ENVM 651
Watershed Planning Management

Session 1: Introduction
Road Map

• For your team projects and at the end of the course, you will use the road map below developed by EPA (Handbook for Developing Watershed Plans to Restore and Protect Our Waters) to develop your own watershed management plan.
Definitions

- **Basin**: A portion of the earth’s surface where all water falling on its surface collects in a network of channels and exits at a single point to the ocean or a major river or lake.

- **Watershed**: Land draining to a common water body, including associated physical, chemical, and biological attributes such as soil, vegetation, animals, land uses, and human activities.

- **Basins** are larger than **watersheds** draining to a major ocean or water body. Basins are also capable of dividing the entire area of the earth surface into natural subunits.
Definitions

Watersheds consist of:

• Bodies of water

• Riparian zones immediately adjacent to and directly affected by the water bodies, and

• Upland areas above riparian zones or flood stage levels.
Watershed Delineation

• Watershed boundaries are ridges (e.g. divides) that separate land that drains into one body of water from land draining to another body.

• Elevation contours on USGS contour maps can be used to identify divides (see http://www.trails.com/ for US topo maps).

• Watersheds based on USGS Hydrologic Unit Codes (HUCs) can be viewed at www.epa.gov/surf/
Drainage Network

- Streams join to form larger streams that are joined by tributaries or streams of equal or greater size.

- Stream size is designated by its order.

- A first order stream has no tributaries.

- Stream order increases only when a stream joins (confluence) a stream of equal order.
Watershed Inventory

Types of information used to describe a watershed:

• **Physical Characteristics**, e.g. geology, soils, topographic features, water bodies.

• **Climate**, e.g. rainfall, temperature, cloud cover.

• **Land Use**, e.g. agriculture, urban, roads.

• **Ecology**, e.g. plant and animal communities, trophic levels.

• **Geographic Features**, e.g. municipalities.

• **Sources of problems**, e.g. pollutant sources.
Services and Benefits Provided by Watershed

- Aquatic life support
- Wildlife habitat
- Fish consumption/shellfish harvesting
- Recreation
- Cultural use
- Drinking water
- Agricultural supply/irrigation
- Industrial use
- Transportation
- Flood control
- Groundwater recharge
- Power generation
- Sediment control
- Biodiversity and habitat protection – riparian zones and wetlands play important roles in the maintenance of biological diversity and habitat for critical life stages of aquatic organisms and wildlife.
Types of Water Quality Impairment

- Oxygen depleting substances
- Nutrients
- Sediments and siltation
- Bacteria and pathogens
- Toxic organic chemicals and metals
- Suspended solids and turbidity
- Noxious aquatic plants
- Oil and grease
- Salinity and mineralization
- Habitat alteration/hydrologic modification
Sources of Impairment

Point Sources (pollutant load easily measured)
- Industrial discharges
- Municipal treatment plants
- Combined sewer overflows

• Nonpoint Sources (pollutant load difficult to measure)
  - Agriculture
  - Silviculture (forestry)
  - Construction
  - Storm sewer/urban runoff

• Other Sources of Impairment
  - Resource extraction, e.g. mines, drilling
  - Land disposal, e.g. septic systems, landfills
  - Hydrologic modifications, e.g. dam construction, dredging
  - Habitat modification, e.g. filling of wetlands, stream bank alteration
Watershed Approach

• “A coordinated framework for environmental management that focuses on public and private sector efforts to address the highest priority problems within hydrologically defined geographic areas, taking into consideration both ground and surface water flow” (Watershed Approach Framework, USEPA, 1996).