

**Tufts University Department of Urban and Environmental Policy UEP 0279-01**  
**Water Resources Policy and Watershed Management**  
**Fall Semester 2013 Fridays 9:00 - 11:30 AM Scott Horsley 508-364-7818 (cell)**  
**scott.horsley@tufts.edu**

Course Summary: This course is designed to present a comprehensive approach to water resources management by integrating environmental science and policy. It is intended for both students with and without technical backgrounds. The course examines ground water, lake, riverine, wetland and coastal management issues at the local, state, tribal, regional, national and international levels and relies heavily on practical case studies to illustrate successful methods.

Grading & Exams Grades will be based upon two take-home exams and participation in class.

Dates - Topic Areas

**1. Goals of the Course/Overview of Water Resources Policy and Watershed Management**

Content: Course goals, requirements and overview.

**2. Scientific Framework for Water Resources Policy and Watershed Management: Geology/Soils/Hydrology**

Content: Basic scientific foundation for water resource and wetlands management. These are not highly-technical presentations but rather are directed at providing an adequate background for resource managers. Those who have technical backgrounds will benefit from these discussions as well.

Readings: EPA Watershed Protection Course Book, Chapters 1 & 2,  
<http://websoilsurvey.nrcs.usda.gov/app/>,  
<http://pubs.usgs.gov/circ/circ1139/>(Circular 1139, Natural Processes of Groundwater and Surface Water Interaction);

**3 Identifying Water Resource Protection Areas:**

Content: Strategies for identifying critical protection areas. Use of field methods, computer models and geographic information systems (GIS) to map (delineate) watersheds, wetlands, wellhead protection areas and aquifer boundaries. Discussion of accepted field survey methods, verification requirements, and controversies surrounding mapping water resource boundaries.

Readings: <http://water.usgs.gov/ogw/pubs/Circ1174> (Estimating Areas of Recharge to Wells) and [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/nh/technical/?cid=nrcs144p2\\_015680](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/nh/technical/?cid=nrcs144p2_015680) (How to map a watershed).

#### **4 Methods of Assessing Water Quality Impacts & Identifying Contamination Sources**

Content: Review of techniques for identifying water resource contamination sources: land use mapping, use of Industrial Codes, analysis of local zoning ordinances (the “blueprint”) and field survey methods.

Readings: EPA Watershed Protection Course Book, pp 3-38 to 3-58 and 4-27 to 4-89

#### **5 Establishing the Carrying Capacity of Water Resources: Water Quality Standards**

Content: Discussion and analysis of how governments could/should establish the “carrying capacity”--the limit--of a given resource to assimilate impacts from land development and land use. Discussion of the techniques for establishing carrying capacity thresholds. Specific examples from Massachusetts, Maine, Florida and Hawaii will be analyzed and critiqued.

Readings: <http://www.epa.gov/owow/tmdl/intro.html> (Introduction to TMDLs)

<http://www.epa.gov/owow/tmdl/nutrient/pdf/nutrient.pdf> AND PATHOGEN GUIDANCE

#### **6 Freshwater Management (Lakes and Rivers)**

Content: Discussion of the values and functions of lakes and streams; interrelationships between lake ecosystems and their watersheds, aquatic problems and their identification and lake management techniques.

Readings: EPA Watershed Protection Course Book, pp 3-1 to 3-38.

#### **7. Coastal Waters Management**

Content: Discussion of coastal water quality issues; impacts from watershed development, and coastal management techniques

Readings: EPA Watershed Protection Course Book, pp 4-1 to 4-27.

#### **8. Groundwater Management**

Content: Discussion of ground water management issues including water supply/demand, capacity and contamination. Techniques for ground water (wellhead)

protection.

Readings: <http://www.epa.gov/safewater/protect/swpocket.html>

## **9. Stormwater Management**

Content: Discussion of stormwater as an emerging central focus of non-point source pollution management. Chronic loadings of load-based pollutants are being identified as significant sources of pollution to receiving waters. This class will look at Massachusetts' response to this issue.

Readings: Massachusetts DEP Standards & Policy for Stormwater Management, Volume 1 <http://www.mass.gov/dep/water/laws/policies.htm#storm> and EPA Watershed Protection Course Book, Chapter 6.

## **10. Wetlands Protection**

Content: What is a wetland? Why are they important? Discussion of wetland resource areas, methods of delineation, values & functions and protection techniques.

Readings: EPA Watershed Protection Course Book, Chapter 5

## **11. Climate Change and Water Resources**

Content: Sea level rise, thermal shifts and storm intensity/frequency: How will these changes affect water resources. Some likely impacts include increased stormwater runoff/ pollution, increased floodplain areas, loss of drinking water supplies and migration of wetlands. Mitigation and adaptation strategies will be discussed and evaluated.

Readings: USEPA, Office of Water Climate Change Policy

## **12. Water Resources Policy at the Federal Level - Clean Water Act/Safe Drinking Water Act**

Content: The United States has developed two principal water management laws: the Clean Water Act and the Safe Drinking Water Act. These laws will be examined as the cornerstones of US water law and how they impact water use and protection at the state and local government/community levels.

Readings: The Clean Water Act (<http://www.epa.gov/watertrain/cwa/index.htm>) and the Safe Drinking Water Act <http://www.epa.gov/OGWDW/sdwa/>

## **13. The Role of Local Governments in Water Resources Management**

Content: Despite decades of federal involvement in water resource management, the fact remains that public is highly-dependent upon local (and state) governmental actions and implementation to protect public water resources. An in-depth look at local governments' roles, responsibilities and opportunities to protect resources.

This analysis will include a survey of regulatory (zoning, subdivision and health regulations) and non-regulatory strategies (land acquisition, public education and monitoring). The concepts of smart growth and low-impact development (LID) will be examined as a new approach to regulating land use patterns.

Readings: EPA Watershed Protection Course Book, Chapters 7 & 8.  
[http://www.mass.gov/envir/smart\\_growth\\_toolkit/](http://www.mass.gov/envir/smart_growth_toolkit/) (Smart Growth Toolkit)

#### **14. Case Study in Water Resources Management and Policy**

Content: The Ipswich River is one of the most stressed watersheds in Massachusetts and nationally. The headwaters of the river go dry as a result of water withdrawals, stormwater management, interbasin transfers and sewerage. The continued growth of the area has been accommodated by conventional water, stormwater and wastewater infrastructure which has caused serious depletion of the resource and corresponding ecological damage. The Ipswich basin is now recognized as very high priority on the state's water agenda and efforts are under way to restore the river.

Readings: Ipswich River Watershed Management Plan, Horsley & Witten, Inc., January 2003. [www.horsleywitten.com](http://www.horsleywitten.com) (publications)

#### **14. Course Summary and Wrap-up**