Agricultural Water Quality

- Pesticides
- Pathogens
- Pharmaceutical compounds and hormones
- Nutrients
- Waste management
- Rural water supply and sanitation
PESTICIDES

• New Chemistry
  – Low-dose, reduced human health risks
  – Ecological impacts (bees, highly adsorbing compounds – pyrethroids, particle-bound and deposition in sediments, impacts on biota)
  – Predicting contamination potential of rural domestic wells which are not under regulatory compliance
**REGISTRATION PROCESS**

- Limited number of field perspective studies conducted for each compound
- Initial screening studies needed to examine leaching potential

Leaching potential of (a) atrazine (b) heptachlor, and c) captafol on Oahu Island in Hawaii assessed by the CLERS model.
Pathogens

- USDA completed a 5-year funding on the fate of pathogens in the environment
- Cryptosporidium and Giardia were the primary pathogens of concerns
- *E. coli* and viruses
- Microbial source tracking
INTEGRATED AQUACULTURE AND SPREAD OF AVIAN FLU IN SE ASIA

- NSF/NIH funding
- Pig waste entering aquaculture ponds
- Chicken raised in cages over bamboo structures on ponds
- Free swimming ducks
- Ducks mingle with migratory birds – bring the infection back to chicken/farm
- Transport of ducks and chicken to markets in peri-urban areas
PHARMACEUTICALS AND HORMONES

- Wastewater reuse for crop production in semi-arid or water-stressed areas
- Wastewater or human or animal origin – with a variety of pharmaceuticals, antibiotics, and hormones
- Uptake of these compounds by salad crops
- What are the key drivers?
PHARMACEUTICALS IN LAGOONS AND RECHARGE PONDS

- Fate and transport of these compounds
- Temperature
- Redox

![Graph showing dissolved oxygen levels over time](image-url)

![Bar chart showing ponding depth](image-url)
PPCPs in SE Vegetable Production Areas

- Chicken and swine manure spread on land
- Runoff collected in small farm ponds
- Water used for irrigation of crops
- Uptake of pharmaceuticals by onions, lettuce, tomato etc
NITRATE AND PHOSPHATE

• Runoff loss still a concern
  — Remedy?
• Understanding redox process in detention basins
  — A lot of work done in Florida
• Nitrapyrin as an inhibitor for nitrification – understand its role in an integrated model
  — Chemigation induced nitrogen load to aquifers
  — Nitrate and uranium chemistry
WASTE MANAGEMENT

• Ethanol plants and distiller’s mash
  — Wet material more efficient; but need animal feeding operation in vicinity of he plant
  — Do ethanol plants need to be involved in confined animal feeding operations?
WATER AND SANITATION

- Water supply – Rural Utilities Service (USDA)
- Household well and septic issues
- Risk of wells being contaminated with pharmaceuticals (besides pesticides and nutrients)