*Disclaimer: Please note that the syllabus may change before or during the class. The most up-to-date syllabus can be found in Blackboard.
The Water-Energy-Food Nexus  
AS.271.402  
Spring 2018

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Office Hours: by appointment

Course Description

The water, energy and food (WEF) nexus is a topic of growing interest in research and policy communities. Critical physical linkages include the enormous appropriation of water resources for food and energy production, the high energy demand of the water sector for transport and treatment, and the uncertain impacts that climate change will have on all three components. Policy linkages include rights and pricing, infrastructure development, and resource competition between sectors. This course will survey WEF concepts and principles, introduce tools of analysis, and engage students in case studies of critical WEF issues within and between nations.

This course aims to empower students to engage in WEF policy design and debate. As WEF policy decisions are often founded on highly technical analysis, we will find it necessary to evaluate arguments based on climate, economic, optimization, and integrated assessment models. However, as WEF debates often encounter matters of hegemony, equity, and natural rights, we will also address policy considerations that lie beyond the realm of quantitative analysis. In class discussion, policy notes, and the term paper students are expected to integrate these approaches to knowledge in order to find creative solutions to current and emerging policy dilemmas.

Structurally, each class session (except the first and last) will consist of two blocks. First, we will have presentations and extended discussion of the previous week’s briefing paper assignment. Second, there will be lecture/discussion on the topic stated in the syllabus and a brief introduction to the new briefing paper assignment. Required readings should be completed before class.

Requirements

Three briefing papers (2-page paper + oral walk-through): 45%

- Prepare a high level briefing paper for a Principal in a government agency, non-governmental institution, or international organization. The paper should provide adequate background on the issue, key decisions that need attention, and a proposed position on those decisions, with justification.
- Assignments will be divided to ensure that we have an even number of briefing papers for each case study.
Term paper (10-15 pages): 30%

- The term paper will address the WEF nexus as it applies to a geographic or thematic case study. Depending on the topic, the paper will be either a review of existing literature or a new application of WEF nexus principles to an understudied issue.

Presentation on term paper topic: 15%

- A 10 minute presentation, supported with visuals as needed, on your term paper topic. This is envisioned as independent work, but if we have a large class then group presentations or poster presentations are a possibility.

Class participation: 10%

- Each class period will include lecture and extended discussion. Attendance and active participation in discussion is expected of all students.

Tentative Schedule and Reading [reading list is indicative and subject to change; bold indicates required reading, all others are supplemental]

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<thead>
<tr>
<th>Session</th>
<th>Topics</th>
<th>Readings</th>
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Randers J (2010) What was the message of the Limits to Growth?
World Economic Forum (2009) The Bubble Is Close to Bursting: A Forecast of the Main Economic and Geopolitical Water Issues Likely to Arise in the World during the Next Two Decades
Recommended briefing paper readings:


<table>
<thead>
<tr>
<th>2. Water for Food [2/4]</th>
<th>Irrigation, groundwater resources, water quality and water value, food security, transboundary dynamics, fisheries, projections and challenges</th>
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<td>Briefing paper assignment: India groundwater</td>
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<td>Kemp-Benedict E et al. (2011)</td>
<td>Connections between poverty, water and agriculture: evidence from 10 river basins</td>
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<td>Peterson JM et al. (2003)</td>
<td>Conserving the Ogallala Aquifer: Efficiency, Equity, and Moral Motives</td>
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<td>Molden D et al. (2007)</td>
<td>Trends in water and agricultural development</td>
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<td>de Fraiture C et al. (2007)</td>
<td>Looking ahead to 2050: scenarios of alternative investment approaches</td>
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Recommended briefing paper readings:

Shah T et al. (2012) Political economy of the energy-groundwater nexus in India: exploring issues and assessing policy options
3. **Water for Energy [2/11]**  
Hydropower, thermoelectric cooling, renewables, conventional and unconventional fossil fuel extraction  
Briefing paper assignment: powering Africa OR the Bakken formation

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<td>Scott CA et al. (2011) Policy and institutional dimensions of the water–energy nexus</td>
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<td>Stein C et al. (2014) Advancing the Water-energy-food Nexus: Social Networks and Institutional Interplay in the Blue Nile</td>
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<td>Recommended briefing paper readings:</td>
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<td>Deichmann U (2013) The economics of renewable energy expansion in rural Sub-Saharan Africa</td>
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<td>Vidic et al. (2013) Impact of shale gas development on regional water quality</td>
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4. **Energy for Water [2/18]**  
Water transport and treatment, desalination  
Briefing paper assignment: California

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Briefing paper assignment: Chinese food security

Boelens R & Vos J (2012) The danger of naturalizing water policy concepts: Water productivity and efficiency discourses from field irrigation to virtual water trade

Hoekstra AY and MM Mekonnen (2012) The water footprint of humanity

Verma S et al. (2009) Going against the flow: A critical analysis of inter-state virtual water trade in the context of India’s National River Linking Program

Aldaya MM et al. (2008) Strategic importance of green water in international crop trade

Recommended briefing paper readings:

Lu Y et al. (2015) Addressing China’s grand challenge of achieving food security while ensuring environmental sustainability

Anderson K & A Strutt (2014) Food security policy options for China: Lessons from other countries

Shifflett SC et al. (2015) China’s Water-Energy-Food Roadmap


Agricultural inputs, pumping and transfers, shipping, food utilization

Pelletier et al. (2011) Energy Intensity of Agriculture and Food Systems

IEA (2006) Energy for cooking in developing countries

Vermeulen S et al. (2012) Climate Change and Food Systems

FAO (2011) “Energy Smart” Food for People and Climate

Recommended Briefing Paper Readings:

Kibo Consulting (2014) Options for Agriculture in the 2015 International Climate Change Agreement

Boos D et al. (2014) How are INDCs and NAMAs linked?


Climate projections, impacts of climate change, adaptation, W-E-F role in mitigation

Briefing paper assignment: UNFCCC Adaptation

Note: Term paper prospectus is due 4/1


Schaeffer et al. (2012) Energy sector vulnerability to climate change: A review


Moss RH et al. (2010) The next generation of scenarios for climate change research and assessment


Fifth Assessment Report of the IPCC: Working Group I Summary for Policymakers
| 9. Instability and Conflict [4/1] | Concepts of security, land grabs, the globalized food and energy markets, political instability | Rulli MC et al. (2013) Global land and water grabbing  
World Bank (2010) Rising interest in global farmland: can it yield sustainable and equitable benefits? [excerpts]  
Natalini et al. (2015) Quantitative Assessment of Political Fragility Indices and Food Prices as Indicators of Food Riots in Countries  

Recommended Briefing Paper Readings:  
de Chatel et al. (2014) The Role of Drought and Climate Change in the Syrian Uprising: Untangling the Triggers of the Revolution  
Lagi M et al. (2011) The Food Crises: A quantitative model of food prices including speculators and ethanol conversion  
Kelley C et al. (2015) Climate change in the Fertile Crescent and implications of the recent Syrian drought |

Ramaswamy A et al. (2017) An urban systems framework to assess the trans-boundary food-energy-water nexus: implementation in Delhi, India  
Villarroel Walker R et al. (2014) The energy-water-food nexus: Strategic |
*WSJ (2012) Are we better off privatizing water?*  
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<td>Assignment: discuss papers</td>
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| 13. Presentations [4/29] | Overview of your term paper topic. Length will depend on total course enrollment |


Brennan TJ (2010) Decoupling in electric utilities


Bakker K & Morinville C (2013) The governance dimensions of water security: a review

Lele K et al. (2013) Good governance for food, water and energy security


Allouche J et al. (2014) Nexus Nirvana or Nexus Nullity? A dynamic approach to security and sustainability in the water-energy-food nexus