Environmental Studies 128
Water Resources Management
Summer 2015

Class Hours:
TuTh 1:00PM - 4:45PM
Sweeney Hall 242

Instructor: Patrick T. Ferraro

Office Hours: Tuesdays/Thursday 12:00 -12:45 PM
Room WSQ 115A

Home Phone: 408-293-1852
E-mail: PTFerraro5@gmail.com

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:


**Hardcover: 576 pages (August 24, 2009)**
- ISBN-10: 0470136316

Preview book at Google Books:


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](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:
Water Resources Management\textit{EnvS 128}
Patrick T. Ferraro, Instructor
Syllabus

Course Web Page: https://sites.google.com/site/envs128waterresourcessmr2015/
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 five-week summer session, 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%** Four (4) take-home problem sets will be given about a week apart. Each set will be worth 10% of course grade
- **25%** Research Report - Each students will write research report 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/envs128waterresourcessmr2015/home/research-assignment-rubric
  
  Research topics are due on July 9. **DRAFT TERM PAPER DUE** July 30, 11:59PM
  
  **Final Draft Due on August 4, 2015 at 1:00 PM**
  
  Written submittals must follow paper requirements. (See below)
- **25%** **Final Exam** will be given during final class meeting and due at the end of the final scheduled meeting August 6, 2015

At SJSU, students are expected to spend at least two hours outside of class for every one hour of in-person class time. Because this is a three-unit course, you can expect to spend a minimum of **18 hours per week** completing class-related assignments in addition to the in-person class meetings. Assignments include weekly readings, problem sets, research and writing term report. These assignments may require work beyond the minimum 18-hours of work outside the classroom. Careful time management will help you keep up with readings and assignments and enable you to succeed in all your classes.

**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

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<tr>
<th>Lecture</th>
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<th>Lecture Content</th>
<th>Assignments &amp; Recommended Text Chapters (due BEFORE class)</th>
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<td>8/6/15</td>
<td>Final Exam, Sweeney Hall 242</td>
<td>1:00 – 4:45 PM</td>
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<tr>
<td>1</td>
<td>7/7/15</td>
<td>Introductions &amp; course overview</td>
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<tr>
<td>2</td>
<td>7/7/15</td>
<td>Managing Water by Watersheds</td>
<td>Problem Set #1 assigned; Chapters 1 (Historical Perspectives of Water Use and Development) AND 2 (The Hydrologic Cycle, Climate, and Weather)</td>
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<tr>
<td>3</td>
<td>7/7/15</td>
<td>Semester Case Study: Coyote Creek</td>
<td>Chapter 3 (Surface Water Hydrology)</td>
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<td>7/7/15</td>
<td>Historical Ecology/Stream and Wetlands Baseline Water Requirement</td>
<td>Chapter 12 (Water, Fish and Wildlife);</td>
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<td>5</td>
<td>7/9/15</td>
<td>Watershed /Groundwater Connection</td>
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<td>6</td>
<td>7/9/15</td>
<td>Surface Water Impoundments</td>
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<td>7</td>
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<td>Artificial Recharge with Reservoir Supplies</td>
<td>Ch 7 (Dams)</td>
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<td>8</td>
<td>7/14/15</td>
<td>Groundwater Extraction/Overdrafts/Subsidence</td>
<td>Problem Set #1</td>
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<td>due. Problem set #2 assigned</td>
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<td>9</td>
<td>7/14/15</td>
<td>Economics &amp; Agricultural Water Demand</td>
<td>Chapter 13 (Economics of Water)</td>
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<td>7/14/15</td>
<td>Urban Water Demand Projections</td>
<td>Ch 6 (Muni Water Development and Irrigation)</td>
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<td>7/16/15</td>
<td>Inter-basin Transfers/Importing Water</td>
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<td>Drinking Water Quality</td>
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<td>Water Treatment</td>
<td>Chapter 11 (Drinking Water and Wastewater Treatment)</td>
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<td>7/21/15</td>
<td>Urban Water Distribution</td>
<td>Problem set #2 due</td>
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<td>Problem set #3 assigned</td>
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<td>15</td>
<td>7/21/15</td>
<td>Improving Water Use Efficiency</td>
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<td>Sewage: Generation &amp; Transmission</td>
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<td>Urban Stormwater &amp; Pollution Prevention</td>
<td>Chapter 5 (Water Quality)</td>
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<td>DRAFT TERM PAPER DUE</td>
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<td>18</td>
<td>7/23/15</td>
<td>Grey Water Generation and Reuse, Rainwater Harvesting</td>
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<td>19</td>
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<td>Sewage Treatment &amp; Disposal</td>
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<td>7/23/15</td>
<td>Water Recycling and Reuse</td>
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<td>21</td>
<td>7/28/15</td>
<td>Flood Frequency, Flow and Volume</td>
<td>Problem set #3 due</td>
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<td>Problem set #4 assigned</td>
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<td>7/28/15</td>
<td>Flood Protection: Land Use Controls, Riparian Setbacks, FEMA Flood Insurance Program, Levees and Bypass Channels</td>
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<td>Climate Change/Sea Level Rise</td>
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<td>Sacramento-San Joaquin Delta &amp; New Convenience</td>
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<td>Hydroelectric Power Generation</td>
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<td>Student Presentations</td>
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8/6/15  **Final Exam**  1:00 - 4:45 PM

Greensheet and class lectures notes will be posted on the following web site: [https://sites.google.com/site/envs128waterresourcessmr2015/](https://sites.google.com/site/envs128waterresourcessmr2015/)
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/envs128waterresourcessmr2015/home
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.

Class Schedule

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<th>Topic/Online reading assignments</th>
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<td>1. JULY 7</td>
<td>Introductions/ Overview of Class</td>
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Two Visions of the Fourth Revolution in Urban Water - David Sedlak
https://www.youtube.com/watch?v=KmR2EWohrCg - t=23 (45:00)

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. JULY 7
Managing Water by Watersheds
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
3. JULY 7
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/](http://www.southbayrestoration.org/)) and it must be accomplished without increasing flood risk...

Guide to San Francisco Bay Area Creeks
Coyote Creek Watershed
[http://museumca.org/creeks/1390-OBCoyote.html](http://museumca.org/creeks/1390-OBCoyote.html)

4. JULY 7
Historical Ecology/Stream and Wetlands Baseline Water Requirement

Coyote Creek Watershed Historical Ecology Study
[http://www.sfei.org/coyotecreek](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://www.nrcs.usda.gov/Programs/watershed/)


5. JULY 9
Watershed /Groundwater Connection

Download Circular 1886: Sustainability of Groundwater Resources 

http://www.sciencemag.org/content/296/5575/1985.abstract

Examples of Innovative Approaches that Contribute to Ground-Water Sustainability  

Ground Water Depletion Across the Nation 

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

6. JULY 9
Surface Water Impoundments
Water Supply Forecasts:  
http://www.wcc.nrcc.usda.gov/wsf/  

US Water Use by category:  

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. JULY 9
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=NqWx2IrqlVk (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. JULY 14

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. JULY 14

Economics & Agricultural Water Demand

Economics Primer:

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)

10. JULY 14 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)


https://www.youtube.com/watch?v=bNF041j9Qwl (1:05:37)

11. JULY 16 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. JULY 16 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  

13. JULY 16  
Water Treatment/ Desalination

Desalination/Pacific Institute Analysis: (1:14:05)  
http://www.youtube.com/watch?v=HFvyxzADd0&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?v=x-ymt-cl=85027636&x-yt-ts=1422503916&v=_5UkDWGoPJ4

14. JULY 21  
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  

15. JULY 21  
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

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


16. JULY 21
Sewage: Generation & Transmission
Typical Sanitary Sewer Design Manual

*Environmental group to sue San Jose for sewage spills and trash pollution*
By Paul Rogers 11/25/2014

17. JULY 23
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
“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=DX2FtTuJ0Y8 (0:32)

City of San Jose Storm Sewer System

City of San Jose Environmental Services - Stormwater Annual Reports

Floodplain Management
http://www.fpm.water.ca.gov/

“Integrated Pest Management” (IPM) strategies.
http://www.sccgov.org/portal/site/ipm/

18. JULY 23 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. JULY 23  Sewage Treatment & Disposal

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

Water Environment Federation Wastewater Treatment Primer:


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. JULY 23  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/


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-
21. JULY 28  Flood Frequency, Flow and Volume

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

22. JULY 28  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

Federal Emergency Management Agency

- 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. JULY 28  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 William St bridge, across from the Williams Street Park.
http://www.valleywater.org/Programs/CoyoteCreekOutdoorClassroom.aspx
Reading Assignments prior to Field Trip:

SEDIMENT SOURCES, TRANSPORT, DEPOSITION, AND RETENTION TIMES
http://water.usgs.gov/osw/techniques/workshop/hupp.html

Sediment Transport and Deposition

Protect Our Groundwater Resources at the Polls, October 14, 2014
http://www.sanjoseinside.com/2014/10/14/protect-our-groundwater-resources-at-the-polls/

24. JULY 30 Climate Change/Sea Level Rise

Addressing Climate Change in Long-Term Water Resources Planning and Management: User Needs for Improving Tools and Information
http://www.usbr.gov/climate/userneeds/

Water and Climate Change Adaptation
http://www.climatechange.ca.gov/adaptation/water.html

CA Climate Change Planning Program /San Francisco Bay Impacts:
http://www.bcdc.ca.gov/planning/climate_change/climate_change.shtml

Climate Change at the Doorstep PBS Video:
http://video.pbs.org/video/1818412519/ (11:35)

KQED Quest Audio File: (5:43)
http://science.kqed.org/quest/audio/rough-waters-for-sea-level-rise-planning/

25. JULY 30 The Sacramento-San Joaquin Delta & The Peripheral Canal

Fixing The Sacramento/San Joaquin Delta
http://neverthirstpatferraro.blogspot.com/2008/06/fixing-sacmentosan-joaquin-delta.html
Another challenge for Henry Waxman: Salt of the Earth

26. JULY 30 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

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

27. AUG 4 Integrated Water Resources Planning

28. AUG 4 Sustainability and Carbon Footprints

Water and energy quiz

New Low Impact Development Approach Offers Climate, Energy and Water Saving Solutions (download report from link on web page)

29. AUG 4 Student Presentations

30. AUGUST 6 (THURSDAY) Final Exam
1:00 PM – 4:45 PM SWEENEY HALL RM 242