

Evolution of U.S. Water Pollution Control

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Outline

- Federal Pollution Control Regulations
 - History of development
 - Key features
- Implementation of Regulations
- Successes, Failures, Future Challenges

History of Regulations

- 1899 Rivers and Harbors Act
 - Precedent for discharge permits
- 1956 Federal Water Pollution Control Act (FWPCA)
 - Funding to municipalities for water pollution control
- 1965 Water Quality Act
 - Water quality standards
 - Created Federal Water Pollution Control Agency

History of Regulations, (cont.)

- 1972 FWPCA Amendments
 - Creates discharge permits program
- 1977 Clean Water Act
 - Authorizes States to run discharge permits program
- 1987 Water Quality Act
- 2000 Wet Weather Water Quality Act

Clean Water Act Objectives

- “Restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.”
- National goals:
 - The discharge of pollutants into the navigable waters be eliminated by 1985;
 - The discharge of toxic pollutants in toxic amounts be prohibited;
 - Programs for the control of nonpoint sources of pollution be developed and implemented in an expeditious manner so as to enable the goals of this chapter to be met through the control of both point and nonpoint sources of pollution.

Clean Water Act - Key Sections

- 301: Effluent guidelines
 - Unable to discharge without a permit
 - National technology-based standards
 - Effluent guidelines for non-municipal
 - Secondary treatment standards for municipal
- 302: Water quality-based effluent limits
 - Additional treatment required in cases where technology-based limits are insufficient to maintain water quality standards

Clean Water Act - Key Sections

- 303: State water quality standards
 - States must publish and periodically update water quality standards
 - States must develop lists of waters not in compliance with water quality standard
 - Develop pollutant loads restrictions (Total Maximum Daily Loads) necessary to attain standards
- 307: Priority pollutants
 - Expanded consideration beyond conventional pollutants such as pathogens, oxygen demand
 - List of 126 priority pollutants

Clean Water Act - Key Sections

- 402: Wet weather
 - 402(p) – Stormwater
 - Industrial stormwater must meet effluent guidelines
 - Municipal sources must reduce discharge of pollutants to maximum extent practicable
 - 402(q) – Combined Sewer Overflows (CSOs)
 - Combined sewer systems convey all sources in a single pipe (stormwater plus dry weather flows)
 - Permits must conform to CSO Policy

Implementation of Regulations

- Sequential areas of focus

Point source-based controls



Watershed-based controls



Biological considerations

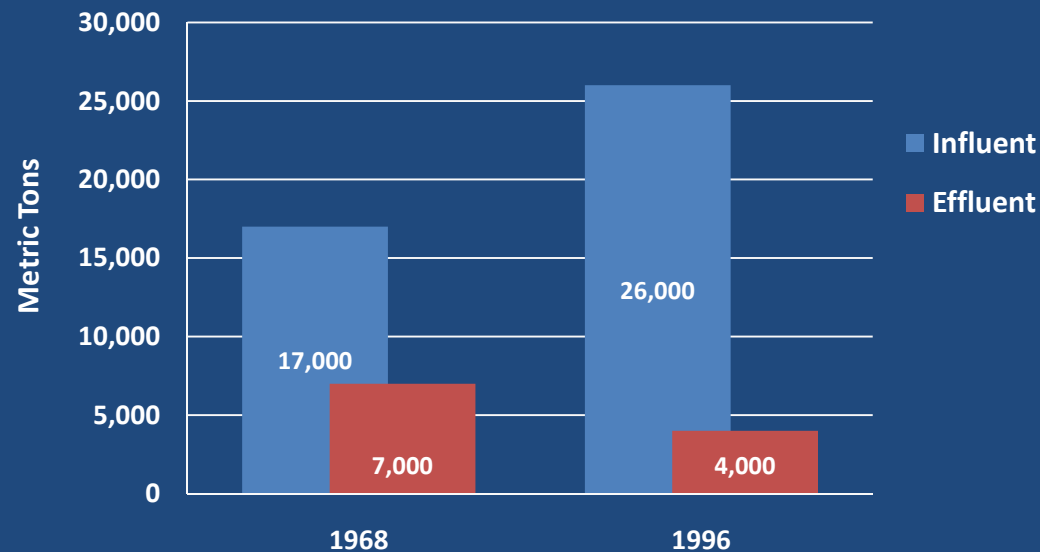
Point Source Controls

- In 1970s, unregulated point sources were a major source of pollution
- Implementation of point source controls greatly improved water quality at many locations

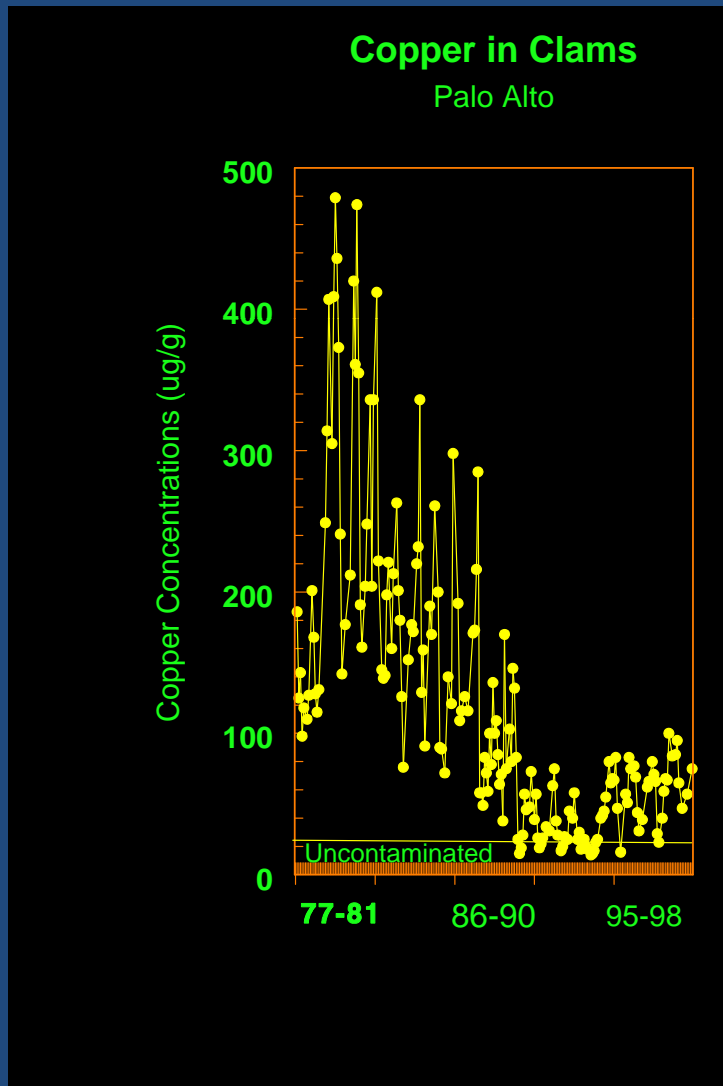
Point Source Controls

- Large improvement in national aggregate removal of biochemical oxygen demand

Wastewater Load of Biochemical Oxygen Demand



Point Source Controls



Data from Hornberger et al, 1999, *ES&T*

Watershed-Based Controls

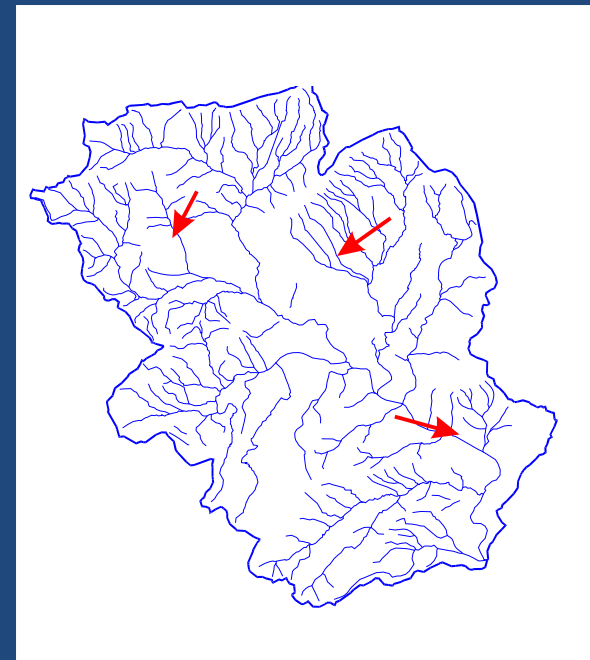
- Many waters remained impaired, even after implementation of point source controls
- In 1990's, environmental groups began bringing lawsuits against EPA
 - Clean Water Act requires states to list all impaired waters, and develop Total Maximum Daily Loads necessary to attain standards
 - “Total” means both point and nonpoint sources

Point vs. Nonpoint Source

- Point source
 - Single identifiable localized source of pollution
 - Enters in a well-defined conveyance (e.g. discharge pipe or channel)
- Nonpoint source
 - Pollution originating from diffuse sources (e.g. runoff, atmospheric deposition)

TMDLs – Change in Approach to Water Pollution Control

- Old versus New Approach
 - Which sources get controlled
 - Old: Point sources
 - New: All sources (point and nonpoint)
 - Geographic focus
 - Old: Direct vicinity of point source being controlled
 - New: Entire watershed



Biological Considerations

- Initial focus of pollution control was on a chemical-specific basis
 - e.g. dissolved oxygen, copper, etc.
- Biological impacts now given more consideration
 - Whole effluent toxicity: Wastewater effluent must not be toxic to test organisms
 - Biocriteria: Surface waters must have acceptable types and amounts of aquatic life

Successes, Failures, and Challenges

- Successes
 - Point source controls implemented in response to Clean Water Act lead to massive improvement at the most grossly polluted sites
 - Evaluation of existing quality and necessary controls now being done on a holistic basis
 - Watershed-based controls consider all potential sources of impairment
 - Biocriteria provide a direct indication of whether a system is meeting its designated use

Successes, Failures, and Challenges

- Failures

- Control of non-point sources

- Clean Water Act provides direct regulatory control over point sources, but no control over non-point sources

- Nutrient assessment

- EPA issued a directive in 2000 for states to develop numeric standards related to nutrient
 - “Acceptable” level of nutrients varies greatly by site
 - Dilemma
 - Promulgate nutrient criteria ignoring site-specific effects
 - Continue waiting for linkages between nutrients and effects

Successes, Failures, and Challenges

- Challenges: Sustainability
 - Population growth will further tax water resources
 - Regulations focused on present, not future

