue hinges on whether the solution is:
  - Easy or difficult
  - Cheap vs. expensive
  - Voluntary vs. regulatory
  - Short-term vs. long-term
- Of course, we need a mix of all of the above
Solutions for Sprawl Impacts

Problems
- Construction
- Impervious surfaces
- Sprawl

Solutions
- Construction BMPs
- Low-Impact Development techniques
  - Rain catchment
  - Rain gardens
  - Pervious paving
  - Avoid curb and gutter
  - Distributed BMPs
- Smart Growth, Land Conservation

Solutions to Problems Pre-Dating Sprawl

Problems
- Agricultural runoff and infiltration
- Septic System Failure
- Turf chemicals
- Endocrine Disrupting Compounds

Solutions
- Ag BMPs
- Regular Maintenance
- Phosphate-free and minimal use
- Decreased use, better disposal and water filtration

Solutions Requiring Regulation

- Wastewater treatment plants
- City storm drains (MS4s)
- Factory farms (CAFOs)
- Industrial waste
- Mining
- Forestry
- Construction

Hot Topics: Pick a Solution

- Virginia’s new construction stormwater rules (see http://www.dcr.virginia.gov/stormwater_management/stormwat.shtml)
- Low-impact development (see http://www.lowimpactdevelopment.org/lid%20articles/Builder_LID.pdf)
- Green Infrastructure (see http://www.conservationfund.org/green_infrastructure)
- Chesapeake Bay TMDL (see http://cbf.org/page.aspx?pid=2612)
Land Use Impacts in the Chesapeake Bay Watershed, by Patrick Felling

Chesapeake Bay TMDL: Intro

- TMDL stands for “Total Maximum Daily Load” (i.e. how much pollution can the water handle before it is “impaired”)
- TMDL also mainly as shorthand for a plan to clean up a waterway
- EPA and the Bay states under court order to write a TMDL for the Bay
- Most Bay pollution comes from rivers feeding the Bay, so TMDL includes the whole watershed

Virginia’s Plan: Pollution by Sectors

- Point sources – wastewater treatment plant upgrades
- Polluted Runoff – forests, agriculture, urban areas, construction, transportation projects, homeowners (septics and fertilizers)
- Heavy emphasis on trading between sectors

Bay TMDL Resources

- [http://www.epa.gov/chesapeakebaytmdl/](http://www.epa.gov/chesapeakebaytmdl/)
- [http://www.chesapeakebay.net](http://www.chesapeakebay.net)
- [http://www.cbf.org](http://www.cbf.org)