



Lecture 8, Practical Applications; A Chain of Causation: Regional Land and Water Management Problems to Tertiary Public Health, Social, and Economic Outcomes

Conrad Daniel Volz, DrPH, MPH

Assistant Professor, Environmental and Occupational Health,
University of Pittsburgh, Graduate School of Public Health

<http://www.pitt.edu/~cdv5/>

Director-Center for Healthy Environments and Communities

<http://www.chec.pitt.edu>



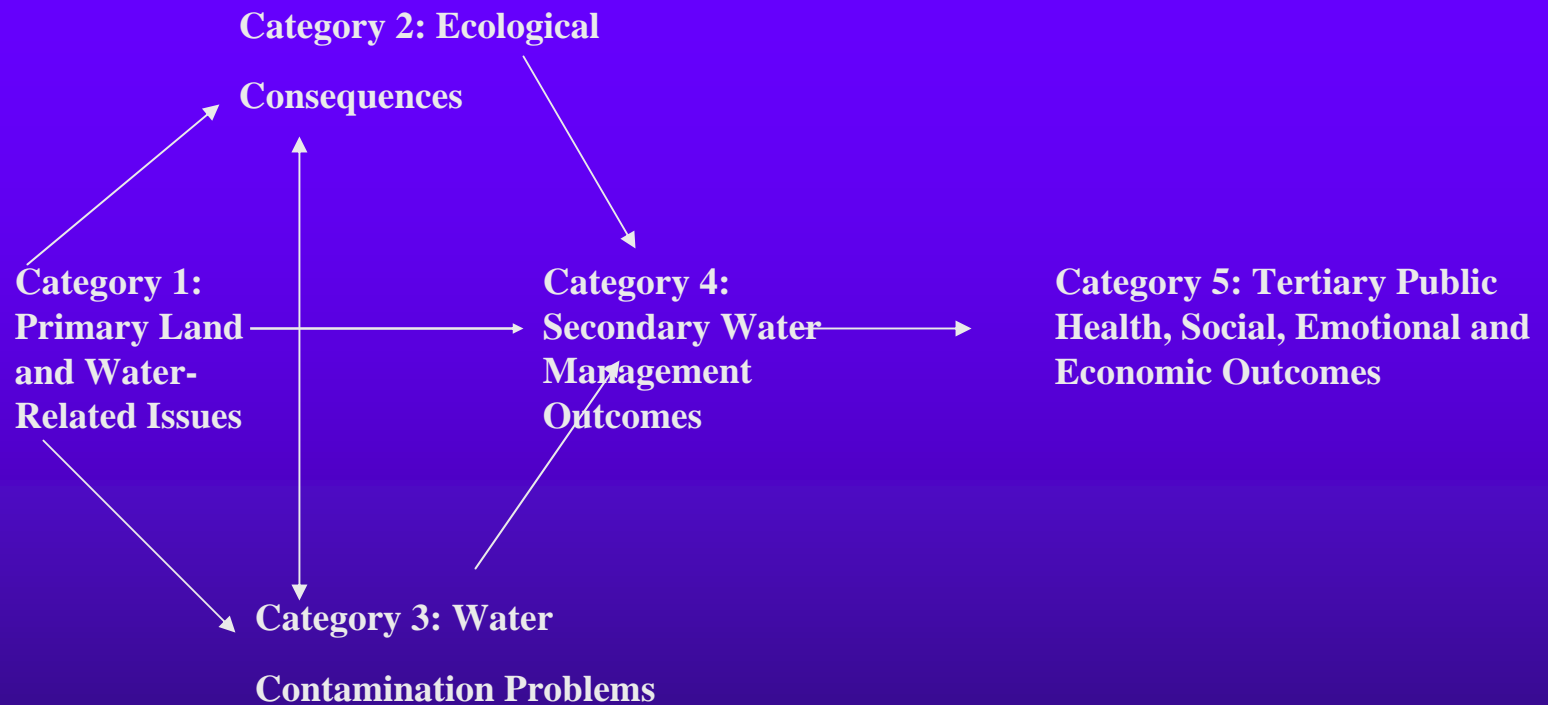
Water Management

- ◆ -The integration of traditional/non-traditional public health issues like:
 - stormwater drainage.
 - water quantity and quality.
 - combined and sanitary sewer overflows, wildcat sewers and failing on-lot systems.
 - watershed protection and associated development and transportation projects.
 - flooding.



A Framework to Understand
How Primary Southwestern
Pennsylvania Land and Water
Management Related
Environmental, Social and
Economic Issues Cause
Flooding Fatalities/Property
Damage and Other Related
Tertiary Water Outcomes.

Figure 1, A Chain of Causation: Primary Land and Water-Related Issues to Tertiary Public Health, Social, Emotional and Economic Outcomes





Category 1 Primary Regional Land and Water Management Issues

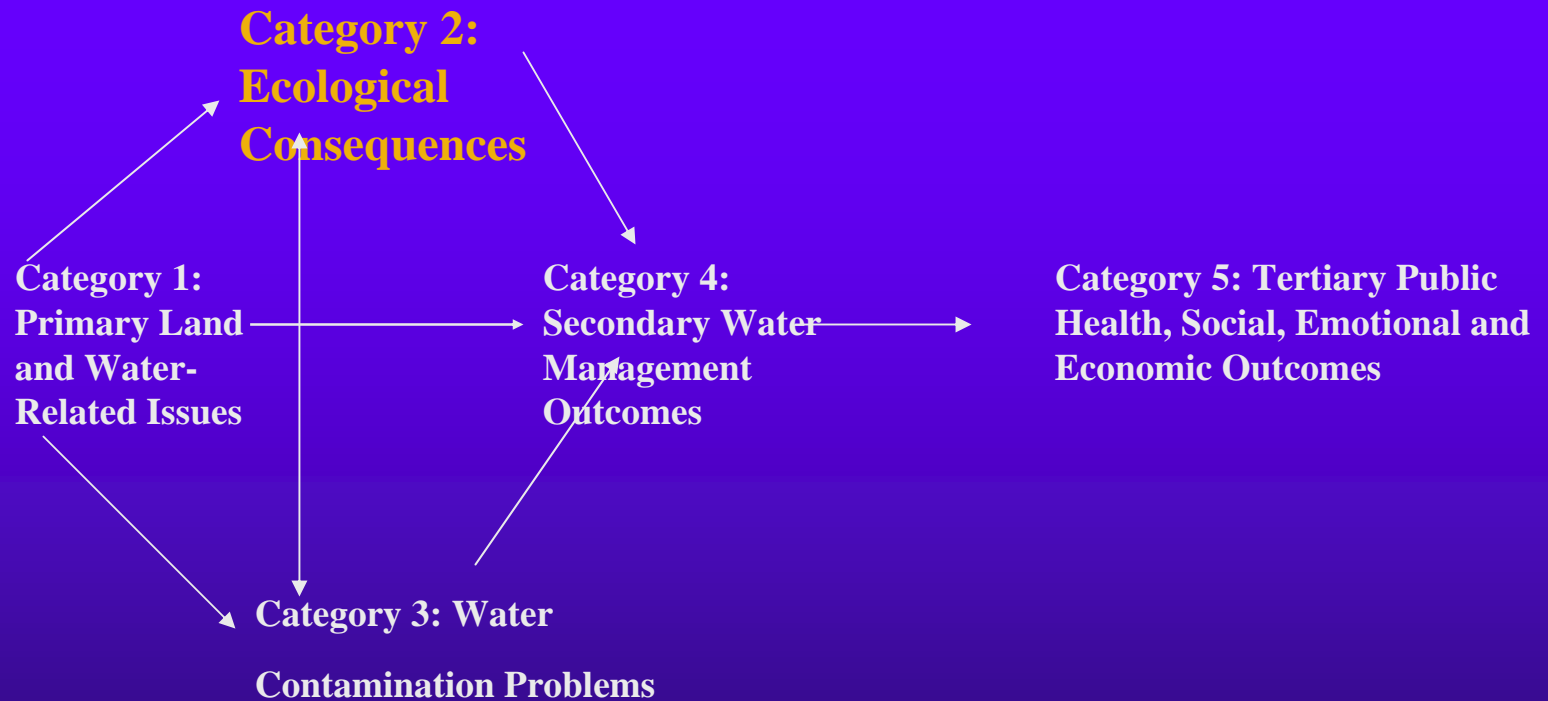
- ❖ Sprawl
- ❖ Lack of Coordinated Water/Land Management Plans
- ❖ Development in Headwaters and Critical Watersheds
- ❖ Inappropriate Transportation Projects
- ❖ Fragmented State, Federal and Local Regulatory Climate
- ◆ Aging/Inadequate Municipal Sewer Infrastructure
- ◆ Fragmentation of Water/Sewer Authorities



Primary Category 1 Problems Continued

- ◆ Legacy and Ongoing Industrial Pollution
- ◆ Spills/ Accidental Releases of Toxic/Hazardous Substances
- ◆ Treating Surface and Groundwater as Not Interconnected
- ◆ Water Priced Low
- ◆ Abandoned/Active Mines
- ◆ Household Hazardous Waste
- ◆ Municipal Infighting Over Development
- ◆ Power Plant and Industrial Air Emissions /Deposition and Transport in Water
- ◆ Attitudes/Behaviors Concerning Unlimited Water Use

Figure 1, A Chain of Causation: Primary Land and Water-Related Issues to Tertiary Public Health, Social, Emotional and Economic Outcomes





Category 2: Ecological Service Losses

- ❖ Wetland Loss / Riparian Habitat Loss
- ❖ Deforestation
- ❖ Loss of Topsoil and Plant Cover
- ❖ Loss of Natural Drainage Patterns
- ◆ Changes in Large River Flow Characteristics
- ❖ Decrease Reserve Farmland
- ❖ Decrease Groundwater Recharge
- ❖ Stream/Land Erosion
- ❖ Algal Blooms and Fish Kills
- ❖ Uptake of Contaminants in Biota/Foodweb

Figure 1, A Chain of Causation: Primary Land and Water-Related Issues to Tertiary Public Health, Social, Emotional and Economic Outcomes

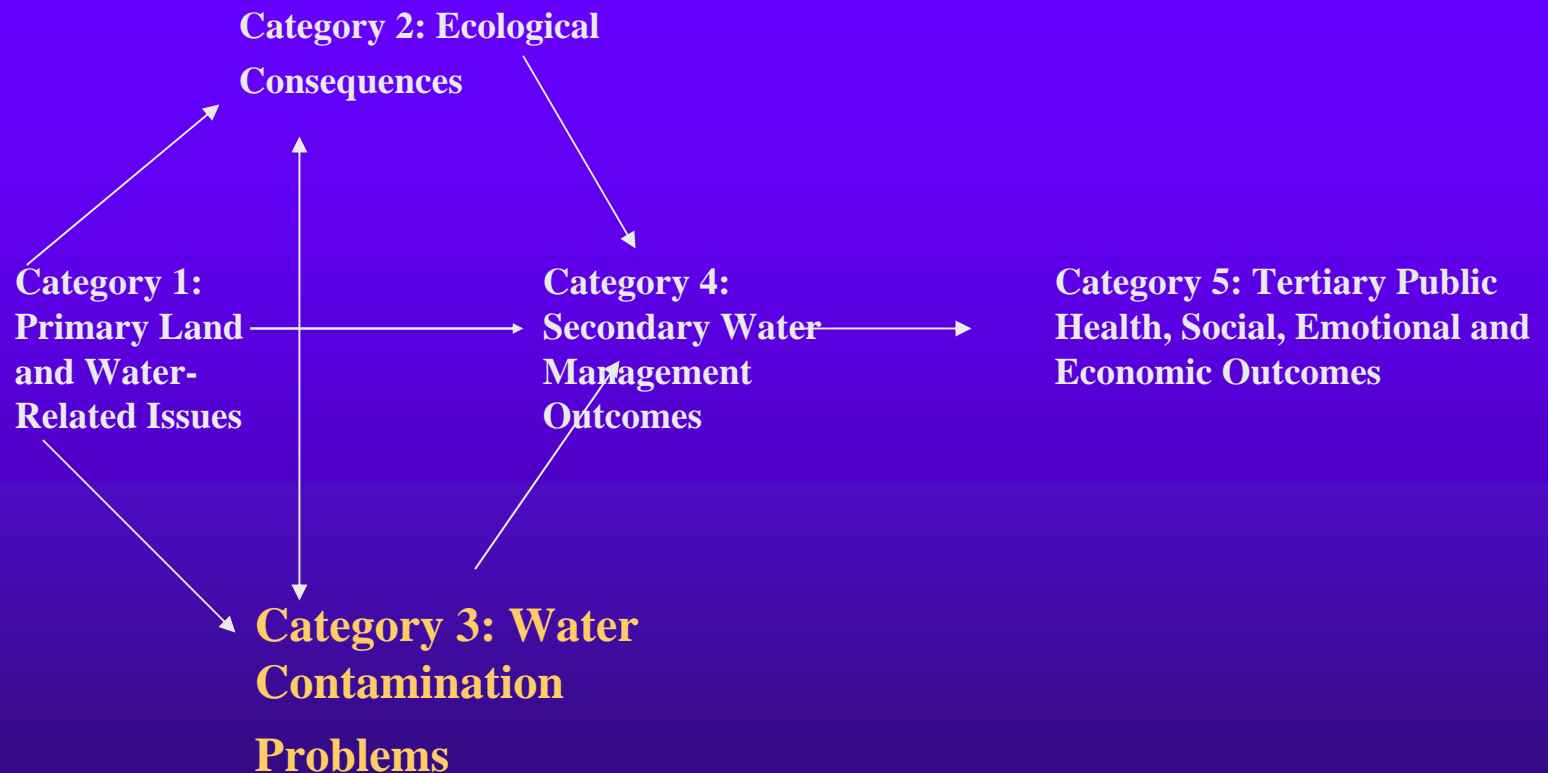


Table 3, Category 3: Water Contamination Problems

- ◆ High Turbidity/Dissolved Solids
- ◆ First Stormsurge Toxic Materials
- ◆ Impervious Topping Compounds
- ◆ Nitrates
- ◆ Low-High pH
- ◆ Oil/Grease
- ◆ Persistent Organic Compounds
- ◆ Combined/ Sanitary Sewer Overflows
- ◆ Increase in Pet Fecal Matter
- ◆ Low Dissolved Oxygen Levels/High BOD




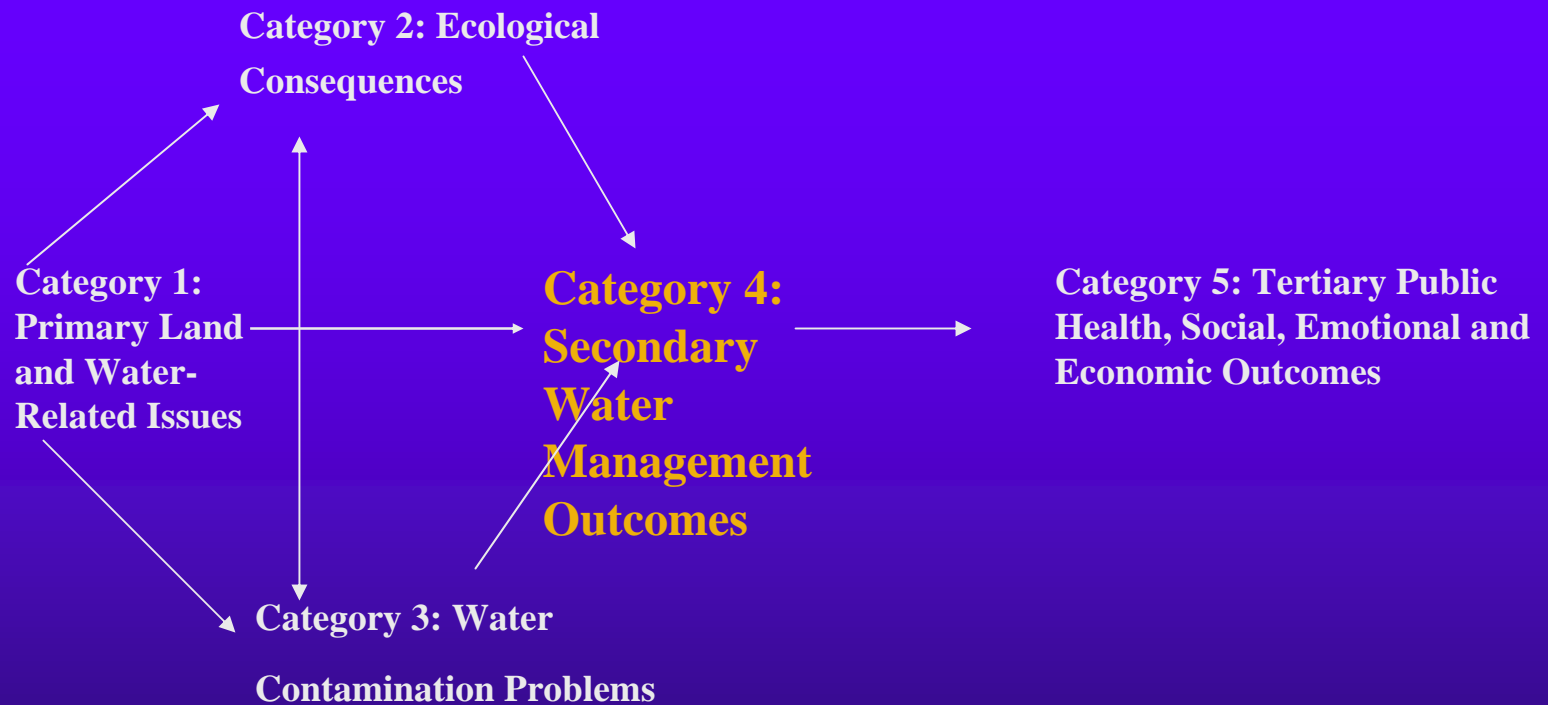


Table 3, Category 3: Water Contamination Problems Continued

- ◆ Acid Mine Drainage
- ◆ Methylmercury
- ◆ Organohalogen Compounds
- ◆ Arsenic and Other Heavy Metals


Figure 1, A Chain of Causation: Primary Land and Water-Related Issues to Tertiary Public Health, Social, Emotional and Economic Outcomes



Category 4: Secondary Water Management Outcomes

- ◆ Increase Sediments in Surface Water
- ◆ Decreased Production Clean Surface/Groundwater
- ◆ Habitat Loss/Fracture
- ◆ Increased Stormwater/ Snowmelt Runoff
- ◆ Increased Contaminant Loads
Surface/Groundwater
- ◆ Flooding
- ◆ ↓Confined/Unconfined Aquifers/Storage Ability

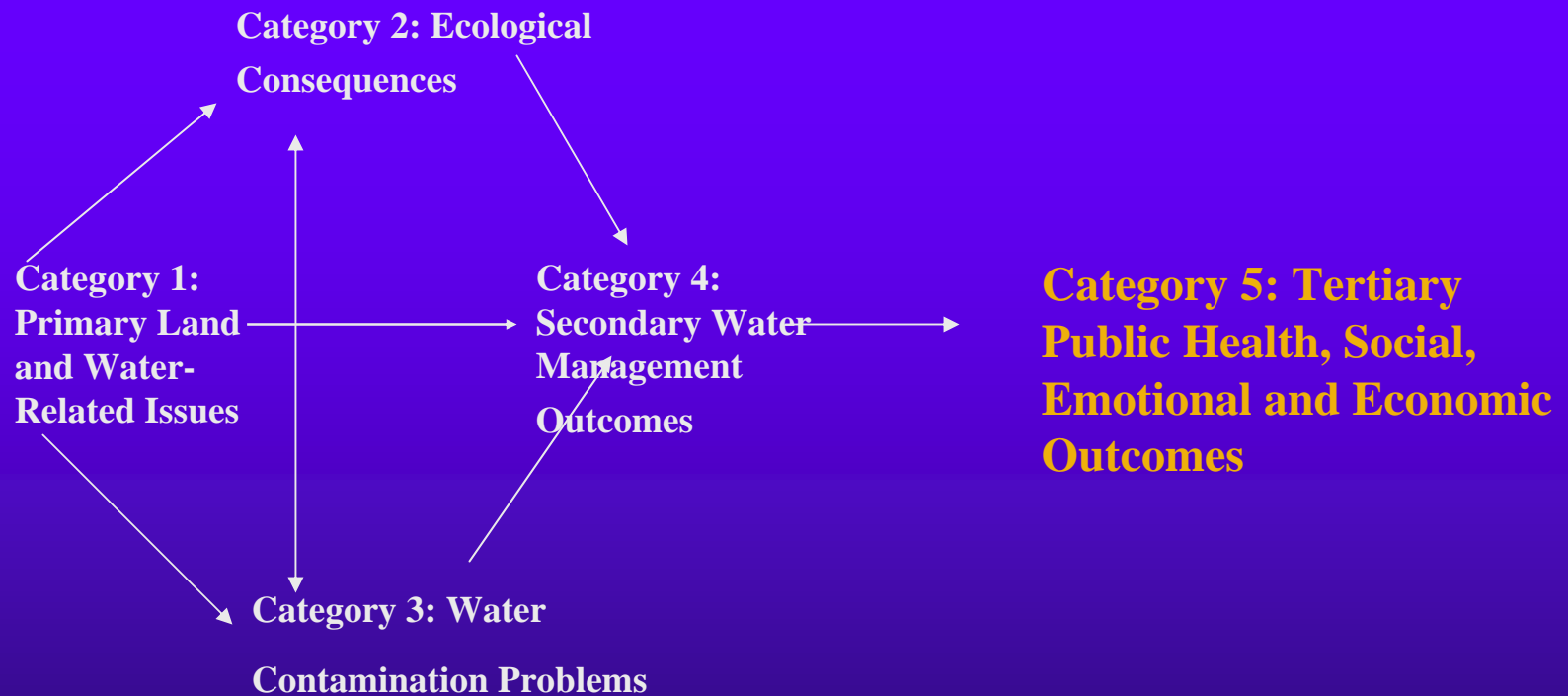




Category 4: Secondary Water Management Outcomes Continued

- ◆ Human Pathogens in Surface Water (Primary for Recreation)
- ◆ Human Pathogens in Groundwater Increase Potential –Mine Blowouts
- ◆ Consumption of Contaminated Fish
- ◆ Human Exposure-
- ◆ Carcinogens
- ◆ Toxic Substances
- ◆ Endocrine-Active Substances

Figure 1, A Chain of Causation: Primary Land and Water-Related Issues to Tertiary Public Health, Social, Emotional and Economic Outcomes



Category 5: Tertiary Public Health, Social, Emotional and Economic Outcomes

- ❖ Property- Flood Damage
- ❖ Flood- Loss of Human Life
- ❖ ↑ Stormwater Management Costs
- ❖ ↑ Costs Water Purification
- ❖ ↓ Human Aesthetic Value
- ❖ ↓ Recreation Potential
- ❖ ↓ Economic Growth
- ❖ ↑ Costs-Flood Protection/Insurance
- ❖ ↓ in Water Quantity
- ❖ ↑ Risk Waterborne Pathogen Diseases



Category 5: Tertiary Public Health, Social, Emotional and Economic Outcomes Continued

- ◆ Loss of Aquatic/Terrestrial Species
- ◆ ↑Risk Cancer/Humans
- ◆ ↑Risk Other Environmental Disease

