

Water-Energy-Food

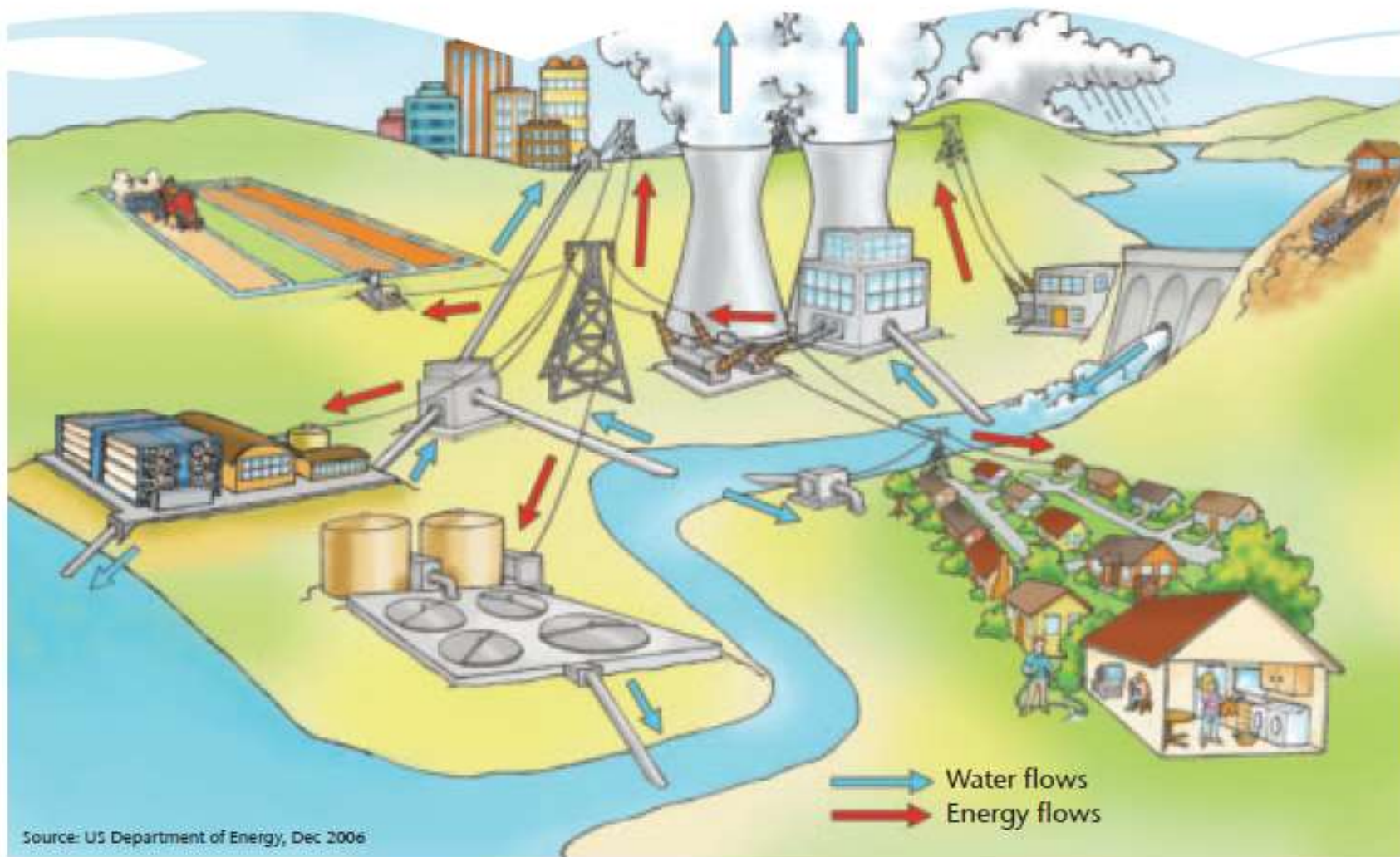
*How have integrationist
frameworks altered the discourse
and practice of water
management?*

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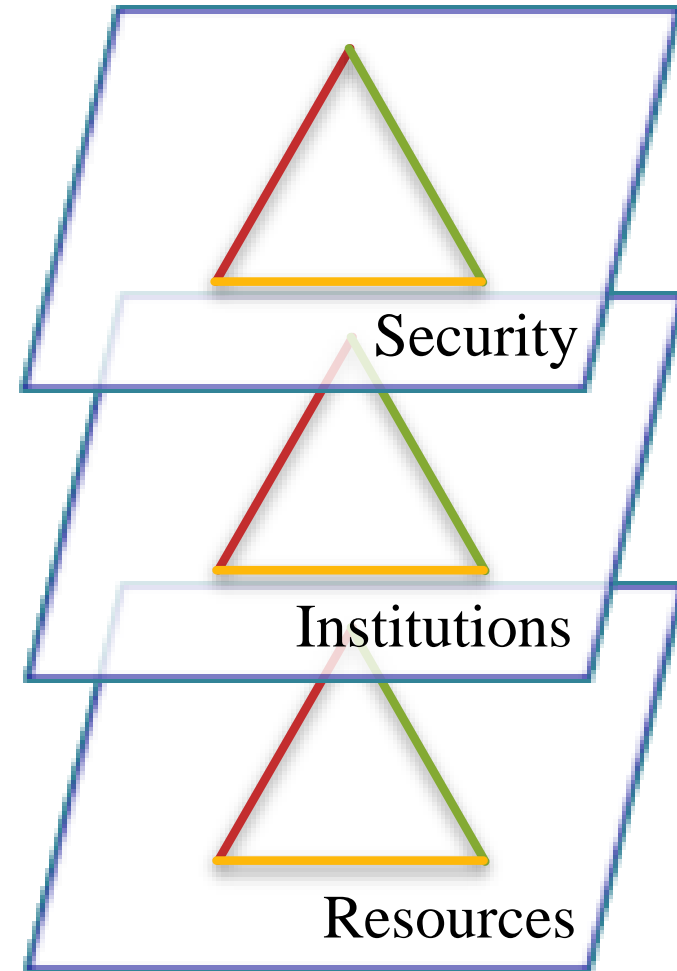
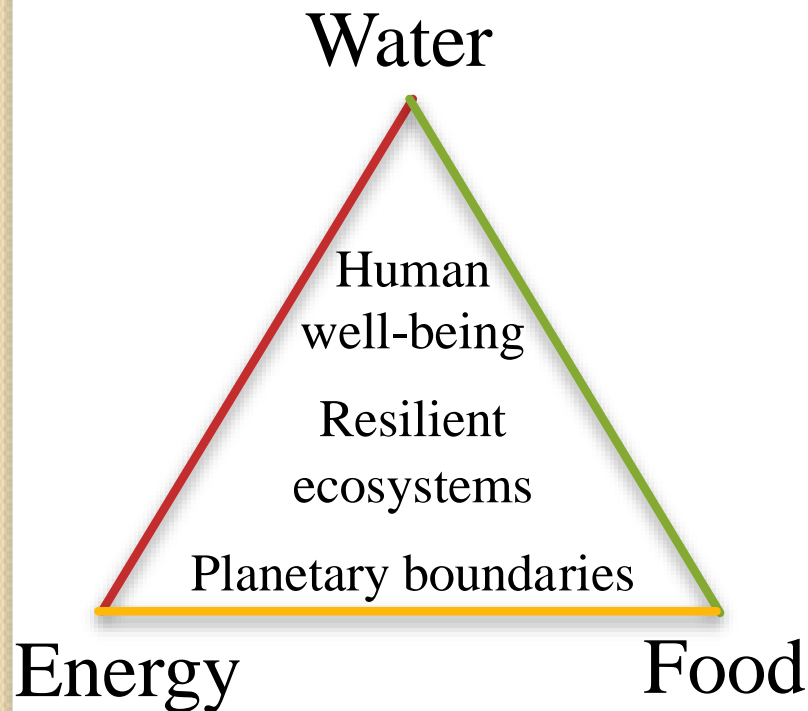
WEF mutual interdependence



What's new in the nexus?

- Resource nexus – crucial for societal well-being and prosperity
- Nexus emerges from water sector, both research and resource policy
 - Allocation & management of scarcity, efficiency
- Social & political processes + institutions & policies – regulate & manage resources
- Security – seen in human, environmental terms **and** national security terms

Water, energy, food: multi-scale interactions



Turning point - The Nexus in 2015

- Shift in global thinking towards sustainable futures
 - Human well-being
 - Resilient ecosystems
 - Co-exist within planetary boundaries
- Paris Climate Accord
- Sustainable Development Goals (SDGs) supplant Millennium Development Goals



Key question

- Does the nexus – the latest in a series of integrationist frameworks – provide better conceptual clarity, operational tools, and human-security outcomes than its predecessors?

Integrationist frameworks

- Integrated water resources management (IWRM)
 - Integrated river basin management (IRBM)
 - Conjunctive surface-groundwater management
 - etc.
- Integrated assessment [modeling] (IAM)
- Coupled natural-human systems (CNH)
- Nexus
 - Energy-food, water-energy, etc.
- Others

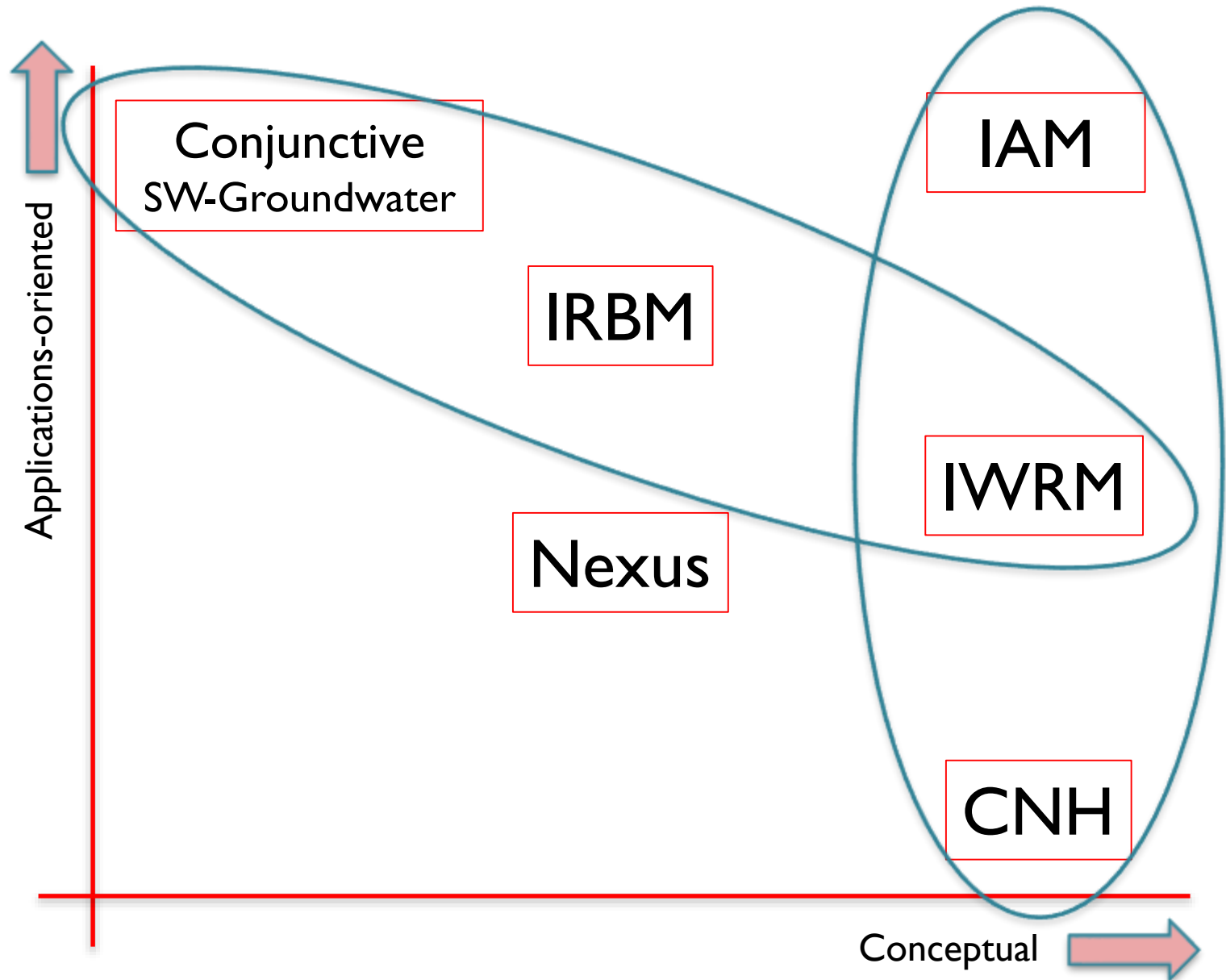
Resources, society, institutions

- Nexus links resource-use practices, previously considered in isolation
- Resource efficiency gains
 - Beware, “savings” lead to increased use
 - Jevons’ Paradox (*The Coal Question*, 1865)
 - Rebound (take-back) effect
- Policy articulation is key to operationalizing the nexus
 - Security of resource access
 - Equity – socioeconomic and intergenerational

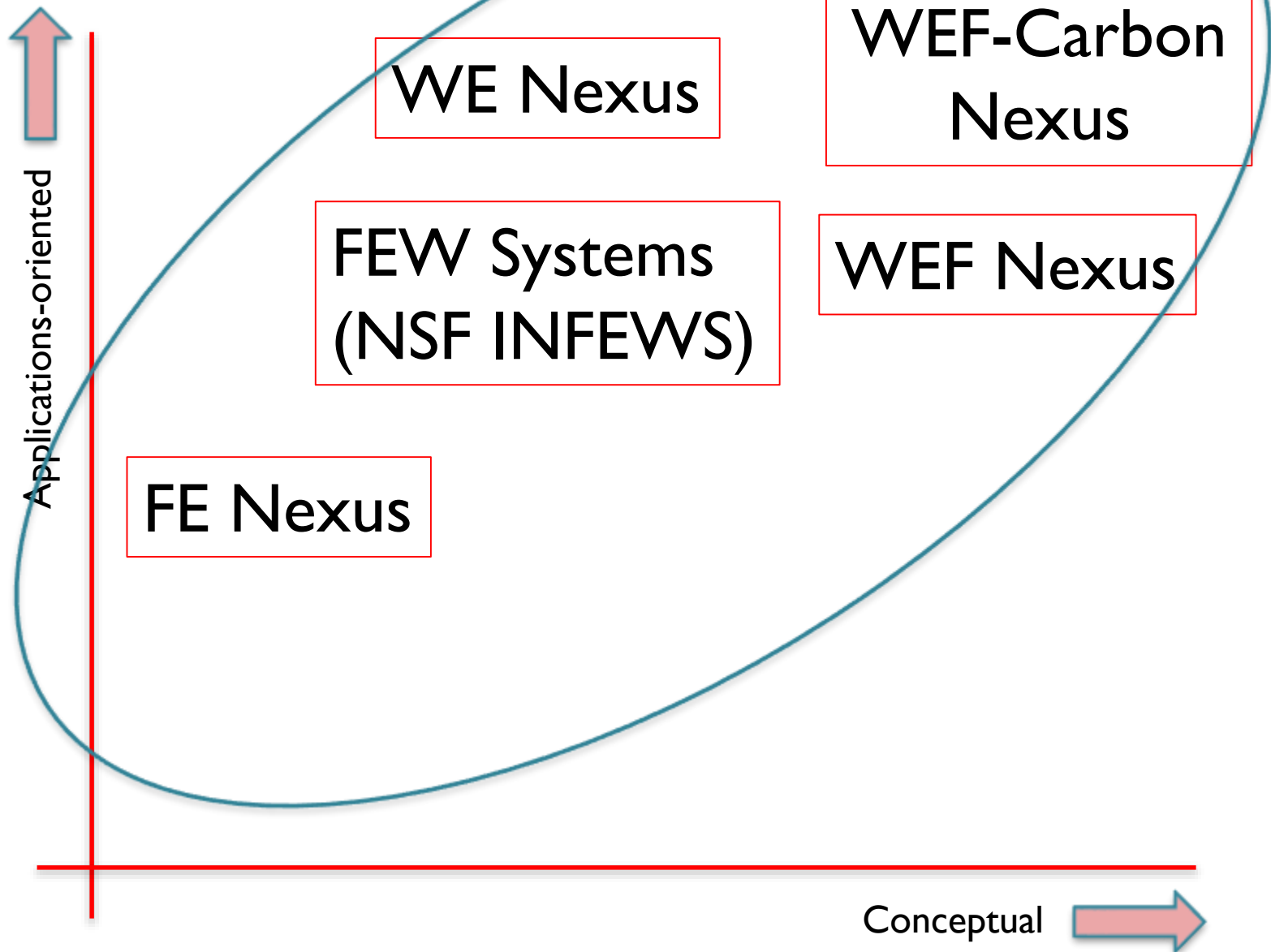
A word on 'efficiency'

- 'Efficiency' = 'Savings' is appealing but can be deceptive
- *Efficiency Paradox*
 - Capturing single- or cross-resource gains requires limits on use, otherwise efficiency causes depletion
 - Or, Water-utility demand hardening, financial paradox
 - 'Inefficiency' \neq 'waste'
 - Think 'waste to resource' across scales, sectors
 - Redundancy enhances resilience

Frameworks: Concepts or tools?



Nexus: Concept or tool?



Whither the nexus?

- Integrationist tendencies are positive
- Nexus exposes 'hidden traps'
- Resource linkages must ultimately widen even further, **especially for carbon**
- Yet, conceptual appeal is accompanied by limits to its application

Ultimate demise of the nexus?

- Broadening of conceptual sweep can diffuse focus
- Solutions-oriented ambitions not matched by outcomes
- Cross-resource maladaptation a lurking threat
- Nexus institutional integration woefully behind
- *Do 'all good things come to an end?'*

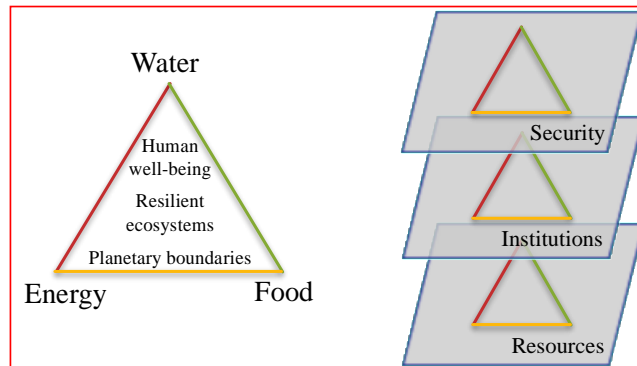
Conclusions

- Emerging frameworks will expand on integrationist character of the nexus
- Must ultimately confront challenges:
 - social and political equity imperative
 - climate change – negative emissions
 - biodiversity and ecological integrity
 - economic-growth limits of resource use

Spring 2019 Seminar GEOG 596J, Water Management & Policy will focus on:

The Water-Energy-Food Nexus

The nexus of water, energy, and food constitutes the interplay of these three resources across multiple domains: biophysical dynamics, societal dependence, and planetary resilience. Increased understanding of their mutual linkages requires that the nexus extend beyond resources to consider institutions and human security. Nexus thinking emerged in the 1980s, and today influences scholarly work, resource management, and international development investments. Critical reflection on the nexus approach has emerged: what are social-justice, equity, and ecological implications of resource development? This seminar will be based on student-led discussion and will include guest-lecture presentations. Term-paper research on your masters or doctoral topic is encouraged.



For further details, contact Christopher Scott, Professor, Geography & Development; and Director, Udall Center for Studies in Public Policy, cascott@email.arizona.edu.

See past syllabus (to be updated for Jan. 2019):

[https://geography.arizona.edu/sites/geography.arizona.edu/files/u171/Water Mgmt %26 Policy GEOG 596J Syllabus v14Jan2016.pdf](https://geography.arizona.edu/sites/geography.arizona.edu/files/u171/Water%20Mgmt%20Policy%20GEOG%20596J%20Syllabus%20v14Jan2016.pdf)

Meets: Wednesdays 1:00 - 3:30PM in ENR2 Building, Room S577

C.A. Scott selected nexus publications

- Scott, C.A., T. Albrecht, R. de Grenade, A. Zuniga-Teran, R.G. Varady, B. Thapa. 2018. Water security and the pursuit of food, energy, and earth systems resilience. Water International. doi: 10.1080/02508060.2018.1534564.
- Pasqual, J.C., H.A. Bollmann, C.A. Scott. 2018. Collective agro-energy generation in family agriculture: the Ajuricaba condominium case study in Brazil. Revista Tecnologia e Sociedade 14 (34): 35-61, doi: 10.3895/rts.v14n34.7626.
- Hammersley, M.A., C.A. Scott, H.R. Gimblett. 2018. Evolving conceptions of the role of large dams in social-ecological resilience. Ecology & Society 23(1): 40, doi: 10.5751/ES-09928-230140.
- Albrecht, T.R., A.B. Crotoft, C.A. Scott. 2018. The water-energy-food nexus: A systematic review of methods for nexus assessment. Environmental Research Letters, doi: 10.1088/1748-9326/aaa9c6.
- Pasqual, J.C., H.A. Bollmann, C.A. Scott, T. Edwiges, T.C. Baptista. 2018. Assessment of collective production of biomethane from livestock waste for urban transportation mobility in Brazil and the U.S. Energies 11 (997), doi: 10.3390/en11040997.
- Scott, C.A., M. Kurian, J.L. Wescoat, Jr. 2015. The Water-energy-food nexus: Adaptive capacity to complex global challenges. In M. Kurian and R. Ardakanian (eds.). *Governing the Nexus: Water, Soil and Waste Resources*, Springer, Berlin, pp. 15-38.
- Scott, C.A. 2013. Electricity for groundwater use: constraints and opportunities for adaptive response to climate change. Environmental Research Letters 8 (2013) 035005, doi: 10.1088/1748-9326/8/3/035005.
- Kumar, M.D., C.A. Scott, O.P. Singh. 2013. Can India raise agricultural productivity while reducing groundwater and energy use? Int'l J. Water Resources Development, doi: 10.1080/07900627.2012.743957
- Scott, C.A. 2011. The water-energy-climate nexus: resources and policy outlook for aquifers in Mexico. Water Resources Research 47, W00L04, doi: 10.1029/2011WR010805.
- Scott, C.A., S.A. Pierce, M.J. Pasqualetti, A.L. Jones, B.E. Montz, J.H. Hoover. 2011. Policy and institutional dimensions of the water-energy nexus. Energy Policy 39: 6622-6630
- Scott, C.A., M.J. Pasqualetti. 2010. Energy and water resources scarcity: Critical infrastructure for growth and economic development in Arizona and Sonora. Natural Resources Journal 50(3): 645-682.

See complete list of nexus publications:

<http://aquasec.org/wrpg/publications/#nexus>



Thanks

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