Little Brazos River Tributaries Bacteria Assessment Project

Water Quality 101

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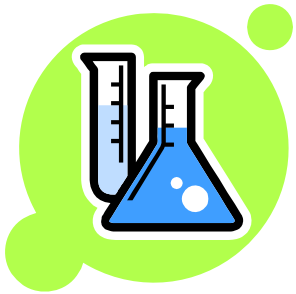
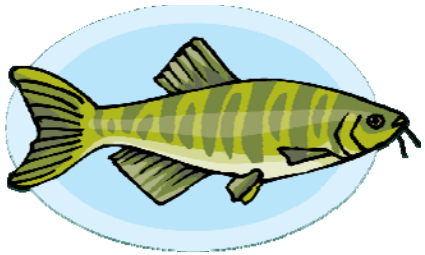
Franklin, Texas

Federal Clean Water Act

- Objective is to “restore and maintain the chemical, physical and biological integrity of the Nation’s waters”





Federal Clean Water Act

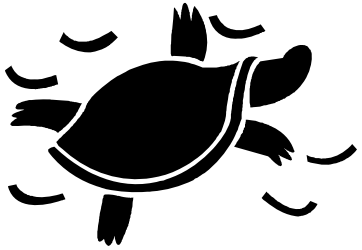
- Interim goal is “water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water”
  - Commonly referred to as “fishable/swimable” goal
- Administered and implemented by the U.S. Environmental Protection Agency (USEPA)

Water Quality Standards

- Clean Water Act requires States to establish Water Quality Standards to achieve objective and goals of the Act
- Water Quality Standard is defined as the designated beneficial uses of a water segment and the water quality criteria necessary to protect those uses

Water Quality Standards

- Uses include contact recreation (swimming), aquatic life, domestic water supply, fish consumption, etc.
- Criteria for parameters include bacteria, dissolved oxygen, salts, toxic substances



Water Quality Standards

- Use = contact recreation
  - Recreational activities involving significant risk of ingestion of water, including wading by children, swimming, water skiing, diving, and surfing
  - Applied to all rivers, streams, lakes and estuaries in Texas with few exceptions (e.g., Houston Ship Channel)
- Criteria = *Escherichia coli* (*E. coli*) bacteria, for freshwater streams
  - Geometric mean (similar to the average) of samples should not exceed 126 colony-forming units of bacteria per 100 mL of water
  - Individual, single samples should not exceed 394 colony-forming units of bacteria per 100 mL of water more than 25% of the time

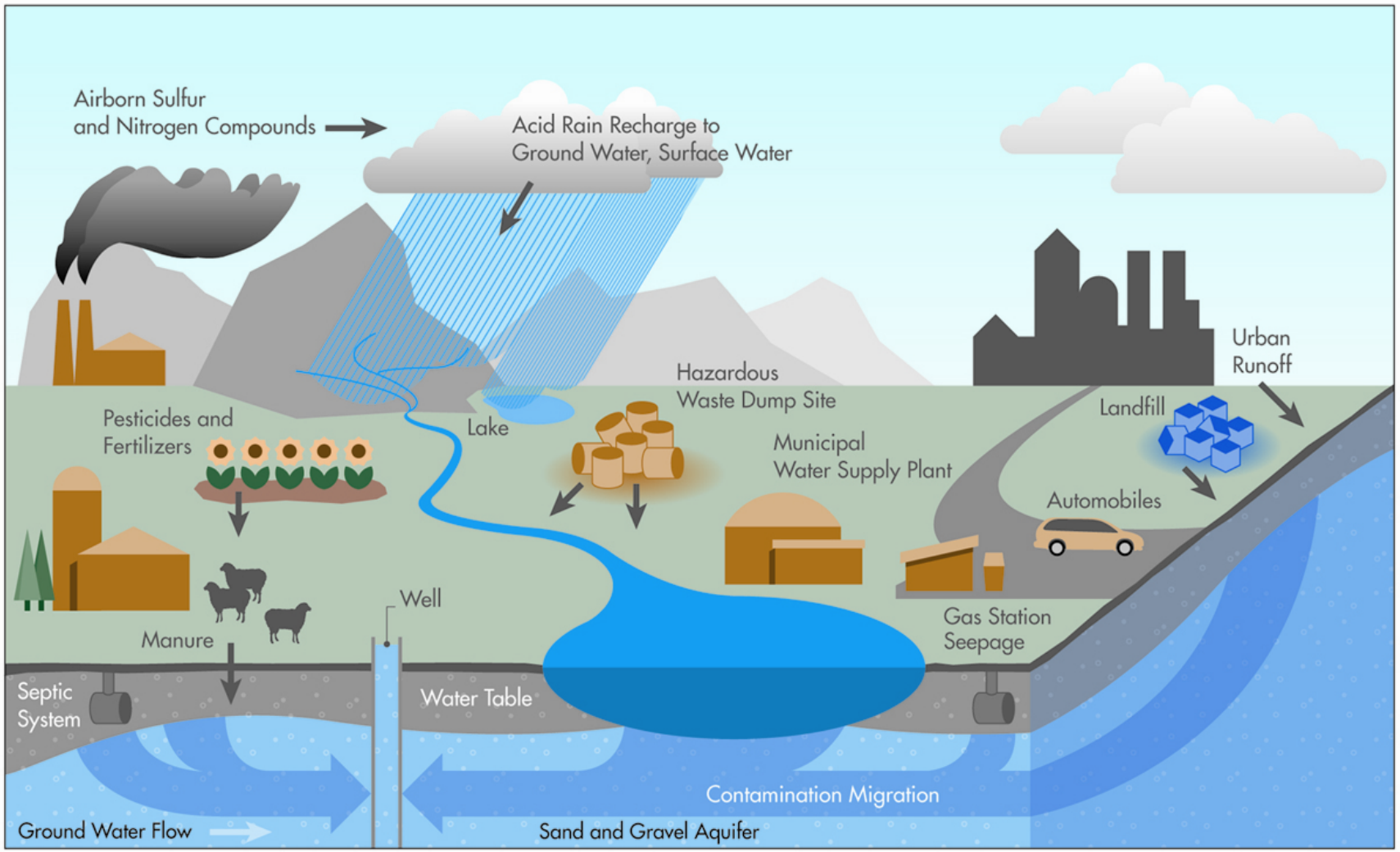
Why Bacteria?

- Elevated levels of bacteria (*E. coli*, *Enterococcus*, fecal coliform) indicate possible fecal contamination and the potential presence of disease-causing pathogens (*E. coli* O157:H7, *Salmonella*, *Giardia*, *Cryptosporidium*)

Why Bacteria?

- These bacteria are present in the intestinal tracts and feces of warm-blooded animals
- These bacteria are used as an indicator of the potential presence of pathogens
- Pathogens cause gastrointestinal (GI) illness

Sources of Bacteria



Sources of Bacteria

- Improperly treated human waste from malfunctioning wastewater treatment facilities or septic systems
- Buildup on the land surface and then washoff during rain events of pet, livestock and wildlife feces
- Direct deposition of feces by pets, livestock and wildlife into waterbodies

Standards Revision

- Major revisions to the *Texas Surface Water Quality Standards* are being drafted, including modifications to contact recreation use and bacteria criteria
- State adoption of any changes is not expected until mid-2009
- USEPA must then approve any changes

303(d) List

- Clean Water Act requires Texas to identify waterbodies failing to meet or not expected to meet water quality standards and not supporting their designated uses
- This list of impaired waterbodies is known as the *Texas Water Quality Inventory and 303(d) List*
- Waterbodies are broken out into categories
- Must be submitted to USEPA for review and approval every two years

303(d) List

- Category 1 – all standards are attained
- Category 2 – some standards are attained
- Category 3 – insufficient or no data to evaluate uses
- Category 4 – standard is not attained, but mechanism in place to restore water quality
- Category 5 – standard is not attained

303(d) List

- 2008 Texas 303(d) List was approved by USEPA on July 9, 2008
- Data from December 1999 to November 2006 was assessed
- 837 waterbody-pollutant combinations
- 48% of these are for elevated bacteria

Who does what?

- Texas Commission on Environmental Quality (TCEQ)
  - General jurisdiction and responsibility for water quality in Texas
  - Establish water quality standards
  - Issue permits for point sources (wastewater treatment facilities, concentrated animal feeding operations)
  - Prevent and abate urban nonpoint source pollution
  - Collect and assess data, report on water quality conditions
  - Regulatory enforcement of water quality standards and permits

Who does what?

- Texas State Soil and Water Conservation Board (TSSWCB)
  - Lead agency in Texas responsible for planning, implementing and managing programs and practices for preventing and abating agricultural and silvicultural (forestry) nonpoint sources of water pollution
  - Works in partnership with the State's 217 local soil and water conservation districts (SWCDs)
  - Provides technical and financial assistance to landowners to develop and implement Water Quality Management Plans (WQMPs) and best management practices (BMPs)

Who does what?

- Other state and federal agencies
  - Texas Department of Agriculture
  - Texas Parks and Wildlife Department
  - U.S. Environmental Protection Agency
  - U.S. Geological Survey (USGS)
  - USDA-Natural Resources Conservation Service (NRCS)

Who does what?

- Local and regional governmental entities
  - Cities and counties
  - River authorities and Texas Clean Rivers Program
  - Soil and water conservation districts
- Citizens and landowners

Possible Outcomes

- Goal = remove from 303(d) List
  - achieving current water quality standards
  - achieving revised water quality standards
  - support a Use Attainability Analysis to change water quality standards
  - develop Watershed Protection Plan for “4b option”
  - develop Total Maximum Daily Load and Implementation Plan for adoption/approval

What is a UAA?

- Use Attainability Analysis
- Evaluation of waterbody and its ability to achieve a specific level of use
- Results in site-specific water quality standard
- No TCEQ guidance for recreational UAA methodology

What is a WPP?

- Watershed Protection Plan
- Coordinated framework for implementing water quality protection and restoration strategies
- Holistically addresses all sources and causes of impairments and threats to both surface and ground water resources
- Voluntary approach, not adopted/approved by TCEQ or USEPA

What is a TMDL?

- Total Maximum Daily Load
  - Like a budget for pollution in the stream
  - defines the maximum amount of a pollutant that a waterbody can assimilate on a daily basis and still meet water quality standards
  - allocates pollutant loads between point sources and nonpoint sources
  - Requires adoption by TCEQ and must be approved by USEPA
- Implementation Plan (I-Plan)
  - Based on environmental target of TMDL, an I-Plan is developed
  - prescribes measures necessary to mitigate anthropogenic (human-caused) sources of that pollutant in that waterbody
  - specifies limits for point source dischargers and recommends best management practices for nonpoint sources
  - Only requires State approval
- Together, the TMDL and the I-Plan serve as the mechanism to reduce the pollutant, restore the full use of the waterbody and remove it from the 303(d) List

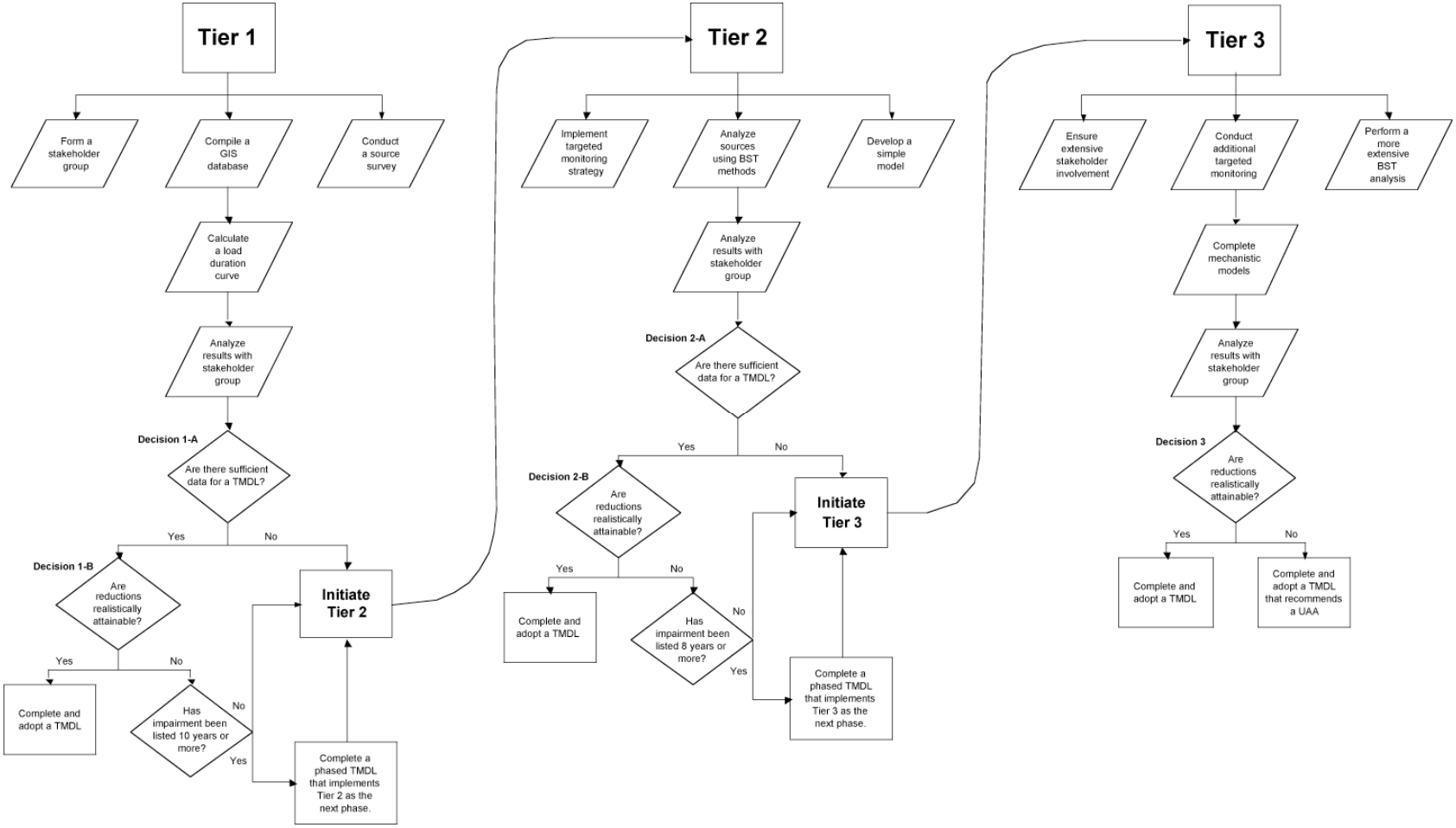
Implementing a WPP or TMDL

- Changes to Wastewater Treatment Facility permits and possible upgrades
- Repair and replace failing septic systems
- Technical and financial assistance to landowners for voluntary implementation of BMPs on agricultural land
- Education on and Demonstration of BMPs

Task Force on Bacteria TMDLs

- TCEQ and TSSWCB established a joint technical Task Force on Bacteria TMDLs in September 2006 charged with
  - Examining approaches other states have used
  - Evaluating variety of models and bacterial source tracking (BST) methods
  - Recommending cost-effective and time-efficient methods
  - Describing a roadmap for further scientific research needed
- In June 2007 TCEQ and TSSWCB approved the recommendations from Task Force

Task Force on Bacteria TMDLs



Task Force on Bacteria TMDLs

- At each successive tier, increasingly aggressive and sophisticated levels of data collection and analysis are used to gain further technical information to support decision-making

- flexible enough to fit
  - the complexity of sources in specific watersheds
  - availability of data
  - degree of impairment
  - level of accuracy required for making sensible decisions

Summary

- Clean Water Act, Water Quality Standards, 303(d) List
- Contact Recreation, *E. coli* bacteria, GI illness, sources
- Role of agencies and stakeholders
- Task Force, tiered-process
- Possible outcomes

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