Global Water Pathogen Project

- **PART ONE. THE HEALTH HAZARDS OF EXCRETA: THEORY AND CONTROL**
  - Introduction to the Importance of Sanitation
  - A QMRA Framework for Sanitation Treatment Decisions
  - Environmental Aspects and Features of Critical Pathogen Groups
  - Gender, Women and Sanitation

- **PART TWO. INDICATORS AND MICROBIAL SOURCE TRACKING MARKERS**
  - Microbial Indicators - “Workhorses” in the Field of Health-related Water Quality Testing
  - General and host-associated bacterial indicators of faecal pollution
  - General and host-associated bacteriophage indicators of faecal pollution
  - Human and animal enteric viral markers for tracking the sources of faecal pollution
  - Using indicators to assess microbial treatment and disinfection efficacy
  - Evaluation of subsurface microbial transport using microbial indicators, surrogates and tracers

- **PART THREE. SPECIFIC EXCRETED PATHOGENS: ENVIRONMENTAL AND EPIDEMIOLOGY ASPECTS**
  - **SECTION I. VIRUSES**
    - Adenoviruses
    - Hepatitis A
    - Hepatitis E
    - Norovirus and other Caliciviruses
    - Papillomavirus
    - Polioviruses and other Enteroviruses
    - Polyomavirus
    - Rotavirus and Astrovirus
    - Summary of Excreted and Waterborne Viruses
  - **SECTION II. BACTERIA**
    - Overview of issues for water bacterial pathogens
    - Aeromonas
    - Arcobacter
    - Members of the family Campylobacteraceae: Campylobacter jejuni, Campylobacter coli
    - Pathogenic members of Escherichia coli & Shigella spp. Shigellosis
    - Helicobacter pylori
    - Leptospira and Leptospirosis
    - Salmonella, Enteric Fevers, and Salmonellosis
    - Vibrio cholerae and Cholera biotypes
    - Antimicrobial Resistance: Fecal Sanitation Strategies for Combatting a Global Public Health Threat
  - **SECTION III. PROTISTS**
    - Balantidium coli
    - Blastocystis
    - Cyclospora cayetanensis
    - Cryptosporidium spp.
    - Entamoeba histolytica
    - Giardia duodenalis
- Microsporidia
- Toxoplasma gondii

**SECTION IV. HELMINTHS**
- Cestodes
  - Diphyllobothriidae
  - Echinococcus spp.
  - Taenia spp.
- Nematodes
  - Ascaris spp.
  - Hookworms
  - Toxocara spp.
  - Trichuris trichiura
- Trematodes
  - The Liver Flukes: Clonorchis sinensis, Opisthorchis spp, and Metorchis spp.
  - Intestinal Flukes: Heterophyidae and Echinostomatidae
  - Paragonimus spp.
  - Schistosoma spp.

**PART FOUR. MANAGEMENT OF RISK FROM EXCRETA AND WASTEWATER**
- Persistence
  - Persistence of Pathogenic Microorganisms in Fecal Wastes and Wastewater Matrices: An Introduction and Overview of Data Considerations
  - Persistence of Pathogens in Sewage and Other Water Types
  - Pathogen Specific Persistence Modeling Data
  - The Persistence of Indicators and Pathogens in Wastewater Biosolids-amended Soil
- Sanitation System Technologies
  - Overview and Introduction
  - Collection and Conveyance of Excreta and Wastewater in On-Site and Off-Site Systems
- Pathogen Reduction in Non-Sewered (On-site) System Technologies
  - Pit Toilets (Latrines)
  - Composting and Dry Desiccating Toilets (Latrines)
  - Cesspits and Soakpits
  - Septic Systems
- Pathogen Reduction in Sewered System Technologies
  - Sludge Management: Biosolids and Fecal Sludge
  - Preliminary Treatment and Primary Sedimentation
  - Anaerobic Sludge Blanket Reactors
  - Activated Sludge
  - Membrane Bioreactors
  - Media Filters: Trickling Filters and Anaerobic Filters
  - Waste Stabilization Ponds
  - Constructed Wetlands
  - Pathogen Reduction and Survival in Complete Treatment Works
- Disinfection
  - Physical Agents
  - Chemical disinfectants
  - Emergency Response

**PART FIVE. CASE STUDIES**
- A framework for safe sanitation systems
  - How to use the GWPP knowledge? A risk management approach for safe sanitation
○ Application of the risk-based framework - is it safe?
  ▪ Disease burden due to gastroenteritis infections among people living along wastewater reuse system in Hanoi, Vietnam
  ▪ Health risk of biogas effluent exposure and handling in Vietnam
  ▪ Wastewater reuse in agriculture and health risk in Vietnam
  ▪ Can farmers in Bolivia safely irrigate non-edible crops with treated wastewater?
  ▪ Is it safe to use untreated greywater to irrigate vegetables in my backyard?
  ▪ Salmonella/Shigella/Vibrio in treated effluents and impact on downstream water users (South Africa)

○ Regulation for safe system design
  ▪ Australian guidelines for water recycling – setting health based performance targets and safe use of wastewater
  ▪ Building a safe recycled water scheme
  ▪ How do I ensure my existing recycled water scheme is safe?

○ System planning: evaluation of alternative scenarios
  ▪ Tiered approach for integral assessment of sanitation, water supply and hygiene health risks in rural Brazil
  ▪ Mapping pathogen emissions to surface water using a global model with scenario analysis
  ▪ The QMRAcatch approach for guiding sustainable water safety management options at a large river
  ▪ Validation of high rate algal ponds as an efficient wastewater treatment option to improve public health in rural communities
  ▪ Pathogen flows in urban environments and their public health risks: A new conceptual approach to inform sanitation planning

○ Managing risks by targeting pathogen sources
  ▪ E. coli and enterococci subtyping to discriminate contamination sources in wastewater treatment ponds
  ▪ Using genetic microbial source tracking (MST) markers to identify fecal pollution sources in spring water of a large alpine karst catchment
  ▪ Pollution Source-Targeted Water Safety Management: Characterization of Diffuse Human Fecal Pollution Sources with Land Use Information, Strategic...

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