

Environmental Studies 128
Spring 2015
Tuesday 3:00-5:45 PM,
HGH 122

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Environmental Studies 128
Water Resources Management
Spring 2015

Class Hours: Tuesday 3:00 –5:45 PM
Room HGH 122

Instructor: Patrick T. Ferraro

Office Hours: **Tuesdays 1:15 – 2:45 PM**
Room WSQ 115A

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Catalog Course Description:

ENVS 128 Water Resource Management

Description

Water uses and supplies; water resource measurement methods; hydrology; erosional processes; sediment production and transport particularly on Northern California coastal watershed; flood hazards and methods of control; groundwater and groundwater aquifers; water quality. Prerequisite: EnvS 129 and STAT 95.

Grading

Normal Grade Rules

Units

3

Course Format:

Students are expected to have completed reading assignments prior to class. Lecture will be supplemented with audio-visual media. A portion of each class will be spent as interactive discussion between instructor and students. Experts may be invited to some of the classes to augment the instructor's expertise. Field trips will be scheduled as time permits.

Course Text:

With the multitude of topics and levels used to approach these subjects, one suitable textbook trying to cover the entire course is limited to prior application of public policy to water management and *visa versa*. Many reading assignments will be internet based and your only cost will be your time and access portal. The campus has computers for use by all students with and without personal/portable IT technology

Readings from pertinent Internet web sites will be assigned for each class topic. Students will be encouraged to search and review related links to supplement the information provided on the assigned sites and use the information to help generate discussions in the classroom.

The following printed materials are recommended and available for purchase at Amazon.com and for use in the MLK library in the reserve section:

Cech, Thomas V. 2005. *Principles of Water Resources: History, Development, Management and Policy*, 3rd. John Wiley and Sons Inc., Hoboken, NJ.

Hardcover: 576 pages (August 24, 2009)

*** ISBN-10: 0470136316**

• ISBN-13: 978-0470136317

Preview book at Google Books:

<http://books.google.com/books?id=A2nJCPPixGQC&pg=PP5&lpg=PP5&dq=Cech,+Thomas+V.+2005.+Principles+of+Water+Resources:+History,+Development,+Management+and+Policy,+3rd.+John+Wiley+and+Sons+Inc.,+Hoboken,+NJ.&source=bl&ots=wnrQcfK62T&sig=45QTEcZaWY9Eh>

Amazon.com link:

http://www.amazon.com/Principles-Water-Resources-Development-Management/dp/0470136316/ref=sr_1_fkmr1_1?ie=UTF8&qid=1295210387&sr=8-1-fkmr1

Water 4.0: The Past, Present, and Future of the World's Most Vital Resource
Hardcover – January 28, 2014 (paperback available until April 1, 2015)

by [David Sedlak](#) (Author)

Amazon.com link:

http://www.amazon.com/Water-4-0-Present-World's-Resource/dp/030017649X/ref=pd_rhf_ee_s_qp_4_DWH2?ie=UTF8&refRID=1BC5M6VSJJK9YTDPC6J2

Water Resources Management EnvS 128

Patrick T. Ferraro, Instructor

Syllabus

Course Web Page: <https://sites.google.com/site/envs128sp2015watermanagement/>
Water resources management is a multi-disciplinary field encompassing:

- water supply reliability
- urban vs. agricultural water supply
- urban and regional planning
- water quality for public health and the environment
- watershed management
- environmental restoration
- flood control
- wastewater treatment
- energy (and thus carbon emission) impacts of human engineered water systems
- anticipating and responding to climate change

This course will give you exposure to both quantitative and qualitative aspects of the topic using a variety of teaching techniques including lectures, group discussion, problem sets, guest lectures, and a field trip. We will look at case studies within California, the US and internationally. We will also evaluate how climate change has already impacted water resources in some regions of the world and how it is expected to change California water management.

Over the semester, you will:

- gain a working familiarity of major aspects of water resources management (e.g., hydrology, water pollution, irrigation);
- hear from professionals working in the field about “on the ground” issues;
- have an opportunity to explore a water resources management topic of personal interest; and
- practice communicating (both orally and in writing) your findings to others.

Generally, we will meet twice weekly for lectures, in-class exercises, case studies, and discussion. Outside of class homework assignments will include completing course readings and being prepared to discuss course materials, conducting web-based research, writing short essays, leading class discussions, completing problem sets, and working in small groups.

Grading

- 10% Classroom participation/ discussion of internet articles on topics of the week.
- 40% Nine (9) take-home problem sets will be given about a week apart. Each set will be 5%, but your lowest score will be tossed.
- 25% Paper - Each students will write term paper on a current local water issue. Suggested topics will be provided, but students may select a topic not listed. Please download rubric at:
<https://sites.google.com/site/envs128sp2015watermanagement/home/research-assignment-rubric>
Research topics are due on Feb 1. **DRAFT TERM PAPER DUE March 17, 11:59PM**
Written submittals must follow paper requirements. (See below)
- 25% Final Exam. Take-home exam will be given two weeks prior to final class meeting and due on day of final scheduled meeting.

Writing for EnvS 128 and use of other sources

SJSU policy prohibits representing the work of another as your own. You must give appropriate credit through quotation and citation whenever you use the work of another. For footnotes, they can be at the end of the page, or the end of the paper. Any significant source, even if not quoted, should be listed in the paper. It is not appropriate to turn in a paper that is a collection of quotes; instead the vast majority of the paper should be your own writing.

Disabilities Policy

It is the policy of San Jose State University to provide appropriate accommodations to students who have documented disabilities meeting the eligibility requirements of the Americans With Disabilities Act of 1990. This website provides information on how students need to document disabilities:

http://www.drc.sjsu.edu/student_services/document_disability.htm

All SJSU Policies currently posted in the university catalogue are applicable:

<http://info.sjsu.edu/static/catalog/policies.html>

Water Resources Management

EnvS 128

Patrick T. Ferraro, Instructor

Lecture	Date	Lecture Content	Assignments & Recommended Text Chapters (due BEFORE class)
	5/18/15	Final Exam, Rm. HGH 122	2:45 – 5:00 PM
1	1/27/15	Introductions & course overview	
2	1/27/15	Managing Water by Watersheds	Problem Set #1 assigned; Chapters 1 (Historical Perspectives of Water Use and Development) AND 2 (The Hydrologic Cycle, Climate, and Weather)
3	2/3/15	Semester Case Study: Coyote Creek	Chapter 3 (Surface Water Hydrology) Problem set #2 assigned
4	2/3/15	Historical Ecology/Stream and Wetlands \Baseline Water Requirement	Chapter 12 (Water, Fish and Wildlife); Assignment #1 due.
5	2/10/15	Watershed /Groundwater Connection	Chapter 4 (Groundwater Hydrology) Problem set #2 due.
6	2/10/15	Surface Water Impoundments	Problem set #3 assigned.
7	2/17/15	Artificial Recharge with Reservoir Supplies	Ch 7 (Dams)
8	2/17/15	Groundwater Extraction/Overdrafts/Subsidence	
9	2/24/15	Economics & Agricultural Water Demand	Chapter 13 (Economics of Water) ; Problem set #4

Lecture	Date	Lecture Content	Assignments & Recommended Text Chapters (due BEFORE class)
			assigned
10	2/24/15	Urban Water Demand Projections	Ch 6 (Muni Water Development and Irrigation) Problem set #3 due
11	3/3/15	Inter-basin Transfers/Importing Water	Problem set #5 assigned
12	3/3/15	Drinking Water Quality	Problem set #4 due
13	3/10/15	Water Treatment	Problem set #5 due Chapter 11 (Drinking Water and Wastewater Treatment)
14	3/10/15	Urban Water Distribution	Problem set #6 assigned
15	3/17/15	Improving Water Use Efficiency	
16	3/17/15	Sewage: Generation & Transmission	Problem set #6 due Problem set #7 assigned
17	3/17/15	Urban Stormwater & Pollution Prevention	Chapter 5 (Water Quality) DRAFT TERM PAPER DUE
	3/24/15	Spring Break	No Class Meeting
	3/31/15	Cesar Chavez Day	No Class Meeting
18	4/7/15	Grey Water Generation and Reuse, Rainwater Harvesting	Problem set #7 due
19	4/7/15	Sewage Treatment & Disposal	Problem set #8 assigned
20	4/7/15	Water Recycling and Reuse	

Lecture	Date	Lecture Content	Assignments & Recommended Text Chapters (due BEFORE class)
21	4/14/15	Flood Frequency, Flow and Volume	
22	4/14/15	Flood Protection: Land Use Controls, Riparian Setbacks, FEMA Flood Insurance Program, Levees and Bypass Channels	Problem set # 8 due Problem set #9 assigned
23	4/21/15	Sediment Transport, Deposition and Tidelands FIELD TRIP: Coyote Creek Outdoor Classroom, located at 791 E. William St, in San Jose, between 16th & Bridge, across from the Williams Street Park.	
24	4/21/15	Climate Change/Sea Level Rise	Chapters 14 (Water Use Conflicts); Problem set #9 due
25	4/28/15	Sacramento-San Joaquin Delta & New Convenience	Final Draft of Term Papers Due
26	5/5/15	Hydroelectric Power Generation	
27	5/5/15	Integrated Water Resources Planning	Chapter 15 (Emerging Water Issues) Last day for late submission of term papers(-10% penalty)
28	5/5/15	Sustainability and Carbon Footprints	
29	5/12/15	Student Presentations	
	5/18/15	Final Exam Due	By 5:00 PM, Emailed to ptferraro5@gmail.com

Greensheet and class lectures notes will be posted on the following web site:
<https://sites.google.com/site/envs128sp2015watermanagement/>

Reading Assignments **EnvS 128 Water Resources Management**

Patrick T. Ferraro, Instructor

This reading list will be supplemented throughout the semester with documents posted on the class web site:

<https://sites.google.com/site/envs128sp2015watermanagement/>

Please check this web site prior to each class and read attached documents. Lecture notes containing video and additional web links will be posted after each class meeting.

<u>Class Schedule</u>	<u>Topic/Online reading assignments</u>
1. Jan. 27	Introductions/ Overview of Class

Two Visions of the Fourth Revolution in Urban Water - David Sedlak

<https://www.youtube.com/watch?v=KmR2EWhrCg-t=23> (45:00)

Panel 1A: David Sedlak, UC Berkeley "Water, Cities, and Infrastructure: Innovations in Technology and Affordability."

<https://www.youtube.com/watch?v=eGTfojoBYa4> (23:12)

Los Angeles, City of Water By JACQUES LESLIEDEC. 6, 2014

http://www.nytimes.com/2014/12/07/opinion/sunday/los-angeles-city-of-water.html?_r=2

2. Jan 27	Managing Water by Watersheds
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Thinking Globally: Water Distribution

OVERPOPULATION crisis part 1 of 2

<http://www.youtube.com/watch?v=HhuQfxHBTzg&feature=related>

video labeled *The Most IMPORTANT Video You'll Ever See*

"Arithmetic, Population and Energy" by Prof. Bartlett, Univ. of Colorado
(part 1 of 8)

<http://www.youtube.com/watch?v=F-QA2rkpBSY&feature=channel>

Click on Playlist in side bar for parts 2-8

http://www.youtube.com/watch?v=Pb3JI8F9LQQ&feature=list_related&playnext=1&list=PL6A1FD147A45EF50D

Water cycle

http://en.wikipedia.org/wiki/Water_cycle

3. Feb 3

Semester Case Study: Coyote Creek

South Bay Restoration/The Mouth of the Coyote:

California Colloquium on Water

Steve Ritchie, Executive Project Manager, South Bay Salt Pond Restoration Project

"The South Bay Salt Pond Restoration Project: The Wild Heart of Silicon Valley" In 2003, the State of California and the U.S. government, with substantial support from private foundations, purchased 15,100 acres of salt production ponds adjoining South San Francisco Bay from Cargill Corporation. These ponds represent an incredible opportunity for shoreline habitat restoration and public access in the San Francisco Bay Area. This is the largest habitat restoration project in the Western U.S.

(<http://www.southbayrestoration.org/>) and it must be accomplished without increasing flood risk...

<http://www.youtube.com/watch?v=pw6UCK80ykw&feature=channel>

Guide to San Francisco Bay Area Creeks

Coyote Creek Watershed

<http://museumca.org/creeks/1390-OBCoyote.html>

4. Feb 3

Historical Ecology/Stream and Wetlands
Baseline Water Requirement

Coyote Creek Watershed Historical Ecology Study

<http://www.sfei.org/coyotecreek>

Use links on page to Download Executive Summary: and/or Full Report:

Federal Law:

United States Department of Agriculture, Natural Resources Conservation

Service/Watershed Program <http://www.nrcs.usda.gov/Programs/watershed/>

http://en.wikipedia.org/wiki/Watershed_Protection_and_Flood_Prevention_Act_of_1954

5. Feb 10

Watershed /Groundwater Connection

U.S. Geological Survey Open File Report 93-643

What is Ground Water? <http://water.usgs.gov/ogw/gsw.html>

Download Circular 1886: *Sustainability of Groundwater Resources*
<http://pubs.usgs.gov/circ/circ1186/pdf/circ1186.pdf>

Flow and Storage in Groundwater Systems, Alley, et al., Science 14 June 2002
<http://www.sciencemag.org/content/296/5575/1985.abstract>

Examples of Innovative Approaches that Contribute to Ground-Water Sustainability
<http://water.usgs.gov/pubs/circ/circ1186/html/boxg.html>

Ground Water Depletion Across the Nation
[http://water.usgs.gov/pubs/fs/fs-103-03/JBartolinoFS\(2.13.04\).pdf](http://water.usgs.gov/pubs/fs/fs-103-03/JBartolinoFS(2.13.04).pdf)

Video: How a Water Well is Drilled
<https://www.youtube.com/watch?v=8K6V450StO4> (10:00)

6. Feb 10 Surface Water Impoundments

Water Supply Forecasts:

<http://www.wcc.nrcs.usda.gov/wsf/>

http://www.wcc.nrcs.usda.gov/factpub/wsf_primer.html

US Water Use by category:

<http://water.usgs.gov/pubs/circ/2004/circ1268/htdocs/text-total.html>

<http://pubs.usgs.gov/circ/2004/circ1268/htdocs/table07.html>

Dams in the Coyote Creek Watershed:

<http://valleywater.org/Services/CoyoteDamAndReservoir.aspx>

<http://valleywater.org/Services/AndersonDamAndReservoir.aspx>

SCVWD real time data:

<http://www.valleywater.org/Services/Alert.aspx>

7. Feb 17 Artificial Recharge with Reservoir Supplies

Artificial Recharge (Resource page)

http://water.usgs.gov/ogw/artificial_recharge.html

What is Aquifer Storage & Recovery?

<http://sofia.usgs.gov/sfrsf/rooms/hydrology/ASR/>

Groundwater Supply in Santa Clara County

<http://www.valleywater.org/Services/GroundwaterSupply.aspx>

Video: Groundwater Management-Santa Clara Valley Water District

<https://www.youtube.com/watch?v=NgWx2lrqIVk> (8:50)

Video: Groundwater: Our most reliable water source

SCVWD Valley Water <https://www.youtube.com/watch?v=n3d7nkwwsCc> (5:07)

Kern Water Bank/Monterey Agreement

<http://www.indybay.org/newsitems/2010/01/02/18634125.php>

8. Feb 17

Groundwater Extraction/Overdrafts/Subsidence

USGS Groundwater Information Pages

<http://water.usgs.gov/ogw/> (Resource page)

Subsidence

<http://www.valleywater.org/Services/LandSubsidence.aspx>

Depth-to-Water Index Well Hydrographs

<http://www.valleywater.org/Services/DepthToWaterIndexWellHydrographs.aspx>

9. Feb 24

Economics & Agricultural Water Demand

Economics Primer:

Price elasticity of demand

http://en.wikipedia.org/wiki/Price_elasticity_of_demand

Video Links:

Price Elasticity of Demand - part 1

<http://www.youtube.com/watch?v=MNiEHvw6TTg>

Price Elasticity of Demand - part 2

<http://www.youtube.com/watch?v=DB6rmbAegvE&NR=1>

Subsidizing Local Food Production, Not Just Farmers

<http://neverthirstpatferraro.blogspot.com/2008/06/subsidizing-local-food-production-not.html>

State of Thirst: CALIFORNIA drought = food decline, Mar 1, 2014

https://www.youtube.com/watch?v=s_bqPVU0LWM (14:57)

State of Thirst: California's Water Future - KQED QUEST (Full Version)
<https://www.youtube.com/watch?v=panaJZaffYk> (26:54) **Jul 11, 2008**

10. Feb 24 Urban Water Demand and Projections

Population History:

Population Explosion - ECU #156

<http://www.youtube.com/watch?v=WmEosykOesE&feature>

OVERPOPULATION crisis part 2 of 2 Steven Hawking (10:02)

<http://www.youtube.com/watch?v=-GRzatTQEgQ&feature=related>

Video: Water Sensitive Urban Design

https://www.youtube.com/watch?v=b_DTnOzYTR4 (4:15)

Video: Highlights: Water Policy and Water Myths in California: Drought Edition <https://www.youtube.com/watch?v=Rlb-zVXyl5E> (3:50)

Full Version: Water Policy and Water Myths in California: Drought Edition, Lecture By Jeffrey Mountm PhD

<https://www.youtube.com/watch?v=bNF041j9QwI> (1:05:37)

11. Mar 3 Interbasin Transfers/Importing Water

Hetch Hetchy Water Project

Temples of Water

<http://neverthirstpatferraro.blogspot.com/2008/08/temple-of-water.html>

State Water Project Slideshow:

<http://www.watereducation.org/topic-state-water-project>

South Bay Aqueduct

http://en.wikipedia.org/wiki/South_Bay_Aqueduct

Central Valley Project/San Felipe Division

<http://neverthirstpatferraro.blogspot.com/2008/06/effluent-for-affluentinside-poop-on-san.html>

12. Mar 3

Water Quality

How Clean IS Clean?

<http://neverthirstpatferraro.blogspot.com/2008/06/how-clean-is-clean.html>

Chlorine by products:

<http://www.southerndatastream.com/thm/index.html> - Introduction

California pesticide use swings up after four-year decline, DPR Jan. 3, 2012
http://westernfarmpress.com/government/california-pesticide-use-swings-after-four-year-decline?NL=WFP-01&Issue=WFP-01_20120103_WFP-01_659&YM_RID=rhellmann@brwncald.com&YM_MID=1282249

13. Mar 10

Water Treatment/ Desalination

Desalination/Pacific Institute Analysis: (1:14:05)

<http://www.youtube.com/watch?v=HFvyxwzADd0&feature=channel>

Innovations in Clean Water Technology: Desalination (59:27)

Massachusetts Institute of Technology Professor Lienhard explains the different types of desalination and the recent developments that make this technology so promising.

https://www.youtube.com/watch?x-yt-cl=85027636&x-yt-ts=1422503916&v=_5UkDWGoPJ4

14. Mar 10

Urban Water Demand & Distribution

Every Flush You Take Silicon Valley is watching your water habits. That's probably a good thing

<https://medium.com/backchannel/conserving-water-with-software-and-shame-3a846c01b811>

http://galileo.phys.virginia.edu/classes/605.ral5q.spring04/lectures/water_distribution.pdf

Gold and Water in Them Thar Hills

<http://neverthirstpatferraro.blogspot.com/2008/09/flow-movie.html>

15. Mar 17

Improving Water Use Efficiency

CA Urban Water Conservation Council:

BMP 1: Utility Operations Tools

<http://www.cuwcc.org/Resources/Memorandum-of-Understanding/Exhibit-1-BMP-Definitions-Schedules-and-Requirements/BMP-1-Utility-Operations-Programs>

BMP 2: EDUCATION PROGRAMS

<http://www.cuwcc.org/Resources/Memorandum-of-Understanding/Exhibit-1-BMP-Definitions-Schedules-and-Requirements/BMP-2-Education-Programs>

BMP 3: RESIDENTIAL

<http://www.cuwcc.org/Resources/Memorandum-of-Understanding/Exhibit-1-BMP-Definitions-Schedules-and-Requirements/BMP-3-Residential>

BMP 4. COMMERCIAL, INDUSTRIAL, AND INSTITUTIONAL

<http://www.cuwcc.org/Resources/Memorandum-of-Understanding/Exhibit-1-BMP-Definitions-Schedules-and-Requirements/BMP-4-Commercial-Industrial-and-Institutional>

BMP 5. LANDSCAPE

<http://www.cuwcc.org/Resources/Memorandum-of-Understanding/Exhibit-1-BMP-Definitions-Schedules-and-Requirements/BMP-5-Landscape>

Price of Water: A Comparison of Water Rates, Usage in 30 U.S. Cities, 4/26 10

<http://www.circleofblue.org/waternews/2010/world/the-price-of-water-a-comparison-of-water-rates-usage-in-30-u-s-cities/>

16. Mar 17

Sewage: Generation & Transmission

Typical Sanitary Sewer Design Manual

[http://www.ci.lancaster.oh.us/dept/waterpollution/pdf/specifications/Sanitary Sewer Design Manual.doc](http://www.ci.lancaster.oh.us/dept/waterpollution/pdf/specifications/Sanitary_Sewer_Design_Manual.doc)

Environmental group to sue San Jose for sewage spills and trash pollution

By Paul Rogers 11/25/2014

http://www.contracostatimes.com/breaking-news/ci_27005457/environmental-group-sue-san-jose-sewage-spills-and

17. Mar 17

Urban Stormwater & Pollution Prevention

Stormwater management: the basics

<https://www.youtube.com/watch?v=0x-TDvnbheM> (7:17)

Stormwater Runoff 101

<http://www.youtube.com/watch?v=eozVMJCYHCM>

Manufacturers, states, EPA sign agreement to reduce copper in brake pads
Washington brakes law serves as national model

<http://www.ecy.wa.gov/news/2015/008.html> **January 21, 2015**

“In Washington, brake pads release about 250,000 pounds of copper to the environment each year. When Washington's Better Brakes Law is fully implemented in 2025, this source of copper will be virtually eliminated.”

Santa Clara Valley Urban Runoff Pollution Prevention Program PSA

<http://www.youtube.com/watch?v=DX2FtTuJOY8> (0:32)

City of San Jose Storm Sewer System

<http://www.sanjoseca.gov/index.aspx?nid=1615>

City of San Jose **Environmental Services - Stormwater Annual Reports**

<http://www.sanjoseca.gov/Archive.aspx?AMID=160>

Floodplain Management

<http://www.fpm.water.ca.gov/>

“Integrated Pest Management” (IPM) strategies.

<http://www.sccgov.org/portal/site/ipm/>

Mar 24

SPRING BREAK

NO CLASS MEETING

Mar 31

CESAR CHAVEZ DAY

NO CLASS MEETING

18. Apr.7

Grey Water Generation and Reuse,
Rainwater Harvesting

Grey Water Reuse and Rooftop Rainfall Capture and Storage Systems

GROWin' and Savin' Water Too - Part 1/4 (edited)

<https://www.youtube.com/watch?v=ppyZN3sQ24M> (13:54)

(links to parts 2-4 are in Youtube side-bar)

About greywater reuse

<http://greywateraction.org/greywater-recycling>

Grey Water Information Central

<http://www.oasisdesign.net/greywater/>

About rainwater harvesting

<http://greywateraction.org/rainwater-harvesting>

19. Apr. 7

Sewage Treatment & Disposal

Wastewater Treatment: <http://ga.water.usgs.gov/edu/wwvisit.html>

Water Environment Federation Wastewater Treatment Primer:

http://www.wef.org/AWK/pages_cs.aspx?id=583

San Jose-Santa Clara WPCP: <http://www.sanjoseca.gov/index.aspx?NID=1663>

GHG Emissions from Treatment Plants: Video: Dr. Perry McCarty @UCBerkeley

Water Colloquium: <http://www.youtube.com/watch?v=15S4teA2l-M&feature=channel> (1:11:54)

20. April 7

Water Recycling and Reuse

Video: ***Water In an Endless Loop***, Water Reuse Association

<http://www.vimeo.com/9333749> (23:21)

Water Recycling and Reuse: The Environmental Benefits

<http://www.epa.gov/region9/water/recycling/>

US EPA Brochure: Water Recycling & Reuse: Environmental Benefits

<http://www.epa.gov/region9/water/recycling/brochure.pdf>

Virginia: <http://www.hrsd.state.va.us/waterreuse.htm>

South Bay Water Recycling Project

South Bay Water Recycling:

<http://www.sjenvironment.org/sbwr>

<http://www.sanjoseca.gov/DocumentCenter/View/34673>

Membrane Filtration for Wastewater Reuse: Current Status and Future Developments

<http://www.waterworld.com/index/display/article-display/7255208084/articles/water-wastewater-international/volume->

[25/issue-5/regional-spotlight/north-american-caribbean/membrane-filtration-for-wastewater-reuse-current.html?cmpid=EnlWaterWorldInter](http://www.enr.com/2009/04/25/issue-5/regional-spotlight/north-american-caribbean/membrane-filtration-for-wastewater-reuse-current.html?cmpid=EnlWaterWorldInter)

21. Apr 14 Flood Frequency, Flow and Volume

Hydrologic Engineering Center (HEC)
<http://www.hec.usace.army.mil/software/>

22. Apr 14 Flood Protection:
Land Use Controls: Riparian Setbacks,
FEMA Flood Insurance Program
Levees and Bypass Channels

Natural Flood Protection
<http://www.valleywater.org/services/NaturalFloodProtection.aspx>

Fear of FEMA, Revisited
<http://neverthirstpatferraro.blogspot.com/2009/01/fear-of-fema-revisited.html>

Federal Emergency Management Agency
http://en.wikipedia.org/wiki/Federal_Emergency_Management_Agency
http://en.wikipedia.org/wiki/National_Flood_Insurance_Program

- <http://www.FloodSmart.gov>
- [Federal law authorizing NFIP](#)
- [Experts: Flood terms mislead public](#)

Report: Criticism of FEMA's Katrina response deserved
<http://www.cnn.com/2006/POLITICS/04/14/fema.ig/index.html>

23. Apr 21 Sediment Transport, Deposition and Tidelands

FIELD TRIP: Meet at regular class time at Coyote Creek Outdoor Classroom, located at 791 E. William St, in San Jose, between S. 16th and the Willaim St bridge, across from the Williams Street Park.

<http://www.valleywater.org/Programs/CoyoteCreekOutdoorClassroom.aspx>

Another challenge for Henry Waxman: Salt of the Earth
<http://neverthirstpatferraro.blogspot.com/2009/05/another-challenge-for-henry-waxman-salt.html>

26. May 5 Hydroelectric Power Generation

Geothermal Geyser Plants:
<http://www.youtube.com/watch?v=Hj6ojHEmW8c&feature=channel>

Hydroelectric power: How it works
<http://ga.water.usgs.gov/edu/hyhowworks.html>

Advantages of Hydroelectric Power Production and Usage
<http://water.usgs.gov/edu/hydroadvantages.html>

SCVWD Failure to Develop Hydro Power: Water and Power
<http://neverthirstpatferraro.blogspot.com/2008/07/water-and-power.html>

Tidal Power: http://en.wikipedia.org/wiki/Tidal_power

27. May 5 Integrated Water Resources Planning
<http://www.waterencyclopedia.com/Hy-La/Integrated-Water-Resources-Management.html>

28. May 5 Sustainability and Carbon Footprints

Water and energy quiz
<http://www.circleofblue.org/waternews/2010/world/infographic-test-your-knowledge-with-the-water-and-energy-quiz/>

Report: Arid West Can Help Meet Its Water Needs While Reducing Energy Use
New Low Impact Development Approach Offers Climate, Energy and Water Saving
Solutions (download report from link on web page)
<http://www.nrdc.org/water/lid/files/lid.pdf>

29. May 12 Student Presentations

30. **Monday, May 18** **Final Exam**
2:45 PM – 5:00 PM **Rm. HGH 122**
Submit by email ONLY to: PTFerraro5@gmail.com by 5:00 PM