

Tufts University  
Department of Urban and Environmental Policy  
UEP 279  
Water Resources Policy and Watershed Management

Fall Semester 2008  
Thursdays 1:30 – 4:00 PM  
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Course Summary: This course is designed to present a comprehensive approach to sustainable 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 three take-home exams (related to a selected case study/project) and participation in class.

Classes - Topic Area

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

Content: Course requirements, philosophy, overview of problems associated with land use and water resource protection in the United States, Europe and developing nations.

**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://soils.usda.gov/survey/online\\_surveys/](http://soils.usda.gov/survey/online_surveys/),  
<http://water.usgs.gov/pubs/circ/> (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.nh.nrcs.usda.gov/technical/WS\\_delineation.html](http://www.nh.nrcs.usda.gov/technical/WS_delineation.html) (How to map a watershed).

#### **4 Establishing the Carrying Capacity/Sustainability of Water Resources**

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 including USEPA's Total Maximum Daily Load (TMDL) approach. Specific examples from Massachusetts, Maine and Hawaii will be analyzed and critiqued.

Readings: <http://www.epa.gov/owow/tmdl/intro.html> (Introduction to TMDLs), EPA Watershed Protection Course Book, pp 3-38 to 3-58 and 4-27 to 4-89

#### **5 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.

#### **6 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.

#### **7 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>

#### **8 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://mass.gov/dep/water/laws/policies.htm#storm>) and EPA Watershed Protection Course Book, Chapter 6.

## **9 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;  
US Army Corps of Engineers, Wetlands Delineation Manual, 1987

## **10 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).

Readings: EPA Watershed Protection Course Book, Chapters 7 & 8.

## **11 Smart Growth and Low-Impact Development (LID)**

The concepts of smart growth and low-impact development (LID) will be examined as a new approach to regulating land use patterns, preserving natural hydrologic framework and protecting water resources. Is "no net impact" or "positive impact" development possible?

Readings [www.horsleywitten.com/smart-growth](http://www.horsleywitten.com/smart-growth) (Smart Growth Toolkit)

## **12 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)

## **13 Course Summary and Wrap-up**