

ENVR 685, PLAN 685 – Spring 2014  
Instructor: Dale Whittington (Dale\_Whittington@unc.edu)  
TA: Kristen Downs (Kristen.Downs@unc.edu)  
(Office hours by appointment)

Fridays, 9:00 am-11:45 am  
McGG 1305 & Mayes Center

## Water & Sanitation Planning and Policy in Developing Countries: Course Syllabus

### **Part I – Introduction (without Manchester class)**

#### **Lecture 1 (Jan. 1) – Economic Analysis of Water Supply Projects; Global benefits and Costs of Water and Sanitation Interventions**

##### Readings

Hanemann, W. M. (2005). "The Economic Conception of Water" in Peter P. Rogers, M. Ramon Llamas and Luis Martinez-Cortina (eds.), *Water Crisis: Myth or Reality*. Taylor & Francis, pp. 61-91.

Whittington, Dale, W. Michael Hanemann, Claudia Sadoff, and Marc Jeuland. "The Challenge of Improving Water and Sanitation Services in Less Developed Countries." *Foundations and Trends in Microeconomics*. Vol. 4, Issues 6-7, 2009. pp. 469-609.

Davis, Jennifer. (2007). "Copenhagen Consensus Perspective Paper." December. 13 pages.

Frank Rijsberman and Alix Zwane. (2008). "Copenhagen Consensus II Perspective Paper." March. 15 pages.

Frank Rijsberman and Alix Zwane. (2012). "Copenhagen Consensus 2012 Sanitation and Water Challenge Paper." April 2012.

Hutton, Guy. (2012). "Copenhagen Consensus 2012 Perspective Paper on the Sanitation and Water Challenge Paper."

Hanemann, Michael. (2012). "Copenhagen Consensus 2012 Perspective Paper on the Sanitation and Water Challenge Paper."

Whittington, Dale, Marc Jeuland, Kate Barker, and Yvonne Yuen. (2012). "Setting Priorities, Targeting Subsidies among Water, Sanitation, and Preventative Health Interventions in Developing Countries." *World Development*. 40 (8), 1546-1568.

##### Background Readings

Hunter, P.R., Zmirou-Navier, D., Hartemann, P. (2009). Estimating the impact on health of poor reliability of drinking water interventions in developing countries. *Science of the Total Environment*, 407, 2621-2624.

Kochar, A. (2004). "Ill-health, savings, and portfolio choice in developing economies." *Journal of Development Economics*. Vol. 73, No. 1, pp. 257-285.

Video - Kabuku Water Project Kenya: Sustainability- Productive Uses of Water

## **Lecture 2 (Jan. 16) – Understanding Water Supply and Sanitation Investments in the Broader Water Resources Management Context**

Before class, students should watch ...

Background Video of Prof. Tony Allan, Kings College London: "Water and food security: some underlying fundamentals and some invisible solutions" [Feb. 4, 2010] – available for students to watch outside of class.

### Class organization

- 9:00 – 10:20 am – Lecture
- 10:20 – 10:30 am – Break
- 10:30 – 10:50 – Student-led discussion of Hall et al. (2014)
- 10:50 – 11:15 - Student-led discussion of Grey & Sadoff (2007)
- 11:15 – 11:45 – Student-led discussion of Dublin Statement (1992)

### Readings

Hall, J. W., D. Grey, D. Garrick, F. Fung, C. Brown, S.J. Dadson, C.W. Sadoff. (2014). "Coping with the Curse of Freshwater Variability." *Science*. 429, 30(2).

Priscoli, J. D. (2000) Water and civilization: Using history to reframe water policy debates and to build a new ecological realism. *Water Policy*, 1 (6), 623-636.  
The Dublin Statement on Water and Sustainable Development (1992).

Grey, D., and Sadoff, C. (2007). "Sink or swim? Water security for growth and development." *Water Policy*. 9 (6), 545-571.

McKinsey & Company – The 2030 Water Resources Group. (2009). *Charting our Water Future: Economic Frameworks to Inform Decision-making*. 185 pages.

### Background Readings

Allan, J.A. (2011). *Virtual Water: Tackling the threat to our planet's most precious resource*. I.B. Tauris Publishers. 365 pages.

### **Lecture 3 (Jan. 23) – Conducting a Systematic Literature Review (Kristen Downs & Ryan Crook); Guest Lecture (David Fuente)**

#### Class organization

9:00 – 10:30 am – Lecture by Kristen Downs and Ryan Crook

10:30 – 10:40 am – Break

10:40 – 11:45 am – Lecture by David Fuente

#### Readings on Conducting a Systematic Literature Review

Greenhalgh, Trisha. How to Read a Paper: Papers That Summarise Other Papers (Systematic Reviews and Meta-Analyses). *BMJ: British Medical Journal*, 315 (7109), 672-675.

Moher D, Liberati A, Tetzlaff J, Altman DG, and the PRISMA Group. Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *Ann Intern Med*. 2009;151:264-269. doi:10.7326/0003-4819-151-4-200908180-00135. Available at: <http://annals.org/article.aspx?articleid=744664>

The PRISMA Checklist and Flow Diagram. PRISMA Statement website: <http://www.prisma-statement.org>

#### Examples of Literature Reviews

Lewis JJ, Pattanayak SK. 2012. Who Adopts Improved Fuels and Cookstoves? A Systematic Review. *Environ Health Perspect* 120:637–645; <http://dx.doi.org/10.1289/ehp.1104194>

Andrew Creese, Katherine Floyd, Anita Alban, Lorna Guinness, Cost-effectiveness of HIV/AIDS interventions in Africa: a systematic review of the evidence, *The Lancet*, Volume 359, Issue 9318, 11 May 2002, Pages 1635-1642, ISSN 0140-6736, [http://dx.doi.org/10.1016/S0140-6736\(02\)08595-1](http://dx.doi.org/10.1016/S0140-6736(02)08595-1).

**Comment [DW1]:** Kristen – please add a couple of more examples that are more WASH-related.

#### Reading for David Fuente's Guest Lecture:

EFD discussion [paper](#)

**Comment [DW2]:** Kristen – David provided the citation on Nairobi tariffs and subsidies. I decided NOT put our new Utility Policy paper here.

## **Part II – Status Quo Water and Sanitation Conditions (What’s going on?)**

### **Lecture 4 (January 30) –Policy Framework; Ancient Instincts**

Broadcast from and to Manchester to UNC-CH – Meet in Mayes Center at 9:00 am

#### Class Organization

9:00 – 10:45 am – Lecture

10:45 – 10:55 am – Break

10:40 – 11:45 am – UNC Class Debate

Class debate No. 1 – Proposition: “The majority of water and sanitation infrastructure in low-income countries is best conceptualized as ‘dead capital’.”

Reading: The Mystery of Capital: Why Capitalism Triumphs in the West and Fails Everywhere Else, by Hernando de Soto (2003).

#### Background Readings

Isbell, L. (2009). The Fruit, the Tree, and the Serpent: Why We See So Well. Harvard U. Press.

Finlayson, C. (2014). The Improbable Primate: How Water Shaped Human Evolution. Oxford U. Press.

Appleton, J. (1975). The Experience of Landscape. John Wiley & Sons.

Oriens, G. (2014). Snakes, Sunrises, and Shakespeare: How Evolution Shapes our Loves and Fears. U. Chicago Press.

Mithen, S. (2012). Thirst: Water and Power in the Ancient World. Weidenfield and Nicholson.

**Lecture 5 (Feb. 6) –Flipped Class: Problem Diagnosis: Infrastructure Coverage; Facts about water & sanitation; Water Markets and Water Vending**

Broadcast from the University of Manchester beginning at 9:00 am. Meet in Mayes Center.

Before class on Feb. 6, students should watch:

Documentary video: Hans Rosling – Stats that reshape your world view

Video 1.0 – Facts about water

Video 1.1 – Global Water and Sanitation Coverage

Video 1.2 – Infrastructure Coverage: Electricity, Water, Telephone

Video 1.3 – Forecasts of Coverage

Video 1.4 – Conversation with Clarissa Brocklehurst

Documentary: “Where’s the outrage?”

Video 2.1: “Outrage versus Strategy?”

Video 2.2 – Types of Vendors, Vendor Prices

Video 2.3 – Money and water flows in Onitsha, Nigeria

Documentary Video: Water and Sanitation for the Poor: Independent Providers (18 min.)

Students should email questions on the MOOC and documentary videos and readings to Kristen Downs by Wednesday, Feb. 4.

Class organization:

9:00 – 10:30 am – Discussion of student questions about MOOC lectures and videos

10:30 – 10:40 am – Break

10:40 – 11:10 am – Student presentation of Fuente et al. (2014)

11:10 - 11:45 am - Student presentation of Kariuki, M. and Schwartz, J. (2005)

Readings

*Infrastructure Coverage:*

Komives, K., Whittington, D., and Wu, X. (2003). Infrastructure coverage and the poor: A global perspective. In P. Brook and T. Irwin (Eds.), *Infrastructure for poor people: Public policy for private provision* (pp. 77–124). Washington, D.C.: The World Bank Public-Private Infrastructure Advisory Facility.

Jeuland, M., S. Ozdemir, D. Fuente, M. Allaire, D. Whittington. (2013). “The long-term dynamics of morality benefits from improved water and sanitation in less developed countries.” *PLOS One*. October, Volume 8, Issue 10, e74804.

Fuente, D., M. Allaire, M. Jeuland, and Whittington. (2014). *Water and Sanitation and Mortality in Africa: Current Estimates, Future Forecasts, and Policy Implications*. Dec. 30 draft. Global Water Partnership, Stockholm.

*Water Markets and Water Vending:*

Whittington, Dale, Donald T. Lauria and Xinming Mu. (1991). "A Study of Water Vending and Willingness to Pay for Water in Onitsha, Nigeria." *World Development*. Vol. 19, No. 2/3, pp. 179-198.

Whittington, Dale, Donald T. Lauria, Daniel A. Okun, and Xinming Mu. (1989). "Water Vending Activities in Developing Countries: A Case Study of Ukunda, Kenya." *International Journal of Water Resources Development*, September 1989. pp. 158-168.

Crane, Randall. (1994). "Water Markets, Market Reform and the Urban Poor: Results from Jakarta, Indonesia." *World Development*. Vol. 22, No. 1, pp. 71-83.

Kariuki, M. and Schwartz, J. (2005). "Small-Scale Private Service Providers of Water Supply and Electricity: A Review of Incidence, Structure, Pricing and Operating Characteristics." World Bank Policy Research Working Paper 3727. The World Bank: Washington, DC.

Background readings:

Kosek, M., Bern, C. and Guerrant, R. L. (2003). "The global burden of diarrheal disease, as estimated from studies published between 1992 and 2000." *Bulletin of the World Health Organization*, 81 (3), 197-204.

Khan, Akhtar Ahmed. (1973). "A History of the Food Problem." The Agricultural Development Council. New York: NewYork. October. 9 pages

Therkildsen, Ole. (1988). *Watering White Elephants: Lessons from Donor-Funded Planning and Implementation of Rural Water Supplies in Tanzania*. Scandinavian Institute of African Studies. Uppsala. 224 pages.

Altaf, Anjum. (2010). "The elusive MDGs." December 24, 2010. Op Ed in the Dawn, Karachi. Dec. 24, 2010. <http://www.dawn.com/2010/12/24/the-elusive-mdgs.html>

Rogers, Peter. (2008). "Facing the Freshwater Crisis." *Scientific American*. August, pp. 46-53.

Task Force for Water and Sanitation. The United Nations Millennium Project. (2004). "What will it take? Water, Sanitation, and the Millennium Development Goals." Abridged Draft Final Report. November.

Briscoe, John. "Environmental Priorities for Development and Sanitation and Clean Water." World Bank reprint series no. 469. Contains parts of Chapter 2 and Chapter 5 of the World Development Report 1992. Washington D.C. Available at: <http://documents.worldbank.org/curated/en/1992/01/10946674/environmental-priorities-development-sanitation-clean-water>

## **Lecture 6 (Feb. 13) –Flipped Class: Corruption; The Supply Side – Technologies and Costs of Improved Water Supply and Sanitation Services**

Broadcast to the University of Manchester beginning at 9:00 am. Meet in Mayes Center.

Before class students should watch ...

Video 2.4 – An introduction to corruption

Video 2.5 – Corruption in South Asia

DocumentaryVideo: PBS Frontline – “Battle for Haiti” - [<http://video.pbs.org/video/1737171448>]

Video 3.0 – The cost of serving households with piped water networks

Video 3.1 – Solution to cost calculation

Video 3.2 – Cost components and more on costs

Video 3.3 – Costs of nonpiped technologies

Video 3.4 – Condominial sewers and desalination

Video 3.5 – Conversation with Don Lauria: Part One

Video 3.6 – Conversation with Don Lauria: Part Two

Documentary: Water Supply and Sanitation in Development 2: Problems & Solutions

### Class organization:

9:00 – 10:20 am – Discussion of student questions on MOOC lectures and videos

10:20 – 10:30 am – Break

10:30 – 11:00 am – Student presentation of Fass, 1988, Chapter 4.

11:00 – 11:45 am Teaching Case No. 1: “USAID Mission to Haiti.”

Note: Students should study the – teaching case before February 6 and come to class prepared to discuss.

### Readings

#### Corruption

Fass, Simon. (1988). Chapter 4: “Water,” in Political Economy in Haiti: The Drama of Survival. Transaction Publishers: New Brunswick, New Jersey.

Davis, Jennifer A. (2004). “Corruption in Public Services Delivery: Experience from South Asia’s Water and Sanitation Sector.” World Development. Vol. 32, No. 1. pp. 53-71.

Lovei, Laszlo, and D. Whittington. (1993). “Rent-Seeking in the Water Supply Sector: A Case Study of Jakarta, Indonesia.” Water Resources Research. Vol. 29, No. 7, July. pp. 1965-1974.

#### Costs and Technologies

Franceys, R., A. Naafs, C. Pezon, and C. Fonseca. (2011). “The cost of capital: costs of financing capital expenditure for water and sanitation.” September. WASH Cost Briefing Note 1c. Available from WASHCost website at: [www.washcost.info/pubs](http://www.washcost.info/pubs).

Anderson, Letty. (1988). "Fire and Disease: The Development of Water Supply Systems in New England, 1870-1900." *Technology and the Rise of the Networked City in Europe and America*. Edited by Joel Tarr and Gabriel Dupuy. Temple University Press, Philadelphia. pp. 137-156.

Tarr, Joel. (1988). "Sewerage and the Development of the Networked City in the United States, 1850-1930." *Technology and the Rise of the Networked City in Europe and America*. Edited by Joel Tarr and Gabriel Dupuy. Temple University Press, Philadelphia. pp. 159-185.

Watson, Gabrielle. (1995). *Good Sewers Cheap: Agency-Customer Interaction in Low-Cost Urban Sanitation in Brazil*. Water and Sanitation Currents. UNDP Water and Sanitation Program. 56 pages plus annexes.

Arnold, B. F., and Colford, J. M. J. (2007). Treating water with chlorine at point-of-use to improve water quality and reduce child diarrhea in developing countries: A systematic review and meta-analysis. *American Journal of Tropical Medical Hygiene*, 76 (2), 354-364.

#### Background Readings

OECD. (2009). *Measuring Capital 2009*. OECD Manual. Second Edition.



## Lecture 7 (Feb. 20) – Understanding Household Water and Sanitation Demand

Before class students should watch ...

Video 4.1 – Introduction to differences between water demand modeling in industrialized and developing countries

Video 4.2 – Households with piped connections: price and income elasticities

Video 4.3 – Households with water sources outside the home

Video 4.4 – Household demand for drinking water improvements

Video 4.5 – Effect of social norms on household water use

Video 4.6 – Conversation with Marc Jeuland

Documentary Video – Water of Ayole

Documentary Video - Orangi: City of Hope

### Class organization:

9:00 – 10:20 am – Discussion of student questions on MOOC lectures and videos

10:20 – 10:30 am – Break

10:30 – 11:00 am – Student Presentation of Katui-Kafui, Mungati et al. (2002). Drawers of Water II: Kenya Country Study.

11:00 – 11:20 am – Student Presentation of DeVoto et al. 2012.

11:00 – 11:45 am Student Presentation of Pattanayak et al. 2009.

### Readings:

#### *Water*

White, Gilbert, David Bradley, and Anne White. (1972). Drawers of Water: Domestic Water Use in East Africa. University of Chicago Press. Chapters 1-3, 6.

Katui-Kafui, Mungati et al. (2002). Drawers of Water II: Kenya Country Study.

Kremer, Michael, Clair Null, Edward Miguel, and Alix Zwane. (2008). “Diffusion of Chlorine Drinking Water Treatment in Kenya.” UC-Berkeley, Working Paper. <http://elsa.berkeley.edu>.

Whittington, D., Pattanayak, S., Yang, J. C., and Kumar. B. (2002). “Household demand for improved piped water services in Kathmandu, Nepal.” *Water Policy*, 4 (6). 531-556.

Ferraro, P.J., J.J. Miranda, and M.K. Price. (2011) “The Persistence of Treatment Effects with Norm-Based Policy Instruments: Evidence from a Randomized Environmental Policy Experiment.” *American Economic Review: Papers & Proceedings*, 101:3, 318–322.

Ashraf, N., J. Berry, and J.M. Shapiro. (2010). “Can Higher Prices Stimulate Product Use? Evidence from a Field Experiment in Zambia.” *American Economic Review*. December, 2383–2413.

Devoto, Florencia, Esther Duflo, Pascaline Dupas, William Pariente, and Vincent Pons. (2012). “Happiness on Tap: Piped Water Adoption in Urban Morocco. *American Economic Journal: Economic Policy*, 4 (4): 68-99.

#### *Sanitation*

Pattanayak, Subhrendu K, Jui-Chen Yang, Katherine L Dickinson, Christine Poulos, Sumeet R Patil, Ranjan K Mallick, Jonathan L Blitstein, & Purujit Praharaj. (2009). "Shame or subsidy revisited: social mobilization for sanitation in Orissa, India." *Bulletin of the World Health Organization*. 87: 580-587.

Pattanayak. S.K., Dickinson, K.L., Patil, S.R., Poulos, C.A., Yang, J.C. 2012. "Nature's call: Environmental health puzzle from rural India." Draft presentation.

Whittington, Dale, Donald T. Lauria, KyeongAe Choe, Jeffrey Hughes, and Venkateswarlu Swarna. (1993). "Household Sanitation in Kumasi, Ghana: A Description of Current Practices, Attitudes, and Perceptions." *World Development*. Vol. 21, No. 5. pp. 733-748.

Whittington, Dale, Donald T. Lauria, Albert M. Wright, KyeongAe Choe, Jeffrey Hughes, and Venkateswarlu Swarna. (1993). "Household Demand for Improved Sanitation Services in Kumasi, Ghana: A Contingent Valuation Study." *Water Resources Research*, Vol. 29, No. 6, pp. 1539-1560. June.

#### Background Readings

Choe, KyeongAe, Dale Whittington, and Donald T. Lauria. (1996). "The Economic Benefits of Surface Water Quality Improvements in Developing Countries: A Case Study of Davao, Philippines." *Land Economics*. November. pp. 519-537.

Lauria, Donald T., Dale Whittington, KyeongAe Choe, Cynthia Turingan, and Virginia Abiad. "Household Demand for Improved Sanitation Services: A Case Study of Calamba, Philippines." *Valuing Environmental Preferences: Theory and Practice of the Contingent Valuation Method.* Edited by Ken Willis and Ian Bateman. 1999. pp. 540-584. Oxford University Press.

Chaudhri, R., R. Sodt, K. Lieberg, J. Chilton, G. Borriello, Y. J. Masuda, and J. Cook. (2012). "Low-power Sensors and Smartphones for Tracking Water Collection in Rural Ethiopia." Working Paper, Evans School of Public Affairs, University of Washington, Seattle, WA 98195-2350.

Masuda, Y.J., L. Fortmann, M. K. Gugerty, M. Smith-Nilson, J. Cook. (2012). "Pictorial Approaches for Measuring Time Use in Rural Ethiopia." *Social Research Indicators*.

Griffin, Charles C.; John Briscoe; Bhanwar Singh; Radhika Ramasubban; and Ramesh Bhatia. (1995). "Contingent Valuation and Actual Behavior: Predicting Connections to New Water Systems in the State of Kerala, India." *The World Bank Economic Review*. Vol. 9, No. 3, pp. 373-395

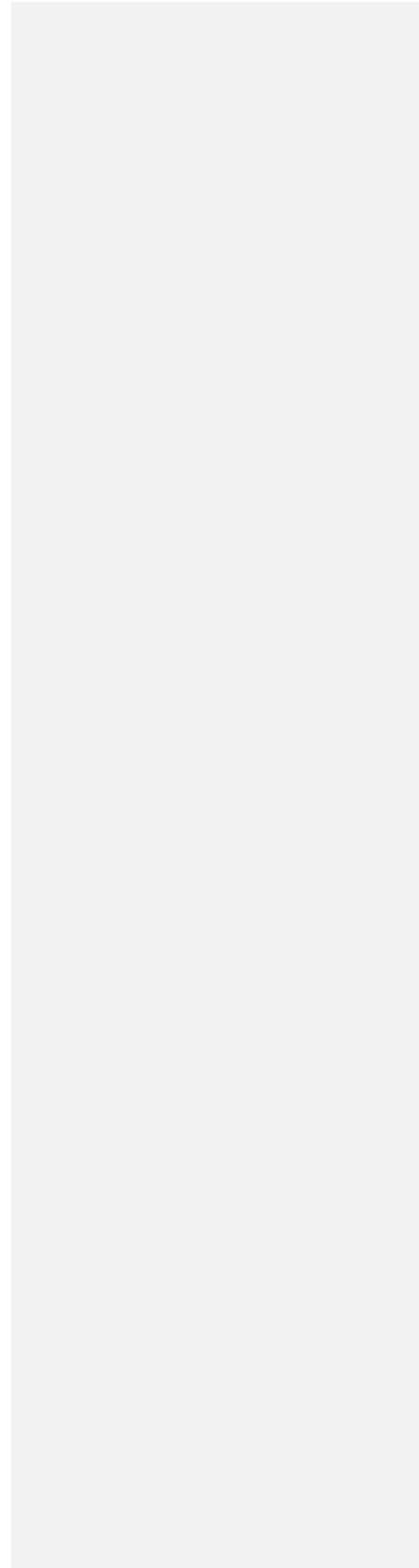
Mu, Xinming, Dale Whittington, and John Briscoe. (1990). "Modeling Village Water Demand: A Discrete Choice Approach." *Water Resources Research*. Vol. 26, No. 4. pp. 521-529.

Briscoe, John; Manisha Chakraborty, and Shahana Ahmed. (1981). "How Bengali Villagers Choose Sources of Domestic Water." *Water Supply and Management*. Vol. 5, 165-181.

MacRae, Duncan, Jr. and Dale Whittington. (1988). "Assessing Preferences in Cost-Benefit Analysis: Reflections on Rural Water Supply Evaluation in Haiti." *Journal of Policy Analysis and Management*. Vol. 7, No. 2. pp. 246-263.

Pattanayak, Subhrendu, Jui-Chen Yang, Dale Whittington, and Bal Kumar. (2005). "Coping with Unreliable Public Water Supplies: Averting Expenditures by Households in Kathmandu, Nepal." *Water Resources Research*. Vol. 4, No. 2, Feb. W02012. 11 pages.

Nagues, C. and Whittington, D. (2010). Estimation of Water Demand in Developing Countries: An Overview. *The World Bank Research Observer*, 25(2), 263-294. doi:10.1093/wbro/lkp016.



### **Lecture 8 (Feb. 28) – Flipped Lecture: Water and Climate Change; Water Development Paths**

Lecture Broadcast to the University of Manchester beginning at 9:00 am from Mayes Conference Center.

Before class, students should watch ...

Climate change:

Video 5.4 – Climate Change, water, and health

Video 5.5 – Effects of climate change on water utilities

Video 5.6 – Conversation with Clive Agnew

Documentary Video: Sun Come Up

Documentary Video: Cool It

Water Development Paths:

Video 6.0 – Possible solutions to the water development path exercise

Video 6.1 – A Historical development path – UKL London and Manchester, England

Video 6.2 – Changing knowledge, practices, and perceptions

Video 6.3 – Path dependency

Video 6.4 - Changing course

Video 6.5 - Capital intensity: England and Wales

Video 6.6 – Conversation with Marie Hart

Class organization:

9:00 – 10:20 am – Discussion of student questions on MOOC lectures and videos

10:20 – 10:30 am – Break

10:30 – 10:50 am – Student-led discussion of Milly et al. (2008)

10:50-11:15 am – Student-led discussion of Geels (2006)

11:15- 11:45 am – Student-led discussion of Farrelly & Brown (2011).

Readings

*Climate Change*

Bates, B.C., Z.W. Kundzewicz, S. Wu and J.P. Palutikof, Eds., 2008: Climate Change and Water.

Technical Paper of the Intergovernmental Panel on Climate Change, IPCC Secretariat, Geneva, 210 pp.

Chapters 1-4 only (Pp. 5-76).

Hsiang, S. (2010). "Temperatures and cyclones strongly associated with economic production in the Caribbean and Central America." *Proceedings of the National Academy of Sciences* 107 (35): 15367-72.

Jeuland, M. (2010). "Economic implications of climate change for infrastructure planning in transboundary water systems: an example from the Blue Nile." *Water Resources Research* 46, W11556, doi:10.1029/2010WR009428.

Milly, P; Betancourt, J; Falkenmark, M; Hirsch, R; Kundzewicz, Z.; Lettenmaier, D; Stouffer, R. (2008) Stationarity Is Dead: Whither Water Management? *Science* 319 (5863): 573-574.

Schlenker, W. and M. J. Roberts (2009). "Nonlinear temperature effects indicate severe damages to US crop yields under climate change." *Proceedings of the National Academy of Sciences* 106(37): 15594-15598.

*Water Development Paths*

Geels, Frank. (2006). The hygienic transition from cesspools to sewer systems (1840-1930): The dynamics of regime transformation. *Research Policy*: 35, 1069-1082.

Farrelly, M. R. Brown. (2011). "Rethinking urban water management: Experimentation as a way forward?" *Global Environmental Change*. 21, pp. 721-732.

Konrad, K., Truffer, B., Vob, J.P. (2008). Multi-regime dynamics in the analysis of sectoral transformation potentials: evidence from German utility sectors. *Journal of Cleaner Production*: 16, 1190-1202.

Ford, R.R. (1998). The technological challenges facing the water industry. Manchester Statistical Society, UK, 1-20. ISBN: 0853361436

Hamlin, C. (1992). Edwin Chadwick and the engineers, 1842-1854: Systems and antisystems in the pipe-and-brick sewers war. *Technology and Culture*: 33(4), 680-709.

Tarr, J.A. (1979). The separate vs. combined sewer problem: A case study in urban technology design choice. *Journal of Urban History*: 5(3), 308-339.

Tarr, J.A., McCurley III, J., McMichel, F.C., Yosie, T. (1984). Water and wastes: A retrospective Assessment of wastewater technology in the United States, 1800-1932. *Technology and Culture*: 25(2), 226-263.

**Assignment No. 1: Performance Indicators due****Note: end of flipped lectures**

### Part III – Policy Interventions (What works? What should be done?)

#### Lecture 9 (March 6) – Better Planning Protocols; Participation, Demand-driven Approaches

Lecture Broadcast to the University of Manchester beginning at 9:00 am from Mayes Conference Center.

Before class, watch ...

Documentary Video - Strategic Sanitation Planning: The Kumasi Experience  
Conversation with Arif Hasan – Parts 1 and 2

#### Class Organization

9:00 – 10:20 am – Lecture  
10:20 – 10:30 am – Break  
10:30 – 11:45 am – Lecture (cont.)

#### Readings

##### *Participation*

Kleemeier E. (2000). “The Impact of Participation on Sustainability: An Analysis of the Malawi Rural Piped Scheme Program.” *World Development*. Vol. 28, No. 5, pp. 929-944.

Prokopy, L. S. (2005). "The relationship between participation and project outcomes: Evidence from rural water supply projects in India." *World Development*. 33(11): 1801-1819.

Mansuri, G. and V. Rao. (2013). *Localizing Development: Does Participation Work?* A World Bank Policy Research Report. Washington D.C. World Bank.

##### *Designing Demand-Driven Rural Water Programs*

Whittington, D., Davis, J., Prokopy, L., Komives, K., Thorsten, R., et al. (2009). “How well is the demand-driven, community management model for rural water supply systems doing? Evidence from Bolivia, Peru, and Ghana.” *Water Policy*. Vol. 11, No. 6. July/August, 2009.

World Bank Water Demand Research Team. (1993). “The Demand for Water in Rural Areas: Determinants and Policy Implications.” *The World Bank Research Observer*. pp. 47-70.  
Background readings

Whittington, Dale, Jennifer Davis, and Elizabeth McClelland. (1998). Implementing a demand-driven approach to community water supply planning: A case study of Lugazi, Uganda. *Water International*, 23 (3), 134-145.

Sara, Jennifer, Alexandra Gross, and Caroline van den Berg. (1996). Rural Water Supply & Sanitation in Bolivia: From Pilot to National Program. UNDP-World Bank Water and Sanitation Program. 43 pages.

Garn, Harvey A. (undated). “Lessons from Large-Scale Rural Water and Sanitation Projects: Transition and Innovation.” Draft working paper. UNDP/World Bank Water and Sanitation Program. Washington D.C. 15 pages.

##### *Designing Demand-Driven Urban Sanitation Programs*

Whittington, Dale, Jennifer Davis, Harry Miarsono, and Richard Pollard. (2000). "Designing a 'Neighborhood Deal' for Urban Sewers: A Case Study of Semarang, Indonesia." *Journal of Planning Education and Research*. Vol. 19, pp. 297-308.

#### Background Readings

Davis, Jennifer and Dale Whittington. (1998). "Participatory Research for Development Projects: A Comparison of the Community Meeting and Household Survey Techniques." *Economic Development and Cultural Change*. October, 1998. pp. 73-94.

Whittington, Dale; Apia Okorafor; Augustine Okore; and Alexander McPhail. (1990). "Strategy for Cost Recovery in the Rural Water Sector: A Case Study of Nsukka District, Anambra State, Nigeria." *Water Resources Research*. Vol. 26, No. 9. pp. 1899-1913.

Altaf, A., Whittington, D., Smith, V. K., and Jamal, H. (1993). Rethinking rural water supply policy in the Punjab, Pakistan. *Water Resources Research*, 29 (7), 1943-1954.

**\*\*SPRING BREAK – NO CLASS Friday, MARCH 13, 2015\*\***

## Lecture 10 (March 20) – Water Pricing and Tariff Design

Broadcast to the University of Manchester from Mayes Center at 9:00 am

### Class organization

9:00 – 10:20 am – Lecture  
 10:20 – 10:30 am – Break  
 10:30 – 11:45 am – Lecture (cont.)

### Readings

#### *Water tariff design*

Whittington, Dale, John Boland, and Vivien Foster. (2002). “Water Tariffs and Subsidies in South Asia: Understanding the Basics.” World Bank. December. 16 pages.

Boland, John, and Dale Whittington. (2000). “The Political Economy of Increasing Block Water Tariffs in Developing Countries.” *The Political Economy of Water Pricing Reforms*. Ariel Dinar, Editor. Oxford University Press. 2000. Pp. 215-236.

Whittington, Dale. (2003). “Municipal Water Pricing and Tariff Design: A Reform Agenda for South Asia.” *Water Policy*. 5, pp. 61-76.

J-PAL. (2011). The Price is Wrong. J-PAL Bulletin (April 2011). Available at: [www.povertyactionlab.org](http://www.povertyactionlab.org).

#### *Background readings*

Walker, A. (2009.). Independent Review of Charging for Household Water and Sewerage Services. Area 2C, Ergon House, Horseferry Road, London, SW1P 2AL. Available from website: <http://www.defra.gov.uk/publications/files/walker-review-final-report.pdf>

Hanemann, W. Michael. (1997). “Price and Rate Structures.” Chapter 5 in *Demand Management and Planning*. By Duanne Baumann, John Boland, and W. Michael Hanemann. McGraw-Hill. Pp. 137-179.

Olmstead, S., W.M. Hanemann, and R. Stavins. (2007). “Water Demand Under Alternative Price Structures.” *Journal of Environmental Economics and Management*. pp. 181-198.

Whittington, Dale. (1992). “Possible Adverse Effects of Increasing Block Water Tariff in Developing Countries.” *Economic Development and Cultural Change*. pp. 75-87.

Warford, Jerry. (1994). “A Marginal Opportunity Cost Approach to Municipal Water Pricing. EEPSEA Special Paper.



**Lecture 11 (March 27) – Providing NonPrice Information – Community-Led Sanitation; Health Information**

No broadcast to the University of Manchester: meet in McGG 1305

Before class, students should watch ...

Documentary UNCEF Videos - Dividing the Mango; Meena's Three Wishes; I'm Meena  
Video: Conversation with Barbara Evans

Class organization

9:00 – 10:40 am – Lecture

10:40 – 10:50 am – Break

10:50 – 11:45 am – Class Debate: Portfolios of the Poor

**Class debate No. 2** – Proposition: "The health risks from poor water and sanitation are a relatively small, unimportant part of 'portfolio' of risks confronting poor households in low-income countries."

Reading: Portfolios of the Poor: How the World's Poor Live on \$2 a day, by Daryl Collins, Jonathan Morduch, Stuart Rutherford, and Orlanda Ruthven. (2009). 281 pages

Readings

*Community-Led Total Sanitation*

Jenkins, M. and S. Sugden (2006). "Rethinking Sanitation: Lessons and Innovation for Sustainability and Success in the New Millennium." UNDO Human Development Office Occasional Paper Series. <http://www.communityledtotalsanitation.org/sites/communityledtotalsanitation.org/files/cltshandbook.pdf>

Peal, A., B. Evans, C. van der Voorden (2010) "Hygiene and Sanitation Software. An overview of approaches" Water Supply and Sanitation Collaborative Council (WSSCC) pp. 2-17. [http://www.wsscc.org/sites/default/files/publications/wsscc\\_hygiene\\_and\\_sanitation\\_software\\_2010.pdf](http://www.wsscc.org/sites/default/files/publications/wsscc_hygiene_and_sanitation_software_2010.pdf)

Kar, K. and R. Chambers. (2008). Handbook on Community-Led Total Sanitation. IDS Sussex and Plan International pp. 7-11. <http://www.communityledtotalsanitation.org/sites/communityledtotalsanitation.org/files/cltshandbook.pdf>

Hueso, A., B. Bell. (2013) "An untold story of policy failure: the Total Sanitation Campaign in India." *Water Policy*. 15, pp. 1001-1017.

*Information and social norms treatments*

Jalan, J. and Somanathan, E. (2008). The importance of being informed: experimental evidence on demand for environmental quality. *J Dev Econ*. 87: 14–28.

Pattanayak, S.K., Yang, J-C., Dickinson, K.L., et al. (2009). Shame or subsidy revisited: social mobilization for sanitation in Orissa, India. *Bull. World Health Organization*. 87(8) 580-587.

Davis, J., Pickering, A., Rogers, K., Mamuya, S., Boehm, A. (2011). The effects of informational interventions on household water management, hygiene behaviors, stored drinking water quality, and hand contamination in peri-urban Tanzania. *Am J Trop Med Hyg*. 84: 184-191.

Ferraro, P., and Price, M. (2013). Using Nonpecuniary Strategies to Influence Behavior: Evidence from a Large-Scale Field Experiment. *Rev. of Econ. and Stats*. 95(1) 64-73

Hamoudi, A., Jeuland, M., Lombardo, S., Patil, S., Pattanayak, S., and Rai, S. (2012). The effect of water quality testing on household behavior: evidence from an experiment in rural India. *Am. J. Trop. Med. Hyg*. 87 (1) 18-22.

### Background Readings

Luoto, J., Levine, D., Albert, J. (2009). Information and Persuasion: Achieving Safe Water Behaviors in Kenya: Working Paper. Berkeley, CA: University of [California](#).

Bibby, S. and Knapp, A. (2007). From Burden to Communal Responsibility - A Sanitation Success Story from Southern Region in Ethiopia. WSP Africa Field Note. [http://www.wsp.org/UserFiles/file/2122007111721\\_From\\_Burden\\_to\\_Communal\\_Responsibility-Ethiopa.pdf](http://www.wsp.org/UserFiles/file/2122007111721_From_Burden_to_Communal_Responsibility-Ethiopa.pdf) - Accessed March 2010

Evans, B., Colin, J., Jones, H. and Robinson, A. (2009). Sustainability and Equity Aspects of Total Sanitation Programs - A study of recent WaterAid-supported programmes in three countries; Global Synthesis Report. WaterAid, London, UK.

Robinson, A. (2005). Scaling Up Rural Sanitation in South Asia - Lessons Learned from Bangladesh, India and Pakistan. WSP South Asia. Available at: [http://www.wsp.org/UserFiles/file/36200745838\\_348730SA0SANITATION120STUDY1PRESS.pdf](http://www.wsp.org/UserFiles/file/36200745838_348730SA0SANITATION120STUDY1PRESS.pdf) - Accessed March 2010.

Kar, K. (2005). Practical Guide to Triggering Community-led Total Sanitation. Institute of Development Studies, University of Sussex, UK. Available at: [http://www.netssaftutorial.com/fileadmin/DATA\\_CD/09\\_Complementary/Planning\\_sustainable\\_sanitation/Practical\\_Guide\\_to\\_Triggering\\_Community-\\_CLTS\\_.pdf](http://www.netssaftutorial.com/fileadmin/DATA_CD/09_Complementary/Planning_sustainable_sanitation/Practical_Guide_to_Triggering_Community-_CLTS_.pdf) (Also available in Chinese, Arabic, Spanish, French and Lao) – Accessed March 2010

Heierli, U. and Frias, J. (2007). "One fly is deadlier than a hundred tigers: total sanitation as a business and community action in Bangladesh and elsewhere." SDC, WSSCC, WSP. Berne, Switzerland. <http://www.poverty.ch/sanitation.html> - Accessed March 2010.

Sannan, D., and Moulik, S. G. (2007). Community-led total sanitation in rural areas: An approach that works (field note). New Delhi, India: Water and Sanitation Program – South Asia.

Allan, S. (2003). The WaterAid Bangladesh/VERC 100% Sanitation Approach; Cost, motivation and subsidy. London: London School of Hygiene and Tropical Medicine.

**Comment [DW3]:** Kristen – can you please check and see if there is a later version of this.

Chambers, Robert (2009). Going to Scale with Community-Led Total Sanitation: Reflections on Experience, Issues and Ways Forward. IDS Practice Paper. Institute of Development Studies, University of Sussex, UK.  
<http://www.communityledtotalsanitation.org/resource/going-scale-community-led-total-sanitationreflections-experience-issues-and-ways-forward>- Accessed March 2010.

**Friday, April 3 – NO CLASS (Good Friday)**

## Lecture 12 (April 10) - Targeting Subsidies

No broadcast to the University of Manchester: meet in McGG 1305

### Class organization

9:00 – 10:40 am – Lecture

10:40 – 10:50 am – Break

10:50 – 11:45 am – Class Debate: Human Right to Water

**Class debate No. 3** – Proposition: “The United Nations Declaration establishing a human right to water and sanitation is a big step forward and will result in many more poor households receiving improved WASH services in the future.”

### Debate Readings:

Resolution A/RES/64/292. United Nations General Assembly, July 2010. Available at: <http://www.un.org/es/comun/docs/?symbol=A/RES/64/292&lang=E>

Briscoe, J. (2011). Invited opinion interview: Two decades at the center of world water policy. Interview with John Briscoe by the Water Policy Editor-in-Chief. *Water Policy* 13, 147-160. doi: 10.2166/wp.2010.000.

Meier, B.M., G. L. Kay, U.Q. Amjad, and J. Bartram. (2013). Implementing an evolving human right through water and sanitation policy.” *Water Policy* 15, 116-133.

### Subsidy Readings

Whittington, D., C. Nauges, D. Fuente, and X. Wu. (2015). “A Diagnostic Tool for Estimating the Incidence of Subsidies Delivered by Water Utilities in Low- and Medium-Income Countries, with Illustrative Simulations.” *Utility Policy*. (forthcoming).

Gómez-Lobo, A. and D. Contreras. (2003). “Water Subsidy Policies: A Comparison of the Chilean and Colombian Schemes.” *The World Bank Economic Review*, 17 (3), pp. 391-407.

Foster, Vivien, Subhrendu Pattanayak, and Linda Prokopy. (2003). “Water Tariffs and Subsidies in South Asia: Do Current Water Subsidies Reach the Poor?.” World Bank. April. 10 pages.

Komives, Kristin, Jon Halpern, Vivien Foster, Quetin Wodon, and Roohi Abdullah. (2007). Utility Subsidies as Social Transfers: An Empirical Evaluation of Targeting Performance. *Development Policy Review*. 25 (6) pp. 659-679.

Komives, K., V. Foster, J. Halpern, and Q. Wodon. (2005). Water, electricity, and the poor: Who benefits from utility subsidies? *Directions in Development*. Washington D.C.: World Bank.

Lecture 13 (April 17) – Changing Institutions: the privatization story: UK experience

Broadcast to and from the University of Manchester: meet in Mayes Center at 9:00 am

Before class, students should watch ...

Video (9:00 am in Rosenau 235) –The World Bank – Public Water, Private Partners (27 min)  
Manila water video

Class organization

9:00 – 10:00 am – Lecture (Dale)  
10:00 –10:50 am – Lecture (Duncan)  
10:50 –11:00 am – Break  
11:00 –11:45 am – Teaching Case No. 2

**Teaching Case 2:** “Regulating Privatized Water Utilities in Manila.” Students should study the case before April 10 and come to class prepared to discuss the case.

Readings

Dumol, Mark. (2000). *The Manila Water Concession: A Key Government Official’s Diary of the World’s Largest Privatization*. 137 pages. The World Bank, Washington D.C.

Galiani, Sebastian, Paul Gertler, and Ernesto Schangrotsky. (2005). “Water for Life: The Impact of the Privatization of Water Services on Child Mortality.” *Journal of Political Economy*. Vol. 113, No. 1. pp. 83-119.

Wu, Xun and and Nepomuceno Malaluan. (2008). “A Tale of Two Concessionaires: A Natural Experiment of Water Privatization in Metro Manila.” *Urban Studies*. January. 45 (1). Pp. 207-227.

Background Readings

Marques, R. S. Berg. (2010). *Risks, Contracts and Private Sector Participation in Infrastructure*. May 3. Working Paper. Public Utility Research Center (PURC), University of Florida,

Komives, Kristin. (2001). “Designing Pro-poor Water and Sewer Concessions: Early Lessons from Bolivia.” *Water Policy*. 3, pp. 61-79.

Davis, Jennifer. (2005). *Private Sector Participation in the Water and Sanitation Sector*. *Annual Review of Environment and Resources*. 30 (6).

### **Lecture 14 (April 24) - The UK Privatization and Regulation Story**

Broadcast to and from the University of Manchester starting at 9:00 am

Before class, students should watch ...

Documentary video - Phnom Penh water

#### Class organization

9:00 – 10:00 am – Lecture (Dale)

10:00 –10:50 am – Lecture (Duncan)

10:50 –11:00 am – Break

11:00 –11:45 am – Teaching Case No. 3

**Teaching Case 3:** “Ek Son Chan and the Transformation of the Phnom Penh Water Supply Utility.” Students should study the case before April 24 and come to class prepared to discuss the case. Kristen will facilitate case discussion.

#### Readings

Littlechild, Stephen C. “Economic Regulation of Privatized Water Authorities and Some Further Reflections.” *Oxford Review of Economic Policy*. Vol. 4, No. 2, 1988. pp. 40-68.

Beesley, M.E. and S.C. Littlechild. “The Regulation of Privatized Monopolies in the United Kingdom.” *The Rand Journal of Economics*. Vol. 20, No. 3. Autumn, 1989. pp. 454-472.

Helm, D. (2005). Water, the environment, and regulation: Changing functions, changing frameworks. Available at:  
<http://www.dieterhelm.co.uk/sites/default/files/WaterEnvironmentRegulation.pdf>

Helm, D. and Yarrow, G. (1988). The Assessment: The Regulation of Utilities. *Oxford Review of Economic Policy* 4(2).

Oxera (2005). Where has the innovation gone? R&D in UK utility regulation. *Agenda* (November 2005). [www.oxera.com](http://www.oxera.com).

Shaoul, J. (1997). A critical financial analysis of the performance of privatised industries: The case of the water industry in England and Wales. *Critical Perspectives on Accounting*, 8, 479-505.

Thomas, D. (2011). Don’t just talk about water success, achieve it. *Utility Week* (February 2011), 11.

#### Background Readings

Bartle, I. (editor). (2003). The UK Model of Utility Regulation. A 20th Anniversary Collection to Mark the ‘Littlechild Report’. Proceedings of a joint LBS Regulation Initiative, CRI and City University Business School Conference. Chaired by Professor John Cubbin and Professor Ralph Turvey held on 9th April 2003 at The Cass Business School, City University, London. Desktop published by Jan Marchant, CRI PROCEEDINGS 31 © The University of Bath.

Berg, Sanford, and Rui Cunha Marques. "Quantitative Studies of Water and Sanitation Utilities: a Benchmarking Literature Survey. *Water Policy*. 13, 2011, pp. 591-606.

**Assignment No. 2 due- Friday, April 24**

**Exam: Monday, May 4, 8:00 - 11:00 am**

**Note:** Understanding the link between water and sanitation interventions and health improvements is essential for designing policy intervention in the WASH sector. However, this subject is not discussed in detail in this course. Students are encouraged to do the following background readings if they are not familiar with the causal relationships between improved water and sanitation infrastructure and health outcomes:

Linking improved water and sanitation conditions to health outcomes – Selected Readings

Kremer, M., Leino, J., Miguel, E., and Zwane, A. P. (2011). Spring cleaning: A randomized evaluation of source water quality improvement. *Quarterly Journal of Economics*: 126, 145-205.

Fewtrell, L., Kaufmann, R., Kay, D., Enanoria, W., Haller, L., et al. (2005). Water, sanitation, and hygiene interventions to reduce diarrhoea in less developed countries: A systematic review and meta-analysis. *Lancet Infectious Diseases* 2005, 5 (1), 42-52.

Zwane, Alix, and Michael Kremer. (2007). "What Works in Fighting Diarrheal Diseases in Developing Countries: A Critical Review." *The World Bank Research Observer*. Vol. 22, No. 1, pp. 1-24.

Cutler, D., and G. Miller. (2005), "The Role of Public Health Improvements in Health Advances: The 20th Century United States." *Demography*, 42 (1): 1-22.

VanDerslice, J. and Briscoe, J. (1993). All Coliforms are Not Created Equal: A Comparison of the Effects of Water Source and in-House Contamination on Infantile Diarrheal Disease. *Water Resources Research*. 29 (7), 1983-1995.

Curtis, Val, and Sandy Cairncross. (2003). "Effect of washing hands with soap on diarrhea risk in the community: a systematic review. *The Lancet Infectious Diseases*. Vol. 3, May. Pp. 275-281.

Jalan, J., and Ravallion, M. (2003). Does piped water reduce diarrhea for children in rural India? *Journal of Econometrics*, 112 (1), 153-173.