

SSCI 265Lg, The Water Planet

Syllabus

Units: 4

Term Day Time: Fall 2022, Tues and Thu, 11 a.m. to 12:20 p.m.

Location: SOS B46

Co-Instructor: John P. Wilson

Office: AHF B55F

Office Hours: Mon, 3-4 p.m. and Fri, 4-5 p.m. Also available by appointment via email.

Contact Info: jpwilson@usc.edu, 213-740-1908

Co-Instructor: Elisabeth J. Sedano

Office: AHF B57C

Office Hours: Tues and Thurs, 2-3 p.m. Also available by appointment via email.

Contact Info: sedano@usc.edu

Lab Instructor: TBD

Library Help: Andy Rutkowski

Office: VKC 36B

Office Hours: Thu 10 a.m. – 12 p.m.

Contact Info: arutkows@usc.edu, see contact page on Blackboard for Zoom room

Course Description

This course entails a comprehensive investigation into the multi-faceted dimensions of water on Earth. Topics range from micro-scale concerns (e.g. water properties, form, and behavior) to regional-scale issues (e.g. water resource distribution, groundwater mining, and watershed dynamics) to global-scale processes such as the hydrologic cycle including atmospheric and oceanic circulation and climate change. Although there are many perspectives from which to approach the topic of water (e.g. economic, legal, political, institutional, and engineering perspectives), we will situate our investigation within a scientific framework with a particular focus on methodologies and the unique insights that science is able to reveal.

Attention will also be directed to the human (social science) dimensions of water supply and demand, and the implications for past and future societies. Water has specific societal significance because it is essential for sustaining life, directly and indirectly. Water is a necessary component of most agricultural and industrial processes, and it serves a central role in global and regional transportation networks. There are extensive technological dimensions to meeting the challenges of adequate water supply that are critical to human existence. We will examine these aspects through a series of case studies that simultaneously explore the water footprint of modern consumer societies and how various cultures and countries have been shaped by some of the world's largest and most iconic rivers as well as some other globally significant freshwater sources.

This course satisfies the requirements for General Education Category E (Physical Sciences). Courses in this category are intended to bring to bear the perspectives of several scientific disciplines on a theme, illustrating the relevant scientific principles, their technological applications, and the societal significance and consequences. The GE designation further requires that the course content give students the opportunity to think critically through focused inquiry into a particular area of knowledge. Scientific methodologies, analytical techniques, and digital scholarship will be stressed.

The overall goal of the GE Program is to provide necessary context for an informed citizenry, and therefore these courses emphasize a broad sweep of knowledge and require active intellectual engagement with scientific principles. In practice, this means that students will be introduced to many concepts and terminologies that may be new and unfamiliar. The focus, nevertheless, will be on applying basic principles to specific problems rather than simple description, memorization, and recapitulation.

Learning Objectives

Upon successful completion of this course, a student will be able to:

- Identify the special properties of water and the fundamental role water plays in the functioning of life on Earth;
- Explain the spatial and temporal character of water-related processes and how these help to shape the basic physical, environmental, and social aspects of the world's water supply;

- Describe the ways that human behavior affects water quality and the rates and patterns of the water cycle around the world;
- Identify the integration of economic, legal, and cultural factors with physical characteristics of water that together explain current water-related issues affecting sustainability and other facets of human society;
- Use spatial data and maps to perform simple analyses of water-related processes; and
- Employ basic cartographic principles and integrate spatial datasets and other digital resources to communicate the results of water-related research.

Prerequisite(s): None

Co-Requisite(s): None

Class Conduct

Harassment, sexual misconduct, interpersonal violence, and stalking are not tolerated by the university. All faculty and most staff are considered Responsible Employees by the university and must forward all information they receive about these types of situations to the Title IX Coordinator. The Title IX Coordinator is responsible for assisting students with supportive accommodations, including academic accommodations, as well as investigating these incidents if the reporting student wants an investigation. The Title IX office is also responsible for coordinating supportive measures for transgender and nonbinary students such as faculty notifications, and more. If you need supportive accommodations you may contact the Title IX Coordinator directly (titleix@usc.edu or 213-821-8298) without sharing any personal information with me. If you would like to speak with a confidential counselor, Relationship and Sexual Violence Prevention Services (RSVP) provides 24/7 confidential support for students (213-740-9355 (WELL); press 0 after hours).

Required Readings and Supplementary Materials

Please acquire the text listed below. It is available at the USC Bookstore. All other supplementary readings listed in the syllabus are available online through USC Libraries or under the tab marked “Readings” on the course Blackboard.

The required textbook for this course is:

- Holden, J. (Ed.) 2013. *Water Resources: An Integrated Approach*. New York, NY: Routledge.

Supplementary readings for this course are:

- Arce-Nazario, J. 2018. The science and politics of water quality. In *Handbook of Critical Physical Geography* (eds. Lave R., C. Biermann, & S. N. Lane), 465-483. London: Palgrave.
- Clifton, C. F., Day, K. T., Luce, C. H., Grant, G. E., Safeeq, M., Halofsky, J. E., & Staab, B. P. 2018. Effects of climate change on hydrology and water resources in the Blue Mountains, Oregon, USA. *Climate Services* 10: 9-19.

- Cooley, H., Phurisamban, R., & Gleick, P. 2019. The cost of alternative urban water supply and efficiency options in California. *Environmental Research Communications* 1: 042001.
- Cronon, W. 1992. A place for stories: Nature, history, and narrative. *Journal of American History* 78: 1347-1376.
- Griffin, R. C. 2012. The origins and ideals of water resource economics in the United States. *Annual Review of Resource Economics* 4(1): 353-377.
- Hoekstra, A. Y. 2012. The hidden water resource use behind meat and dairy. *Animal Frontiers* 2(2): 3-8.
- Hussey, K., & Pittock, J. 2012. The energy-water nexus: Managing the links between energy and water for a sustainable future. *Ecology & Society* 17(1): 3.
- McKenna, M. L., McAtee, S., Bryan, P. E., Jeun, R., Ward, T., Kraus, J., Bottazzi, M. E., Hotez, P. J., Flowers, C. C., Mejia, R. 2017. Human intestinal parasite burden and poor sanitation in rural Alabama. *American Journal of Tropical Medicine & Hygiene* 97(5): 1623-1628.
- Milly, P. C. D., Betancourt, J., Falkenmark, M., Hirsch, R. M., Kundzewicz, Z. W., Lettenmaier, D. P., & Stouffer, R. J. 2008. Stationarity is dead: Whither water management? *Science* 319: 573-574.
- Novotny, V. 2013. Water-energy nexus: Retrofitting urban areas to achieve zero pollution. *Building Research & Information* 41: 589-604.
- Sheil, D. 2018. Forests, atmospheric water and an uncertain future: The new biology of the global water cycle. *Forest Ecosystems*, 5: 19.
- Tickner, D, Parker, H., Moncrieff, C. R., Oates, N. E. M., Ludi, E., & Acreman, M. 2017. Managing rivers for multiple benefits: A coherent approach to research, policy and planning. *Frontiers in Environmental Sciences*, 5: 4.
- Vasco, D. W., Farr, T. G., Jeanne, P., Doughty, C., Nico, P. 2019. Satellite-based monitoring of groundwater depletion in California's Central Valley. *Scientific Reports*, 9: 16053.
- Walsh, C. J., Fletcher, T. D., & Burns, M. J. 2012. Urban stormwater runoff: A new class of environmental flow problem. *PLoS ONE* 7(9): e45814.

Description and Valuation of Assessments

This course includes a diversity of assessments that allow students to show their mastery of the material in a variety of ways. The different types of assessments are described below and their point value to final grades are listed in the following Grading Breakdown section.

Labs

A set of 12 lab sessions is spread across the semester. These laboratory experiences are designed to introduce the tools of scientific inquiry and give students practical experience in implementing these tools within the framework of the scientific method. Lab assignments are

linked to the lectures and class discussions, but do not duplicate the lecture experience. Students must register for one laboratory session in addition to registering for the class itself. Six of the lab meetings are spent on short, stand-alone projects, and six are spent on the StoryMap assignment (see below).

Absences from lab meetings must be requested by sending an email to the laboratory co-instructor for your lab section *prior to the lab meeting you need to miss*. Excused absences from labs will be granted only for valid reasons; please notify us of the reason for your absence in your email.

The mapping software and geospatial data required for the lab assignments will be accessed using computing resources provided by the Spatial Sciences Institute.

Online Discussions

There will be three online discussions on Bb. The purpose of the online discussions is to build skills for close reading and critical thinking. In each discussion, every student will make one short post responding to a given prompt and then make at least two posts responding to other students. Your participation in the online discussions will be *individually graded* using the gradebook feature in Bb.

Article Summaries

Throughout the semester, students will produce three summaries of articles from peer-reviewed academic journals on one or more water-related issues that respond to three prompts distributed with each of these assignments.

StoryMap

The final lab project is an ArcGIS StoryMap. A StoryMap is an online platform that allows for the integration of digital maps with a variety of content such as graphs, text, photographs, video, and audio. The underlying data often depict the coupling of social and natural systems. These may be things like wetland areas, land cover, and census data, and may also include video feeds and live data such as temperature, precipitation, and streamflow. They often present scientific data and analysis, but they are mainly designed for the general public and do not require their users to have special knowledge or skills in geographic information software and services. In this course, you will create a StoryMap that integrates data on natural and social systems around the presence (or absence), quality, and movement of water on or near the Earth's surface.

Final Exam and Other Policies

The final exam is closed book. This exam will cover content learned in course readings and during lecture and lab sessions.

No make-up opportunities will be offered for the final exam or labs, so mark the appropriate dates on your calendars! If you have a legitimate conflict, per the College policy on Final Exam Scheduling, speak with one of the instructors as soon as possible. Also, note that there is **no credit for late assignments**.

Grading Breakdown

The table below shows the breakdown of the assessments and their weight in the final grade. The emphasis is on regularly completing a number of short assignments as well as solid performance on the final examination and StoryMap project.

Assessment	Number	Points Each	Total Points (% of Grade)
Online Discussions	3	4	12
Laboratory Reports	6	5	30
Article Summaries	3	5	15
StoryMap Progress Reports	5	1	5
Final Project: StoryMap	1	15	15
Final Exam (Closed book)	1	23	23
Totals	19	--	100

Schedule

Date	Topics	Readings	Deliverables/Due Dates and Times (PT)
Module 1 Fundamental Properties and Key Concepts			
Week 1			
8/23	Introduction to Course		No labs
8/25	Water Fundamentals, Part I	Holden, Ch. 1, pp. 1-5, 10-18. Cronon 1992. A place for stories: Nature, history, and narrative. <i>Journal of American History</i> 78: 1347-1376.	
Week 2			
8/30	Water Fundamentals, Part II	Holden, Ch. 1, pp. 6-10.	Labs meet. Lab Report 1: Due 11:59 p.m. the day before your next lab meeting
9/1	Global Water Cycle	Holden, Ch. 2, pp. 19-24. Sheil 2018. Forests, atmospheric water and an uncertain future: the	

		new biology of the global water cycle. <i>Forest Ecosystems</i> 5: 19.	
Module 2 Water Flows and Stocks			
Week 3			
9/6 *9/5 is a university holiday	Hydrologic Pathways	Holden, Ch. 3, pp. 49-56.	No labs (Due to holiday) Article Summary 1: Due Friday, 9/9, 11:59 p.m.
9/8	River Flow	Holden, Ch. 3, pp. 57-68.	
Week 4			
9/13	River Channel Dynamics	Holden, Ch. 3, pp. 68-76. Tickner et al. 2017. Managing rivers for multiple benefits: A coherent approach to research, policy and planning. <i>Frontiers in Environmental Sciences</i> 5: 4	Labs meet. Lab Report 2: Due 11:59 p.m. the day before your next lab meeting
9/15	Characteristics of Surface Waters	Holden, Ch. 4, pp. 79-93.	
Week 5			
9/20	Water Use and Water Quality Deterioration	Holden, Ch. 4, pp. 93-115. Walsh et al. 2012. Urban stormwater runoff: A new class of environmental flow problem. <i>PLoS ONE</i> 7(9): e45814.	Labs meet. Lab Report 3: Due 11:59 p.m. the day before your next lab meeting Online Discussion 1 Post: Due Friday, 9/23, 11:59 p.m.
9/22	Groundwater Flow Principles and Abstraction	Holden, Ch. 5, pp. 123-145.	
Week 6			
9/27	Groundwater Chemistry and Pollution	Holden, Ch. 5, pp. 145-157. Vasco et al. 2019. Satellite-based monitoring of groundwater depletion in California’s Central Valley. <i>Scientific Reports</i> 9: 16053.	Online Discussion 1 Responses to Classmates’ Posts: Due Monday, 9/26, 11:59 p.m. Labs meet. Lab Report 4: Due 11:59 p.m. the day before your next lab meeting
Module 3 Climate Change and Changing Aquatic Ecosystems			

9/29	Climate Variability	Holden, Ch. 2, pp. 24-39. Milly et al. 2008. Stationarity is dead: Whither water management? <i>Science</i> 319: 573-574.	
Week 7			
10/4	Screening of “Before the Flood”	Holden, Ch. 5, pp. 123-145.	Labs meet. Lab Report 5: Due 11:59 p.m. the day before your next lab meeting Article Summary 2: Due Friday, 10/7, 11:59 p.m.
10/6	Climate Change	Holden, Ch. 2, pp. 40-44. Clifton et al. 2018. Effects of climate change on hydrology and water resources in the Blue Mountains, Oregon, USA. <i>Climate Services</i> 10: 9-19.	
Week 8*			
10/11 *10/13-10/14 is a university holiday	Human Modification and Management of Aquatic Ecosystems	Holden, Ch. 6, pp. 180-195	Labs meet. StoryMap Progress Report 1: Due 11:59 p.m. the day before your next lab meeting
Module 4 Water and Health			
Week 9			
10/18	Infectious Diseases	Holden, Ch. 8, pp. 223-239. McKenna et al. 2017. Human intestinal parasite burden and poor sanitation in rural Alabama. <i>American journal of Tropical Medicine & Hygiene</i> 97(5): 1623-1628.	Labs meet. StoryMap Progress Report 2: Due 11:59 p.m. the day Online Discussion 2 Post: Due Friday, 10/21, 11:59 p.m. before your next lab meeting
10/20	Chemical Contaminants	Holden, Ch. 8, pp. 239-249. Kolpin et al. 2002. Pharmaceuticals, hormones, and other organic wastewater contaminants in U.S. streams, 1999-2000: A national reconnaissance. <i>Environmental Science & Technology</i> 36: 1202-1211.	
Week 10			

10/25	Physical Water Risk	Holden, Ch. 8, pp. 249-259.	Online Discussion 2 Responses to Classmates' Posts: Due Monday, 10/24, 11:59 p.m. Labs meet. StoryMap Progress Report 3: Due 11:59 p.m. the day before your next lab meeting Article Summary 3: Due Friday, 10/28, 11:59 p.m.
Module 5 Water Management			
10/27	Screening of "Mulholland's Dream"		
Week 11			
11/1	Water Demand Planning and Management	Holden, Ch. 7. Cosgrove, W.J., & Loucks, D.P. 2015. Water management: Current and future challenges and research directions. <i>Water Resources Research</i> 51(6): 4823-4839.	Labs meet. StoryMap Progress Report 4: Due 11:59 p.m. the day before your next lab meeting
11/3	The Water-Energy Nexus	Hussey, K., & Pittock, J. 2012. The energy–water nexus: Managing the links between energy and water for a sustainable future. <i>Ecology & Society</i> 17(1): 31. Novotny, V. 2013. Water-energy nexus: Retrofitting urban areas to achieve zero pollution. <i>Building Research & Information</i> 41: 589-604.Holden, Ch. 6.	
Week 12			
11/8	Potable Water and Wastewater Treatment	Holden, Ch. 9. Arce-Nazario 2018. The science and politics of water quality. In <i>Handbook of Critical Physical Geography</i> (eds. Lave et al.), 465-483. London: Palgrave.	Labs meet. StoryMap Progress Report 5: Due 11:59 p.m. the day before your next lab meeting Online Discussion 3 Post: Due Friday, 11/11, 11:59 p.m.
11/10	Water Economics	Holden, Ch. 10, pp. 293-314. Griffin, R.C. 2015. The origins and ideals of water resource economics in the United States. <i>Annual Reviews of Resource Economics</i> 4:353-377.	

		Cooley et al. 2019. The cost of alternative urban water supply and efficiency options in California. <i>Environmental Research Communications</i> 1: 042001.	
Week 13			
11/15	Screening of “Company Town”		Online Discussion 3 Responses to Classmate’s Posts: Due Monday, 11/14, 11:59 p.m. Labs meet. StoryMap Final Presentation (in lab meeting)
11/1	Water Rights, Law, and Governance	Holden, Ch. 11.	
Week 14*			
11/22 *11/23-11/27 is a university holiday	Virtual Water and the Water Footprint	Hoekstra, A.Y. 2012. The hidden water resource use behind meat and dairy. <i>Animal Frontiers</i> , 2(2), 3-8.	No labs (Due to holiday)
Module 6 Future Prospects			
Week 15			
11/29	Water Models and Sustainability	Holden, Ch. 12, pp. 333-345.	Labs meet. Lab Report 6: Due the day after your lab meeting by 11:59 p.m. No submissions accepted after 12/2.
12/1	The Future of Water		
Final Examination – December 13, 8–10 a.m.			

Statement on Academic Conduct and Support Systems

Academic Conduct

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, “Behavior Violating University Standards” policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are

equally unacceptable. See additional information in SCampus and university policies on [Research and Scholarship Misconduct](#).

Students and Disability Accommodations

USC welcomes students with disabilities into all of the University's educational programs. The Office of Student Accessibility Services (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at osas.usc.edu. You may contact OSAS at (213) 740-0776 or via email at osasfrontdesk@usc.edu

Support Systems

Counseling and Mental Health - (213) 740-9355 – 24/7 on call

studenthealth.usc.edu/counseling

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call

suicidepreventionlifeline.org

Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL), press "0" after hours – 24/7 on call

studenthealth.usc.edu/sexual-assault

Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office for Equity, Equal Opportunity, and Title IX (EEO-TIX) - (213) 740-5086

eeotix.usc.edu

Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298

usc-advocate.symplicity.com/care_report

Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.

The Office of Student Accessibility Services (OSAS) - (213) 740-0776

osas.usc.edu

OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.

USC Campus Support and Intervention - (213) 821-4710

campussupport.usc.edu

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity, Equity, and Inclusion - (213) 740-2101

diversity.usc.edu

Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call

dps.usc.edu, emergency.usc.edu

Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call

dps.usc.edu

Non-emergency assistance or information.

Office of the Ombuds - (213) 821-9556 (UPC) / (323-442-0382 (HSC)

ombuds.usc.edu

A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.

Occupational Therapy Faculty Practice - (323) 442-3340 or otfp@med.usc.edu

chan.usc.edu/otfp

Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.