

PPS 580S: Water Cooperation and Conflict

Fall 2016

Class meeting time: M 4:40-7:10 pm

Location: Sanford 150

Instructor Contact Information

Marc Jeuland

Rubenstein 188

marc.jeuland@duke.edu

919-613-4395

Office hours

W 1-3 pm, or by appointment

Course overview

Water resources provide to people and societies a myriad of economic and environmental benefits, related to productivity, consumption, health, and general well-being. Some experts however argue that conflicts over water are likely to become more frequent and violent as human population growth and development patterns increase pressure on available supplies of freshwater.

This course will focus on the theories and historical/empirical evidence on the linkages between water resources and conflict or cooperation. Our primary interest will be directed to transboundary water issues, broadly defined. Conceptual issues related to water scarcity, and theories of natural resource conflict, hydro politics, hydro hegemony and water security will be discussed. The role of multiple and diverse stakeholders, and the spatial scale of disputes or agreements over water will also be considered. International water resource problems will also be linked to a broader literature on the management of public goods and economic externalities as they relate to the environment and health.

Students will read about contemporary research on the patterns of water and resource conflict and cooperation, learn about the norms and laws for mediating water conflict at different jurisdictional levels, and relate these to current events related to water. Students will be expected to critically assess a) the assumptions of different elements of this research, and b) attempts thus far to classify or systematize knowledge of water resources conflicts and cooperation. Individual research projects will complement the broader course outlook.

Course objectives

Student learning will be achieved in the following specific areas in this course:

- Understanding of the basis for predictions that have been made about the future of water management from a variety of disciplinary perspectives.

- Knowledge of the hypotheses and evidence on drivers that have contributed to the emergence of writings on water conflict and cooperation over the recent historical period.
- Identification of the features of water conflicts and types of agreements and cooperative frameworks devised for managing them.
- Evaluation of various explanations for conflict and cooperation pertaining to water resources. This will include the following specific issues: a) Consideration of the importance and meaning of different conceptions of the value of water, including notions related to scarcity; b) Evaluation of different definitions of water rights for dealing with conflicts; c) Assessment of the role of institutions designed to deal with such problems; and d) Weighting of the importance of uncertainty and its role in encouraging risk averse management strategies in light of the possibility of climate change and population-level impacts on health and well-being.
- Exploration and work on an in depth research project (quantitative or qualitative in nature) investigating a specific water resource issue that holds particular interest for the student.

Basic Topic List

Unit 1: Introduction; Water and resource conflict theories (Weeks 1-2)

1. Organization of the course, introduction to basic principles and the problem of transboundary waters
2. The conflict-environment position (and critiques)
3. The natural resource curse theory applied to water
4. Water as a catalyst for cooperation

Unit 2: Systematic ways of thinking about water conflict and cooperation (Week 3)

1. Type of evidence used for systematic analyses: Transboundary Freshwater Dispute Database (TFDD) and other river basin event data
2. Quantitative assessments of conflict and cooperation; and challenges

Unit 3: Water and scarcity: definitions and dimensions of depletion (Week 4)

1. Concepts of water scarcity (and relevance to well-being and conflict processes)
2. Models of resource use and depletion
3. Scarcity in the future: Climate, technology and adaptation

Unit 4: Water infrastructure, development and well-being (Week 5)

1. Investments in water resources: drivers or correlates of economic development?
2. What do we know about the impacts of infrastructure?
3. Linking water resources to health and well-being

Mid-semester presentations / discussion (Week 6)

**** Fall break ****

Unit 5: Integrated water resource management (IWRM) and socio-hydrology (Week 7)

1. IWRM
2. Game theory
3. Socio-hydrology

Unit 6: Economic perspectives (Week 8)

1. The challenging economics of water
2. "Virtual" water, trade, and general equilibrium
3. Markets and privatization

Unit 7: International legal frameworks for dealing with water and institutional perspectives (Week 9)

1. International water law: Helsinki rules and UN Convention
2. Noteworthy river basin agreements and institutions
3. Management of commons property resources and institutional resilience

Unit 8: Water security and competition (Week 10)

1. Hydropolitics and securitization: Power asymmetries, issue salience, negotiation
2. The effects of water variability and disasters
3. Internal politics and discourse

Nile Case study (Week 11?; TBD)

Weeks 12 and 13: Student presentations and discussions

Textbook

As the literature on water conflict and cooperation is fairly new and books written on the subject tend to be written based on very specific viewpoints and/or opinions on this issue, it would be difficult to argue that there is one fully appropriate textbook for the course. Instead, readings will be collected and made available on the course blackboard site.

Useful online resources

- FAO Water: <http://www.fao.org/nr/water/>

- International Rivers and Lakes Newsletter:
http://www.un.org/esa/sustdev/sdissues/water/rivers_lakes_newsletter.htm

- International Water Association:

<http://www.iwahq.org.uk/>

- Some key river basin organizations

1. Mekong River Commission: <http://www.mrcmekong.org/>
2. Murray-Darling Basin Authority: <http://www.mdba.gov.au/>
3. Nile Basin Initiative: www.nilebasin.org

- Sources for water development tenders (project-specific calls to design firms):

1. Financial Times' Global Water Report (biweekly)
2. Global Water Intelligence (monthly).
3. Water International Publishing Ltd. (www.e-waternews.com) - daily updates of water project tenders and contracts in developing countries.

- Transboundary Freshwater Dispute Database: <http://ocid.nacse.org/tfdd/index.php>

- United Nations Environment Program: <http://www.gpa.unep.org/>

- Water and Sanitation Program (WSP): <http://www.wsp.org/>

- Water, Engineering and Development Center: <http://wedc.lboro.ac.uk/>

- World Health Organization, Water Sanitation and Health: http://www.who.int/water_sanitation_health/en/

- UNICEF / WHO Joint Monitoring Programme (JMP): <http://www.wssinfo.org/>

Organization of class meetings

The reading materials are mainly journal articles from the water literature, supplemented with sections from reports and books. The class meetings will typically consist of a short instructor introduction followed by more in-depth student-led discussion of assigned readings and specific examples. I expect students to come prepared for these discussions and to actively participate in them. In general, two students will be randomly assigned to lead the discussions pertaining to the weekly sessions identified on the syllabus.

The course will also include occasional reflections, which I will ask you to submit regularly. For example, I may ask for short reaction papers to specific readings, or I may provide groups with some data from the readings and ask them to use those data to conduct basic calculations and analyses that relate to the concepts in the readings. There will also be 1 literature review assignment and 2 intermediate writing assignments (plus a problem statement) related to students' selected research projects.

Expectations

Students are expected to:

- Be fully prepared to discuss readings assigned for each class period
- Attend all class sessions
- Submit assignments on time (no late assignments will be accepted)
- Engage in civil and informed in- and out-of-class discussions.

As you see from the syllabus, there are plenty of readings. Readings denoted as background are optional and will not be discussed in detail, though they do provide important background on the topics in question. I leave it to your discretion to decide whether you'd like to read, skim, or skip these.

Finally, the honor code governs all work in this course. If you have questions about what is allowed and what is not allowed, please let me know. I have tried to be clear about when (and how) collaboration is allowed, whenever possible. Please respect the Duke Community Standard (<http://studentaffairs.duke.edu/conduct/about-us#node-950>):

“Duke University is a community dedicated to scholarship, leadership, and service and to the principles of honesty, fairness, respect, and accountability. Citizens of this community commit to reflect upon and uphold these principles in all academic and nonacademic endeavors, and to protect and promote a culture of integrity. To uphold the Duke Community Standard: a) I will not lie, cheat, or steal in my academic endeavors; b) I will conduct myself honorably in all my endeavors; and c) I will act if the Standard is compromised.”

Grading and evaluation

Student grades will be computed as follows:

- Weekly reflections & participation (15%)
- Literature review assignment (15%)
- Intermediate assignments related to research project (10%)
- Student-led discussion (10%)
- 10-15 minute research project presentation (10%)
- Final research paper (40%)

Each of these components is described in more detail below. If you have specific questions about how your grade is calculated, or about a grade received on one of your assignments, please come to office hours or schedule an appointment outside of class (i.e., do not spend valuable class time on these questions). If you have general questions that others are likely to have as well, you may voice them at the beginning of class.

Weekly (or approximately weekly) reflections. These will be short. Some will be completed before the start of a class period to assess student preparation and comprehension of

assigned readings; others will be given at the end to judge students' engagement in class discussions; some will be turned in by the Friday night (midnight) following class. The assignments will not be announced ahead of time and cannot be made up, and some may involve work in small groups. The assignments will be returned to students promptly. Four marks will be possible for these assignments: Excellent, Good, Satisfactory, or Not Acceptable (NA; missed assignments will automatically receive the 'not acceptable' mark). Excellent grades on these assignments actually require something rather exceptional and will rarely be granted. Good marks display a firm grasp of the material in question, and some valuable insights. Satisfactory marks will not hurt your course grade; while excellent and good marks will help it, respectively. For example, if you get all S marks, you will receive the full 10%, while all E's and G's would get you 20% and 15%, respectively, giving you the possibility of boosting your grade if you falter in other areas. General participation will represent 5% of your grade.

Literature review assignment. Details will be announced early in the semester. This assignment will represent 15% of your grade.

Intermediate graded project assignments (2; 10%). Details on these assignments will be provided throughout the course. These written assignments will help you to start your projects early and make steady progress so that you do not leave things until the last minute.

Student-led discussion (10%). Pairs of students will be responsible for leading the discussion (randomly assigned) for the readings pertaining to one class period (generally taking about 75-90 minutes of class time including discussion), and for posting a 2-3 page "reaction paper" by Friday at 5 pm following the class meeting. This reaction should address the following: 1) Relate the article to other literature or ideas seen in the course; 2) List some of the main insights that emerged from the discussion of the articles in class; and 3) Address any issues that may not have been fully discussed.

Research paper (40%) and presentation (10%). Students have the option to carry out research in one of the following two broad areas:

1. A group systematic review on a topic chosen by the instructor: Topic will be announced early in the semester; students choosing this option will then need to define the parameters and methods guiding the review. Groups will have no more than 3 students, but multiple groups are possible.
2. Individual quantitative analysis and/or hypothesis testing related to water resources issues that are relevant to water conflict and cooperation literature or theories (for example considering the effect of droughts or floods on conflict). For students working on such research project, evaluation will not only be based on the quality of analysis conducted but also on the effort put into data assimilation and methodology.

Two written assignments, plus an ungraded initial problem statement, will provide students with the opportunity to receive formal feedback from the instructor over the course of the semester. It is expected that the precise inquiry for this project will evolve as the semester

progresses; the intermediate assignments therefore should not be viewed as a binding "contract". All students are encouraged to discuss their projects with the instructor before each of the intermediate assignments are due.

The research project work will culminate in a 15-20 (maximum) page paper and short presentation (~15-20 minutes for individual projects including questions; and longer for group projects) to the class.

There will be no final exam.

Unit 1: Introduction; water and resource conflict theories (Weeks 1-2)

Topics:

- Organization of the course, introduction to basic principles and the problem of transboundary waters
- The conflict-environment position (and critiques)
- The natural resource curse theory applied to water
- Water as a catalyst for cooperation

Readings: **Mon, Aug.29**

1. Starr, J. (1991). Water wars. *Foreign Policy* 82 (Spring): 17-36, Available at: <http://www.ciesin.columbia.edu/docs/006-304/006-304.html>
2. Gleick, P. H. (1993). Water and Conflict: Fresh Water Resources and International Security, *International Security* 18 (1), 79-112.
3. Islam, S. & L. Susskind. Understanding and Characterizing Complex Water Management Problems. In *Water Diplomacy: A Negotiated Approach to Managing Water Networks*. RFF Press: New York, 2012; Pp. 41-52.
4. Sivapalan, M. (2011). "Socio-hydrology: A new science of people and water" *Hydrological Processes*.
5. **Background:** Postel, S. (1993). "The Politics of Water." *World Watch*.
6. **Background:** Liu et al. "Complexity of Coupled Human and Natural Systems." *Science* 317: 1513-1516.

Readings: **Mon, Sep.5**

1. Sachs, Jeffrey, and Andrew Warner, 2001, "The Curse of Natural Resources." *European Economic Review* 45 (4-6): 827-838.
2. Gleditsch, N.P. (1998). "Armed Conflict and the Environment: A Critique of the Literature." *Journal of Peace Research* 35 (3), 381-400.
3. Sadoff, C.W. and Grey, D. (2002). "Beyond the River: the Benefits of Cooperation on International Rivers." *Water Policy* 4 (5), 389-403.
4. Koubi et al. (2014). "Do natural resources matter for interstate and intrastate armed conflict? *Journal of Peace Research* 51 (2), 227-243.
5. **Background:** Bulte, Erwin, Richard Damania, and Robert Deacon, 2005, "Resource Intensity, Institutions and Development." *World Development* 33 (7); 1029-1044.
6. **Background:** Frankel, J.A. (2010). "The Natural Resource Curse: A Survey." NBER Working Paper 15836.
7. **Background:** Barnett, J. (2000). "Destabilizing the environment-conflict thesis." *Review of International Studies* 26, 271-288.

Unit 2: Systematic Ways of Thinking about Conflict & Cooperation (Week 3)

Topics: **Mon, Sep.12**

- Type of evidence used for systematic analyses: Transboundary Freshwater Dispute Database (TFDD) and other river basin event data
- Quantitative assessments of conflict and cooperation; and challenges

Readings:

1. Wolf, A., Yoffe, S. and Giordano, M. (2003). "International waters: identifying basins at risk." *Water Policy* 5, 29-60.
2. Kalbhenn, A. and Bernauer, T. (2011). "International Water Cooperation and Conflict: A New Event Dataset." *Unpublished Paper*.
3. Song, J. and Whittington, D. (2004). "Why have some countries on international rivers been successful negotiating treaties: A global perspective." *Water Resources Research* 40 (5).
4. Gleditsch, N.; Furlong, K.; Hegre, H.; Lacina, B.; Owen, T. (2006). "Conflicts over shared rivers: Resource scarcity or fuzzy boundaries?" *Political Geography* 25: 361-382.
5. Raleigh, C. and Urdal, H. (2007). "Climate change, environmental degradation and armed conflict." *Political Geography* 26: 674-694.
6. **Background:** Kalbhenn, A. (2011). "Liberal peace and shared resources – A fair-weather phenomenon?" *Journal of Peace Research* 48(6): 715-735.
7. **Background:** Tose, H.P.W, Gleditsch, N. P., Hegre, H. (2000). "Shared Rivers and Interstate Conflict." *Political Geography* 19, 971-996.
8. **Background:** Gleick, P. and Heberger, M. (2012). "Water Brief 4: Water Conflict Chronology." In: Gleick, P. et al. *The World's Water: The Biennial Report on Freshwater Resources*. Pacific Institute for Studies in Development, Environment, and Security. Island Press: Washington, DC. Pp. 175-214.

Assignment 1 (Ungraded): Research topic statement due Tues Sep.13 at 5 pm.

Unit 3: Water and scarcity: definitions and dimensions of scarcity and depletion (Week 4)

Topics: Mon, Sep.19

- Concepts of water scarcity (and relevance to well-being and conflict processes)
- Models of resource depletion, water use
- Scarcity in the future: Climate, technology and adaptation

Readings:

1. Homer-Dixon, T. (1994). "Environmental Scarcities and Violent Conflict: Evidence from Cases." *International Security* 19 (1), 5-40.
2. Ohlsson, L. (2000). "Water conflicts and social resource scarcity." *Physics and chemistry of the earth. Part C, Solar-terrestrial and planetary science* 25 (3), 213-220.

3. Vorosmarty, C.; P. Green; J. Salisbury; R. Lammers (2000). "Global Water Resources: Vulnerability from Climate Change and Population Growth." *Science* 289: 284-288.
4. Rijsberman, F. (2006). "Water scarcity: Fact or fiction?" *Agricultural Water Management* 80: 5-22.
5. Hornbeck, R. & Keskin, P. (2014). "The Historically Evolving Impact of the Ogallala Aquifer: Agricultural Adaptation to Groundwater and Drought." *American Economic Journal: Applied Economics* 6(1): 190-219.
6. **Background:** Simon, Julian. (1996). "The Ultimate Resource 2." Princeton, NJ, Princeton University Press. Introduction; Chapter 1 (whole chapter) and 10 (only section on water).
7. **Background:** Gleick, P. (2000). "The World's Water, 1998-1999." Chapters 3-4.

Unit 4: Water infrastructure, development, and well-being (Week 5)

Topics: Mon, Sep.26

- Investments in water resources: drivers or correlates of economic development?
- What do we know about the impacts of infrastructure?
- Linking water resources to health and well-being

Readings:

1. Cichetti, C.; Smith, K and Carson, J. (1975). "An Economic Analysis of Water Resource Investments and Regional Economic Growth." *Water Resources Research* 11 (1).
2. Grossman, G. and A. Krueger (1995). "Economic Growth and the Environment." *The Quarterly Journal of Economics* 110 (2): 353-377.
3. Jeuland, M.; S. Ozdemir; D. Fuente; M. Allaire; D. Whittington (2013). "The long-term dynamics of health benefits from improved water and sanitation in developing countries." *PLoS ONE* 8(10): e74804. doi: 10.1371/journal.pone.0074804.
4. Galiani, S.; P. Gertler and E. Schargrotsky (2005). "Water for Life: The Impact of the Privatization of Water Services on Child Mortality." *Journal of Political Economy* 113(1): 83-120.
5. Alsan, M. & C. Goldin (2015). "Watersheds in infant mortality: The role of effective water and sewerage infrastructure, 1880 to 1915." *NBER Working Paper*.
6. Olmstead, S. & H. Sigman (2016). "Drought, dams, and economic activity." *Working Paper*.
7. **Background:** Dasgupta, P. (2013). "The nature of economic development and the economic development of nature." *Economic & Political Weekly* 48(51): 38-51.
8. **Film:** Cadillac Desert Part I (Note: We will view this in class)

Oral Research Presentations (Week 6): Mon, Oct.3

Assignment 2 (Graded): Research project draft literature review (Due Fri. Oct.7 at 5 pm)

**** Fall Break ****

Unit 5: Integrated Water Resource Management (IWRM) and socio-hydrology (Week 7)

Topics: Mon, Oct.17

- IWRM
- Game theory
- Socio-hydrology

Readings:

1. Savenije, H.H.G. & P. Van der Zaag. (2008). "Integrated water resources management: Concepts and issues." *Physics and Chemistry of the Earth* 33: 290-297.
2. Rogers, P. (1969). "A game theory approach to the problems of international river basins." *Water Resources Research* 5(4): 749-760.
3. Ray, I. and Williams, J. (2002). Locational asymmetry and the potential for cooperation on a canal. *Journal of Development Economics* 67, 129-136; 150-151.
4. Troy et al. (2015). "Moving sociohydrology forward: a synthesis across studies." *Hydrology & Earth Systems Science* 19: 3667-3679.
5. Kandasamy et al. (2015). "Socio-hydrologic drivers of the pendulum swing between agricultural development and environmental health: a case study from Murrumbidgee River basin, Australia." *Hydrology & Earth Systems Science* 18: 1027-1041.
6. **Optional:** Wu, X. and Whittington, D. (2006). "Incentive compatibility and conflict resolution in international river basins: A case study of the Nile Basin" *Water Resources Research* 42, W02417, doi:10.1029/2005WR004238.
7. **Optional:** DiBaldissarre et al. (2013) "Towards understanding the dynamic behaviour of floodplains as human-water systems." *Hydrology & Earth Systems Science* 17: 3235-3244.

Systematic Review Assignment (Graded): Due Mon. Oct.17 at 4 pm

Unit 6: Economic perspectives (Week 8)

Topics: Mon, Oct.24

- The challenging economics of water
- "Virtual" water, trade, and general equilibrium
- Markets and privatization

Readings:

1. Hanemann, W.M. (2005). The economic conception of water.
2. Hoekstra, P.Q.; Hung, A.Y. (2005). "Globalisation of water resources: international virtual water flows in relation to crop trade." *Global Environmental Change* 15: 45-56.

3. Grafton, R.; C. Landry; G. Libecap; R. O'Brien (2012). "Comparative assessment of water markets: Insights from the Murray-Darling Basin of Australia and the Western US." *Water Policy* 14: 175-193.
4. Olmstead, S. (2010). "The Economics of Managing Scarce Water Resources." *Review of Environmental Economics and Policy* 4(2): 179-198.
5. **Background:** Allan, J. A. (1998). "Virtual Water": An Essential Element in Stabilizing the Political Economies of the Middle East, in Jeff Albert, Magnus Bernhardsson & Roger Kenna, eds, *Transformations of Middle Eastern Natural Environments: Legacies and Lessons*. New Haven, CT: Yale School of Forestry and Environmental Studies, Bulletin Series No. 103 (141-149).
6. **Background:** Phillips, D., Daoudy, M., McCaffrey, S., Öjendal, J. & Turton, A.R. (1998). *Transboundary Water Cooperation as a Tool for Conflict Prevention and Broader Benefit-Sharing*. Swedish Ministry for Foreign Affairs Expert Group on Development Issues (EGDI), 15-40; 175-177.

Unit 7: International legal frameworks and institutional perspectives (Week 9)

Topics: Mon, Oct.31

- International water law: Helsinki rules and UN Convention
- Noteworthy river basin agreements and institutions
- Management of commons property resources and institutional resilience

Readings:

1. UN Convention on the Law of the Non-navigational Uses of International Watercourses, 1994. (adopted, but not in force pending ratification)
http://untreaty.un.org/ilc/texts/instruments/english/conventions/8_3_1997.pdf
2. Utton, A. (1996). Regional Cooperation: The Example of International Waters Systems in the Twentieth Century. *Natural Resources Journal* 151-154.
3. Wolf, A., Stahl, K., Macomber, M. (2003). Conflict and Cooperation within International River Basins: The Importance of Institutional Capacity. *Water Resources Update*. Pp.1-6.
4. Ostrom, E. (1999). "Revisiting the Commons: Local Lessons, Global Challenges." *Science* 284 (5412), 278-282.
5. Deets, S. (2009). "Constituting Interests and Identities in a Two-Level Game: Understanding the Gabcikovo-Nagymaros Dam Conflict." *Foreign Policy Analysis* 5: 37-56.
6. PCA Press Release (2013). "Indus Waters Kishenganga Arbitration (Pakistan v. India)" Permanent Court of Arbitration.
7. **Background:** Hardin, G. (1968). "The Tragedy of the Commons." *Science* 162, 1243-1248.
8. **Background:** Helsinki Rules; International Law Commission Water Resources Committee, 1966.

9. **Background:** Kaika, M. (2003). "The Water Framework Directive: A New Directive for a Changing Social, Political and Economic European Framework." *European Planning Studies*, 11(3): 299-316.
10. **Background:** PCA (2013). "Final award in the matter of the Indus Waters Kishenganga Arbitration." Permanent Court of Arbitration.

Assignment 3 (Graded): Draft data and methodology sections (Due Mon, Oct.31 at 4 pm)

Unit 8: Water security and competition (Week 10)

Topics: Mon, Nov.7

- Hydropolitics and securitization: Power asymmetries, issue salience, negotiation
- Volatility, disasters and instability
- Internal politics and discourse

Readings:

1. LeMarquand, D., *International Rivers: the Politics of Cooperation*, Westwater Research Center, Vancouver, 1977, pp. 7-24.
2. Levy, M. (1995). "Is the environment a national security issue?" *International Security* 20(2): 35-62.
3. Deudney, Daniel. (1991). The Case Against Linking Environmental Degradation and National Security. *Millennium* 19 (3), 461-476.
4. Miguel, E.; Stayanath, S. and Sergenti, E. (2004). "Economic Shocks and Civil Conflict: An Instrumental Variables Approach." *Journal of Political Economy* 112 (4): 725-753.
5. Guariso, A. & T. Rogall (2015). "Rainfall inequality, political power, and ethnic conflict in Africa." *Working Paper*.
6. Feitelson, E. (2002). Implications of Shifts in the Israeli Water Discourse for Israeli-Palestinian Water Negotiations. *Political Geography* 21 (3):293-318.
7. **Background:** Brown, C.; U. Lall (2006). "Water and economic development: The role of variability and a framework for resilience." *Natural Resources Forum* 306: 306-317.
8. **Background:** Olmstead, S. & H. Sigman (2015). "Damming the Commons: An Empirical Analysis of International Cooperation and Conflict in Dam Location." *Journal of the Association of Environmental and Resource Economists* 2(4): 497-526.

Nile Case Study: Mon, Nov.14 (Week 11)

Class presentations (Weeks 12-13): Schedule TBD

Final paper: Research project paper (Due Fri, Dec.9 at 5 pm)