Harvard University Extension School

ENVR E-171  WATER, HEALTH AND SUSTAINABLE DEVELOPMENT
January 28 – May 12, 2016

Course Syllabus

Time: Thursday 5:30 – 7:30 PM
Location: Sever Hall 102
Professor: Joseph M. Hunt, Ph.D. (617) 822-9474, jomhunt@gmail.com

No Required text

Supplemental Text: A Primer on Health Impacts of Development Programs
By Gene Peralta and Joseph M. Hunt
Manila: Asian Development Bank 2003 (PDF will be on website)

This is a paperless course. Required articles will be posted online. All students will be required to submit their assignments via the Canvas course website. Final reports must be submitted in Office Word (2010 version) for ease of review and exchange. Please plan accordingly. After the second week students will be required to use their student HUID (or XID) and password to enter the site.

Course Description: “Water promises to be to the 21st century what oil was to the 20th century: the precious commodity that determines the wealth of nations.” FORTUNE

And the health of nations, as well. The course provides an overview of environmental assessment to design, evaluate and replicate sustainable projects and programs in the water sector. The course develops the tools to assess natural resources protection, improvements in population health, positive social impacts and poverty reduction, and economic appraisal that include sustainability measures at least cost. Students will practice assessment methods at project and strategic levels. Integrated Assessment using all methods will focus on the water sector with linkages to energy and agriculture, applying both project and program analysis. At course end, students will apply practical methods that inform prudent investment decisions to support universal access to water quality and quantity while supporting economic growth, social development, and environmental sustainability. (4 credits)

Course Outline (15 weeks, 14 lecture classes plus student presentations).

January 28. Introduction to the Course. The course goals, overview of the lectures, and student requirements will be presented. This will give you an idea what to expect and what’s expected of you. You’ll fill out a personal bio in advance so I know what your interests and background are, and I’ll try to fit these issues into the course and your assignments. A quick introduction to Environmental impact assessment (EIA) will prepare you for its application to health and the environment. Previous training in public health is not required.

February 4. Overview of the EIA Process applied to the Water Sector. EIA considers changes in the natural resource base, interactions between population and environment, and the formal EIA review process under NEPA and comparable systems in other countries. The lectures will review the EIA Process and its core elements: screening; the initial environmental examination (IEE); scoping; full scale Assessment (if required); EIA review and decision-making; monitoring, follow-up and project audit. Water projects in the U.S. and other countries will be tested under EIA protocols.
Reading: Glasson, Therivel and Chadwick, Introduction to Environmental Impact Assessment. Routledge (2012), Fourth Edition. Chapters 1, 2 (pp. 31-40), 4, 5 (pp.126-140)


February 18 Health impact assessment (HIA) in Water Projects and the Water Sector. HIA addresses both the health hazards and health risk assessments applicable to cohort populations directly and indirectly affected by development programs. Over one-third of global disease burden is due to environmental problems (related to air, water, soils, forests, food, the built environment and the workplace), even higher in poor developing countries. Seasonal water availability and water quality are cross-cutting risk factors for morbidity and mortality in all the above sectors. Water-related disease burden accounts for over a fifth of the global total. Pressing demographic shifts to urban and industrial ways of life increase demand for water-related environmental assessment of health-enhancing strategies and programs. HIA methods handle and clarify these problems, often within the EIA framework.


Peralta and Hunt - Chapters 1 &3.


February 25 Social impact assessment (SIA), along with HIA, addresses the causes and impacts of harm by socio-economic status and locations. SIA identifies and involves all potentially affected groups; analyzes impact equity; focuses the assessment on significant impacts and the least protected; and establishes monitoring and mitigation programs. The lecture will explore the lessons learned from the SIA experience in the Water Sector, covering community-based water supply, irrigation systems, and the impacts of household-level water quality on families’ health and nutrition.

Readings: Glasson, Therivel and Chadwick Chapter 6


Peralta and Hunt – Chapter 8


March 3 & 10 Economic evaluation addresses economic valuation of environmental resources; impacts on productivity, income, growth, disease burden and longevity; establishes efficient levels of pollution abatement; recommends pricing tools for implementing environmental regulation and fiscal remedies for those disproportionately harmed by industrial practices. The lecture will discuss valuation methods, both direct and indirect, for environmental resources and services, in order to estimate the price that society will be willing to pay to sustain those resources. Both market-based and survey-based estimates will be compared. Case studies include projects from water alone, water-agriculture, water-energy and urban water sectors.


< SPECIAL LECTURE >

*Integrated Assessment (Health and Environment) at Project and Program Levels.* The intent is to bring the several strands of analysis developed in the early lectures and see whether IA improves both the quality of design and decision-making for development projects and programs. Links between environmental protection and population health will be explored. Strategic environmental assessment will also be touched upon, as related to climate change mitigation approaches.

(Note: This lecture tape will be available on the course Canvas site, and should be viewed over the Spring Break).

**Optional Readings on Integrated Assessment:** Glasson, Therivel and Chadwick, Chapters 7 & 12


**MARCH 17**  
**SPRING BREAK**

**March 24**  
**Water – Food – Energy Nexus: Strategies and Management Issues.**

*Guest Lecturer: Dr. Peter Rogers, Gordon Mackay Professor of Environmental Engineering Emeritus, Harvard University.* Dr. Rogers is a Harvard legend, with a half century’s experience in water policy and strategy all over the world. I am delighted to welcome Peter, who will enlighten us with the core findings of his latest book, being prepared for Harvard University Press, on the water crisis and alternative solutions that will balance the need for energy and food around the globe.


**Others TBD**

**March 31**  
**Evaluating Water and Sanitation Programs.** The lecture will analyze water supply and sanitation project design and quality improvements, based on field experience, with attention to the assessment methods in the course. The student-led Water and Sanitation Sector (WSS) Assessment Group will also work with the Instructors to develop a framework for evaluating the Sustainable Development Goal for Water and Sanitation (2015-2030), recently approved by the United Nations. The UN’s measure of progress is reduction of child stunting. The lectures will link the three contributing risk factors (access to WSS, girls’ education and life expectancy, and food security including dietary quality). Country case studies will be drawn from South Asia and sub Saharan Africa where the above challenges converge. GIS assessment of cholera spread and outbreaks will be described as a powerful tool of emerging and changing diseases.


**April 7. Women, watersheds and the welfare of children.** The themes will be climate change, persistent drought, and the reclamation of river basins for meeting human needs and preserving public health. Gender analysis of land and water rights, the right to health care, water management and household needs will be important to consider for community health, especially for women and children.


**April 14. Dams and Disease**

The main theme will be managing the water-energy nexus for population health, with detailed investigation of the future prospects of hydropower as a low carbon source of electricity in rural areas given climate uncertainties, potential biodiversity losses, displacement of communities and peripheral spread of infectious and vector-borne diseases. The lecture will analyse health impacts of dams and irrigation systems will be analysed, and how environmental management can impede disease transmission and reduce global disease burden.


World Health Organization. The effect of irrigation and large dams on the burden of malaria.


Barringer F., Troubling interdependence of water and power. NY Times 22 April 2015
April 21. **Watershed Management, Sustainable Agriculture, and Food Security**

Tremendous pressures on river basin and watershed resources are reported all over the world, and in addition a recent NASA GIS report states that half of the world’s 37 main aquifers are being drained without likelihood of being replenished. Since agriculture uses upwards of 70 percent of available water resources, something has to give. The lecture will assess the environmental and health impacts of the water scarcity and water quality crisis that agriculture faces, including possible increase in malnutrition for mothers and children in vulnerable water catchments. Examples of successful integrated water resource management in wet and dry environments in the developing world will be described.


Hauter W. Agriculture’s Big Thirst: how to change the way we grow our food. . In Lohan (op.cit.): pp 72-81.


April 28 and May 5. **Water planning, technology and management for healthy cities.** The UN projects that three-fifths of humanity will be living in cities by 2030, and by 2050 one-third may be existing in a state of congealed misery in informal urban settlements without suitable aerated housing or affordable water and sanitation facilities. “Green Buildings” initiatives may help, if water recycling is part of a closed loop. Coastal cities face the further threat of rising sea levels as a direct risk to life and indirect risk to potable water security. Critical technology options and successful municipal water management strategies will be studied through international case studies and student research teams applying theory to urban planning practice. Harvard’s extensive policy and planning research on China’s healthy cities initiative will be an important learning theme for students. Regional cooperation for low-lying coastal cities will be explored as an emerging approach to urban water and food security.


**May 12  Student Group Presentations**

The last lecture date will be reserved for the sector teams to report on their findings and to make recommendations to the Summer 2016 class for their consideration.

**Assignments.**

Students will complete two short homework assignments, and write two short papers on one of the assessment methods related to a water problem.

The third paper will be a group report divided into four thematic groups as described below.

All students will join one of four Water Sector Assessment Groups:

- Meeting the SDG for Water and Sanitation
- Dams, Power, Health and Human Needs
- Watershed Management and Sustainable Agriculture
- Healthy Cities and Water Security
- The hope is to prepare publication-level sector assessments on water and sustainable development as Harvard contributions to the environment debate. Due recognition of all four Assessment Groups will be important.

**Grade Breakdown**

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<tr>
<th>Assignment</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Homework Assignments</td>
<td>20%</td>
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<tr>
<td>Two short papers</td>
<td>30%</td>
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<tr>
<td>Final Paper &amp; Group Presentation</td>
<td>50%</td>
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