

**IH5XX: NATURAL RESOURCES, HEALTH, AND DEVELOPMENT**  
**DRAFT**

Rick Rheingans  
Department of International Health

Proposed Timing:  
Spring 2002

**Objectives:**

- Improved understanding of how natural resource use and environmental factors affect human health in developing countries
- Improved understanding of the interactions between household decisions, natural resource use patterns, and health
- Use local level information on these interactions to improve health and resource use projects and policies

**Description:**

The course examines natural resource issues affecting developing countries, and explores the impacts on communities, households, their decisions, and their health. Key resource use issues include water use (drinking, sanitation, and irrigation), agriculture (intensification, pesticide use, and land degradation), fuel wood scarcity, deforestation, conservation, and mining. For each of these issues, discussions and readings address: 1) global and regional patterns in resource use, 2) ecological processes, 3) household and community responses and resource use decisions, and 4) the influence of these factors on human health. Examples of topics covered include: deforestation and vector-borne disease, malaria and agriculture, water scarcity and quality. Topics are addressed in an interdisciplinary context by examining the interactions between environmental processes, disease ecology, household resource allocation decisions, and other social factors. Related policy issues are also discussed. Readings and exercises examine these issues in a wide range of settings.

**Course Instructor:**

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## **Course Projects**

Project - National assessment of national of natural resource use on health.

During the course students will develop a preliminary assessment of the expected impact of natural resource use patterns within a country of their choice. The final report is due at the end of the course. During the course students will make short presentations regarding the impact of specific resource use issues on health within their area.

Class Presentations – Students will make class presentations regarding each of three natural resource and health issues. Presentations will describe how the issues interact in a particular community setting. Presentations may be based on suggested case study readings listed in the syllabus or other readings. Students may choose to make the presentations for a community in the country being researched for the class project, but it is not required. Presentations should be 8-10 minutes long.

Take Home Exam

## **General Resources:**

Westra, L, D Pimentel (eds). 2000. Ecological integrity in environmental, agricultural and health systems. Washington, DC: Island Press.

World Resources Institute. 2000. World Resources 2000-2001: People and ecosystems: The fraying web of life, Washington, DC: World Resources Institute.

World Resources Institute. 1999. World Resources 1998-1999, Washington, DC: World Resources Institute.

Lee, J (Eds). 1999. The environment, public health, and human ecology,

Gurinder, S (Ed). 1999. International Perspectives on environmental, development, and health: Toward and a sustainable world,

Pimentel, D (Ed). 1999. Ecological integrity: Integrating environment, conservation and health,

## **COURSE SCHEDULE**

### **WEEK 1 – INTRODUCTION: HUMAN ECOLOGY AND DEVELOPMENT**

#### **Water - Global, national, and local resource use patterns**

##### **Readings:**

WRI, 2001. World Resources Institute website ([www.wri.org](http://www.wri.org))

Revenga, C, J Brunner, N Henninger, K Kassem, R Payne, 2001. Pilot analysis of global ecosystems: Freshwater Systems, Washington, DC: World Resources Institute.

McMichail, AJ. 1999. Human numbers, environment, sustainability, and health, *BMJ* 319:977-980.

World Commission on Environment and Development. 1987. *Our Common Future*. Oxford: Oxford University Press.

WHO Commission on Health and Environment. 1992. *Our planet, our health*, Geneva: WHO.

### **WEEK 2 - WATER AND HOUSEHOLD HEALTH - INTRODUCTION**

#### **Impacts on households - Distribution of water, time, and health impacts**

Exercise: Obtaining data on water availability, quality, and time allocation

##### **Readings:**

Kay BH. 2000. Water resources: Health, environment and development,

Starkloff, R. 1998. Water scarcity in Kitulwatte: The social causes and consequences of environmental degradation in a highland Uva village in Sri Lanka, *World Development*, 26(6):913-932.

McCauley AP, S West, M Lynch. 1992. Household decisions among the Gogo people of Tanzania determining the roles of men, women and the community in implementing a trachoma prevention programme, *Soc Sci Med*, 34(7):817-824.

Rao B. 1991. Women and water in rural Maharashtra, *Environment & Urbanization*, 3(2):57-65.

Cairncross, S, JL Cliff. 1987. Water use and health in Mueda, Mozambique, *Transactions of the Royal Society of Tropical Medicine & Hygiene*, 81(1):51-4.

Foret G, WA Sanchez-Bain. 1999. Managing the ecosystem to improve human health: integrated approaches to safe drinking water, *International Journal of Occupational & Environmental Health*, 5(1):38-50.

### **WEEK 3 - WATER AND SANITATION**

#### **Assessing national, regional, and local sanitation conditions using existing data**

#### **Sanitation interventions and community assessment**

## **Readings:**

WHO. 2000. Intersectoral decision-making skills in support of Health Impact Assessment of development projects, Geneva: WHO.

UNICEF. 1999. Towards better programming: A water handbook. Water, Environment and Sanitation Technical Guidelines Series – No. 2, New York: UNICEF.

UNICEF. 1999. Towards better programming: A sanitation handbook. Water, Environment and Sanitation Technical Guidelines Series – No. 3, New York: UNICEF.

UNICEF. 1999. Sanitation and Hygiene: A right for every child. A summary of lessons learned and new approaches from the UNICEF Workshop on Environmental Sanitation and Hygiene. New York: UNICEF.

Whittington, D, et al. 1993. Household sanitation in Kumasi, Ghana: A description of current practices, attitudes, and perceptions, *World Development*, 21(5):733-48.

Balint, PJ. 1999. Drinking water and sanitation in the developing world: The Miskito Coast of Nicaragua and Honduras as a case study, *Journal of Public and International Affairs* 10: 99-117.

Hoque BA, KM Aziz, KZ Hasan, RB Sack, 1994. Women's involvement in a rural Bangladesh water and sanitation project, *Southeast Asian Journal of Tropical medicine & public health*, 25(1):67-73.

## **WEEK 4 - DAMS AND THEIR IMPACT ON HEALTH - DISLOCATION, CHANGING VECTOR HABITAT, AGRICULTURE**

Class presentations: Water use and health issues

### **Readings:**

Jobin, WR. 1999. Ecological design and health impact of large dams, canals and irrigation systems, New York: Routledge.

Basahi, IA, 2000. Marib Dam: the importance of environmental and health impact studies for development projects, *Eastern Mediterranean Health Journal*, 6(1):106-17.

1993 Birley, M.H. An historical review of malaria, kala-azar and filariasis in Bangladesh in relation to the Flood Action Plan. *Annals of Tropical Medicine and Parasitology*, 87 (4) 319-334.

## **WEEK 5 - AGRICULTURE - GLOBAL AND REGIONAL LAND USE PATTERNS**

### **Changes in global agriculture - Impacts on the environment and communities**

### **Broader health consequences of intensification - dislocation, nutrition**

### **Readings:**

WRI, 2000. Sections on agriculture

Wood, S, K Sebastian, S Scherr, 2001. Pilot analysis of global ecosystems: Agroecosystems,

Washington, DC: World Resources Institute.

Lado, C. 1992. Female labour participation in agricultural production and the implications for nutrition and health in rural Africa, *Soc Sci Med*, 34(7):787-807.

Holmboe-Ottesen, G, M Wandel, 1991. Men's contribution to the food and nutritional situation in the Tanzanian household. *Ecology of food and nutrition*, 26:83-96.

Edmundson WC, Edmundson SA, 1988. Food intake and work allocation of male and female farmers in an impoverished Indian village, *British journal of nutrition*, 60:433-439.

Lappe, M, B Bailey. 1999. *Against the grain: the genetic transformation of global agriculture*, London: Earthscan.

Kennedy, E, H Bouis, J von Braun, 1992. Health and nutrition effects of cash crop production in developing countries: a comparative analysis, *Soc Sci Med*, 35(5a):689-97.

## **WEEK 6 - AGRICULTURAL INTENSIFICATION: ECOLOGICAL AND SOCIAL DIMENSIONS**

### **Impact of pesticide and fertilizer use on households, communities, and health**

#### **Readings:**

Folasade Iyun, B, E Adewale Oke. 2000. Ecological and cultural barriers to treatment of childhood diarrhea in riverine areas of Ondo State, Nigeria, *Soc Sci Med*, 50: 953-964.

Sauerborn, R, A Nougara, M Hien, HJ Diesfeld. 1996. Seasonal variations of household costs of illness in Burkina Faso, *Soc Sci Med*, 43(3):281-290.

Buck, E. 1997. *Pfiesteria and related harmful blooms natural resource and human health concerns*. Washington, DC: Resources for the Future.

Rola, AC, PL Pingali. 1993. *Pesticides, rice productivity, and farmers' health: an economic assessment*, New York: World Resources Institute.

Albert LA, 1996. Persistent pesticides in Mexico, *Reviews of Environmental Contamination & Toxicology*, 147:1-44.

Ecobichon DJ, 2001. Pesticide use in developing countries, *Toxicology*, 160(1-3):27-33.

Rojas M, J Reid, R Rincon, 1999. Pesticide exposure in a farming village in Venezuela - a developing country, *Archives of Environmental Health*, 54(6):430-5.

Thrupp LA. 1991. Sterilization of workers from pesticide exposure: the causes and consequences DBCP-induced damage in Costa Rica and beyond, *International Journal of Health Services*, 21(4):731-57.

Szmedra P, 1999. The health impacts of pesticide use on sugarcane farmers in Fiji, *Asia-Pacific Journal of Public Health*, 11(2):82-8.

Cifuentes E, M Gomez, Blumenthal, MM Tellez-Rojo, I Romieu, G Ruiz-Palacios, S Ruiz-Velazco. 2000. Risk factors for Giardia intestinalis infection in agricultural villages practicing wastewater irrigation in Mexico, American Journal of Tropical medicine & Hygiene, 62(3):388-92.

Van der Hoek W, F Konradsen, K Athukorala, T Wanigadewa. 1998. Pesticide poisoning: a major health problem in Sri Lanka, Soc Sci Med, 46(4):495-504.

Clarke EE, LS Levy, A Spurgeon, IA Calvert. 1997. The problems associated with pesticide use by irrigation workers in Ghana, Occupational Medicine, 47(5):301-8.

## **WEEK 7 - AGRICULTURE, IRRIGATION, AND MALARIA**

### **Assessing the potential impact of agricultural development on malaria in specific areas**

#### **Readings:**

Ijumba JN, SW Lindsay. 2001. Impact of irrigation on malaria in Africa: paddies paradox, Medical and Veterinary Entomology, 15:1-11.

Singh N, RK Mehra, VP Sharma, 1999. Malaria and the Naarmada-river development in India: a case study of the Bargi dam, Annals of Tropical Medicine & Parasitology, 93(5):477-88.

## **WEEK 8 - AGRICULTURE AND SPECIFIC DISEASES (SCHISTOSOMIASIS, )**

Class presentations: Agriculture and health

#### **Readings:**

Gazzinelli A, MF Gazzinelli, MM Cadete, S Pena Filho, IR Sa, H Kloos, 1998. Sociocultural aspects of schistosomiasis mansoni in an endemic area in Minas Gerais, Brazil, Cadernos de Saude Publica, 14(4):841-9.

Baumgartner J, M Bieri, G Buffoni, G Gilioli, H Gopalan, J Greiling G Tikubet, I Van Schayk. 2001. Human health improvement in Sub-Saharan Africa through integrated management of arthropod transmitted diseases and natural resources, Cadernos de Saude Publica, 17Suppl:37-46.

Habbari K, A Tifnouti, G Bitton, A Mandil, 2000. Geohelminthic infections associated with raw wastewater reuse for agricultural purposes in Beni-Mellal, Morocco, Parasitology International. 48(3):249-54.

Katsivo, MN, LN Muthami, M Karama, F Kingori. 1993. Perception of a schistosomiasis control project in rural Kenya by the beneficiaries, East African medical Journal, 70(10):613-616.

## **WEEK 9 - FORESTS - GLOBAL, NATIONAL, AND LOCAL USE PATTERNS**

### **Deforestation and health**

#### **Readings:**

- Walsh, JF, DH Molyneux, MH Birley. 1993. Deforestation: effects on vector-borne disease, *Parasitology* 106:S55-S75.
- Pedersen, D. 1996. Disease ecology at a crossroads: Man-made environments, human rights and perpetual development utopias, *Soc. Sci. Med.* 43(5):745-758.
- Mayer, JD. 2000. Geography, ecology and emerging infectious diseases, *Soc Sci Med*, 50:937-952.
- Patz JA, TK Graczyk, N Geller, AY Vittor. 2000. Effects of environmental change on emerging parasitic diseases, *International Journal for Parasitology*, 30(12-13):1395-405.
- Lilley B, P Lammie, J Dickerson, M Eberhard. 1997. An increase in hookworm infection temporally associated with ecological change, *Emerging Infectious Diseases*, 3(3):391-3.
- Fischer P, R Garms, DW Buttner, W Kipp, J Bamuhiiga, J Yocha. 1997. Reduced prevalence of onchocerciasis in Uganda following either deforestation or vector control with DDT, *East African Medical Journal*, 74(5):321-5.
- Manga L, JC Toto, P Carnevale, 1995. Malaria vectors and transmission in an area deforested for a new international airport in southern Cameroon, *Annales de la Societe Belge de Medecine Tropicale*, 75(1):43-9.
- Coura JR, AC Junqueira, CM Giordano, RK Funatsu, 1994. Chagas' disease in the Brazilian Amazon: I. A short review, *Revista do Instituto de Medicina Tropical de Sao Paulo*, 36(4):363-8.
- Muro AI, JN Raybould. 1990. Population decline of *Simulium wooki* and reduced onchocerciasis transmission at Amani, Tanzania, in relation to deforestation, *Acta Leidensia*, 59(1-2):153-9.
- Muro AI, NR Mziray. 1990. Decline in onchocerciasis in the eastern Usambara mountains, north eastern Tanzania, and its possible relationship to deforestation, *Acta Leidensia*, 59(1-2): 141-150.
- Were MK. 1989. Ecological upheavals with special reference to desertification and predicting health impact, *Soc Sci Med*, 29(3):357-67.
- Roberston SE, BP Hull, O Tomori, O Bele, JW LeDuc, K Esteves. 1996. Yellow fever: a decade of reemergence, *JAMA*, 276(14):1157-62.

## **WEEK 10 - FORESTS, FUELWOOD, AND HEALTH**

### **Readings:**

- Mehretu A, C Mutambirwa. 1992. Time and energy costs of distance in rural life space of Zimbabwe: case study in the Chiduku communal area, *Soc Sci Med*, 34(1):17-24.
- Barber CV, J Schweithelm. 2000. *Trial by fire: Forest fires and forestry policy in Indonesia's era of crisis and reform*. Washington, DC: World Resources Institute.
- Murray, TP, J Sanchez-Choy. 2001. Health, biodiversity, and natural resource use on the Amazon frontier: an ecosystem approach, *Cadernos de Saude Publica*, 17 Suppl:181-91.

Taylor D. 1997. Seeing the forests for more than the trees, *Environmental Health Perspectives*, 105(11):1186-91.

Vasconcelos PF, AP Travassos da Rosa, SG Rodrigues, ES Travassos da Rosa, N Degallier, JF Travassos da Rosa. 2001. Inadequate management of natural ecosystems in the Brazilian Amazon region results in the emergence and reemergence of arboviruses, *Cadernos de Saude Publica*, 17Suppl:155-64.

Loughran D, L Pritchett. 1997. Environmental Scarcity, Resource Collection, and the Demand for Children in Nepal, Policy Research Working Paper. Washington, DC: World Bank.

Filmer, D. and L. Pritchett. 1996. Environmental Degradation and the Demand for Children: Searching for the Vicious Circle. Policy Research Working Paper 1623. Washington, DC: World Bank.

## **WEEK 11 - SAVANAS, WETLANDS, AND OTHER RESOURCES**

Class presentations: Forests and health

### **Readings:**

Burke, L, Y Kura, K Kasseem, C Revenga, M Spalding, D McAllister, 2001. Pilot analysis of global ecosystems: Coastal ecosystems, Washington, DC: World Resources Institute.

Zimmerman RH. 2001. Wetlands and infectious diseases, *Cadernos de Saude Publica*, 17Suppl:127-31.

## **WEEK 12 - MINERAL RESOURCES, POLLUTION, AND HEALTH**

### **Gold mining and mercury poisoning**

#### **Fish contamination and Native American communities in North America**

### **Readings:**

Wheatley, B, S Paradis. 1996. Balancing human exposure, risk and reality: questions raised by the Canadian Aboriginal Methylmercury Program. *NeuroToxicology* 17(1):241-250.

Boischio, AAP, DS Henshel. 1996. Risk assessment of mercury exposure through fish consumption by the riverside people in the Madeira Basin, Amazon, 1991, *Neurotoxicology* 17(1):169-176.

Weatley, MA. 1996. The importance of social and cultural effects of mercury on Aboriginal peoples, *Neurotoxicology* 17(1):251-256.

Saeki, K, M Fujimoto, D Kolinjim, R Tatsukawa. 1996. Mercury concentrations in hair from populations in Wau-Bulolo area, Papua New Guinea, *Arch. Environ. Contam. Toxicol.* 30:412-417.

Wheatley, B, MA Wheatley, 2000. Methylmercury and the health of indigenous peoples: a risk management challenge for physical and social sciences and for public health policy, *Science for the*



Total Environment, 259(1-3):23-9.

Dolbec J, D mergler, CJ Sousa Passos, S Sousa de Morais, J Lebel. 2000. Methylmercury exposure affects motor performance of a riverine population of the Tapjos rive, Brazilian Amazon, International Archives of Occupational & Environmental health, 73(3):195-203.

### **WEEK 13 - ASSESSING THE HEALTH IMPACT OF DEVELOPMENT PROJECTS**

#### **Readings:**

1995 Birley, M.H. The Health Impact Assessment of Development Projects. HMSO, London. Pp 241.

1995 Birley, M.H. and G.L. Peralta. The health impact assessment of development projects. In: Social and Environmental Impact Assessment. Eds: F. Vanclay and D. Bronstein, Wiley June 1995. International Association for Impact Assessment.

1996 Konradsen F., M. Chimbari, P. Furu, M.H. Birley and N.O. Christensen. The use of health impact assessments in water resource development: a case study from Zimbabwe. Impact Assessment, 15, 55-72. The journal of the International Association for Impact Assessment

1997 Birley, M.H. and G.L. Peralta. Advances in the health impact assessment of development projects. In: International perspectives on environment, development and health, towards a sustainable world. Ed: Shahi GS, Levy BS, Binger A, Kjellstrom T, and R Lawrence. Springer, New York

### **WEEK 14 – CONCLUSIONS – INTEGRATING NATURAL RESOURCE, DEVELOPMENT AND HEALTH STRATEGIES**

Class presentations

#### **Readings**

Waltner-Toews, D. 2001. An ecosystem approach to health and its application to tropical and emerging diseases, Cadernos de Saude Publica, 17Suppl:7-22.

Rojas CA. 2001. An ecosystem approach to human health and the prevention of cutaneous leishmaniasis in Tumaco, Colombia, Cadernos de Saude Publica, 17Suppl:193-200.

Kilonzo BS. 1994. Importance of intersectoral co-ordination in the control of communicable diseases, with special reference to plague in Tanzania, Central African Journal of Medicine, 40(7):186-92.