

# Understanding the Environment for a Sustainable Future:



University of  
Connecticut

## Integrating Multidisciplinary Research, Education, and Outreach



*Michael R. Willig*

*Christopher R. Perkins*

# Environmental Problems

Clean Air

Clean Water

Soil Fertility

Biodiversity Conservation

# Societal Challenges

Global Change

Sustainable Development



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# 21<sup>st</sup> CENTURY VISION

Social Sciences

Engineering

**Multidisciplinary  
Perspective**

Natural Sciences

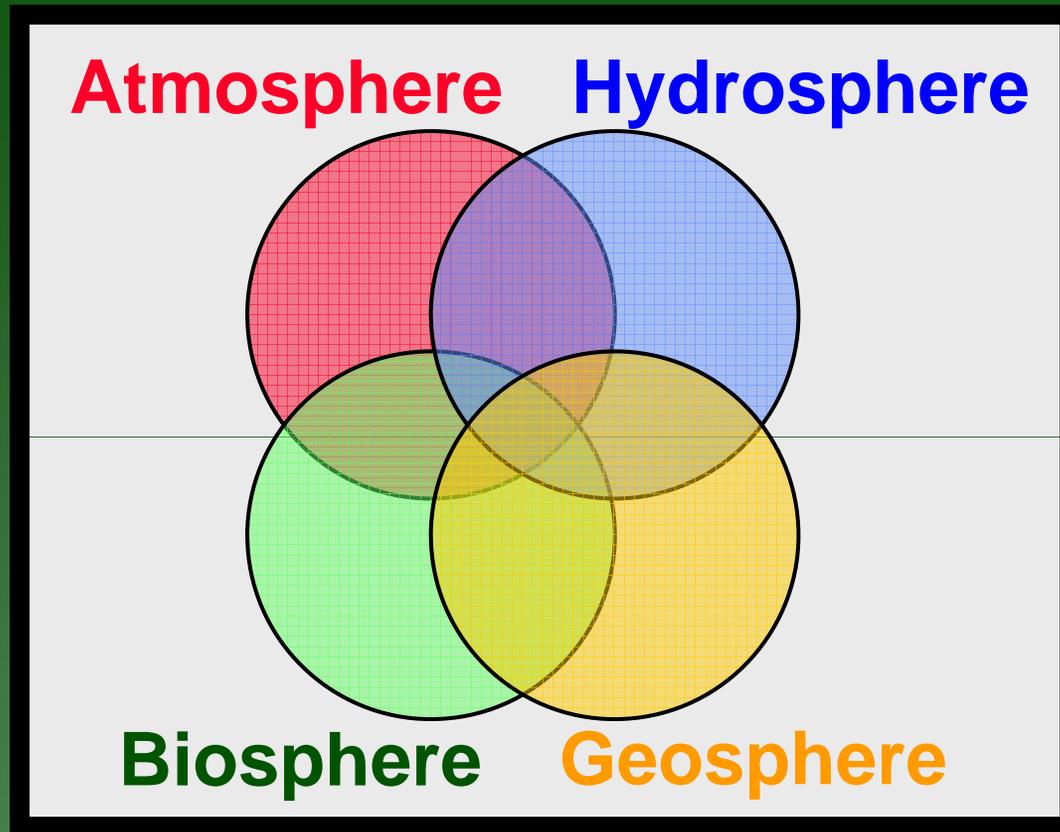
Agriculture



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# COUPLED HUMAN & NATURAL SYSTEMS



Land Grant  
Sea Grant  
Space Grant  
Agriculture  
Engineering  
Sciences  
Public Health  
Law

*Socioeconomic Context*



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# The Environment

## Pillar of the Academic Plan

- Sustainable Ecosystems
- Environmental Health
- Energy & the Environment



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# C E S E

## Catalyst for Innovation & Integration



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# CESE --- IDENTITY

A multidisciplinary center organized as part of a larger research enterprise that focuses an intellectual critical mass on a cascade of questions that span basic & applied approaches to environmental research & education



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# CESE --- MISSION

- To lead & promote multidisciplinary research, education, & outreach in environmental science, engineering, policy, & sustainability.
- To provide core analytical laboratory & field capabilities to support research.
- To assist Connecticut State Agencies in environmental monitoring & assessment.



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# CESE

**Large Faculty**

**Center Faculty (10 FTEs)**

**Affiliated Faculty (> 130 FTEs)**

**Diverse Faculty**

**Agriculture & Natural Resources (8 Departments)**

**Liberal Arts & Sciences (14 Departments)**

**Engineering (6 Departments)**

**Pharmacy**

**Public, Occupational & Environmental Health**

**Law**



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# New Multidisciplinary Faculty Positions

*Richard Anyah*  
*Jeffrey McCutcheon*  
*Angi Seth*  
*Craig Tobias*  
*Chuanrong Zhang*

*New Positions*

*CESE-NRME*  
*CESE-CMBE*  
*CESE-CEE*



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# National Corporation for Atmospheric Research (NCAR)

# National Ecological Observatory Network (NEON)



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# CESE INFRASTRUCTURE

Physical Space (19,500 sq ft)

Collaboratories

Analytical Facilities

Administrative Functions



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# CESE Analytical Laboratories

## *Nutrients*

Atmosphere & Soil  
Marine & Freshwater Systems

## *Metals*

Atmosphere & Soil  
Marine & Freshwater Systems  
Biological Tissues

*Quality Assurance/ Quality Control*

LIMS

Data Review & Audits



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# CESE Nutrients Laboratory

## *Water Quality & Air Filter Analysis*

- *Nitrogen & Phosphorus Series*
- *Total Organic Carbon*
- *Ion Analysis (Chloride, Sulfate, etc.)*
- *Elemental Carbon & Nitrogen*



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# CESE Metals Laboratory

## *Trace Section*

- Ambient & Elevated
- ICP – Multi-elements
- AAS – Mercury



## *Ultra Trace Section*

- Clean Facility
- ICPMS – Multi-elements
- AFS – Mercury



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# CESE

## Multi-User Laboratory

### *Organics Section*

- GC: Pesticides – PCB
- GCMS: PAHs – Semivolatiles – Volatiles

### *Metals Section*

- GFAA: Single element trace analysis



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# CESE Field Support

## *Atmosphere*

Gaseous, particulate & deposition research

## *Ambient Water Quality*

Near-shore marine, riverine & lake studies

## *Subsurface*

Groundwater & soil research



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# Atmospheric Mercury

Statewide Assessment of Hg  
in various forms (1996-99)

- Particulate
- Gaseous
- Precipitation

Monitoring of Hg off-gassing  
from Compost

Linkage of Hg from airshed  
to watershed through  
model development (CRAWC)



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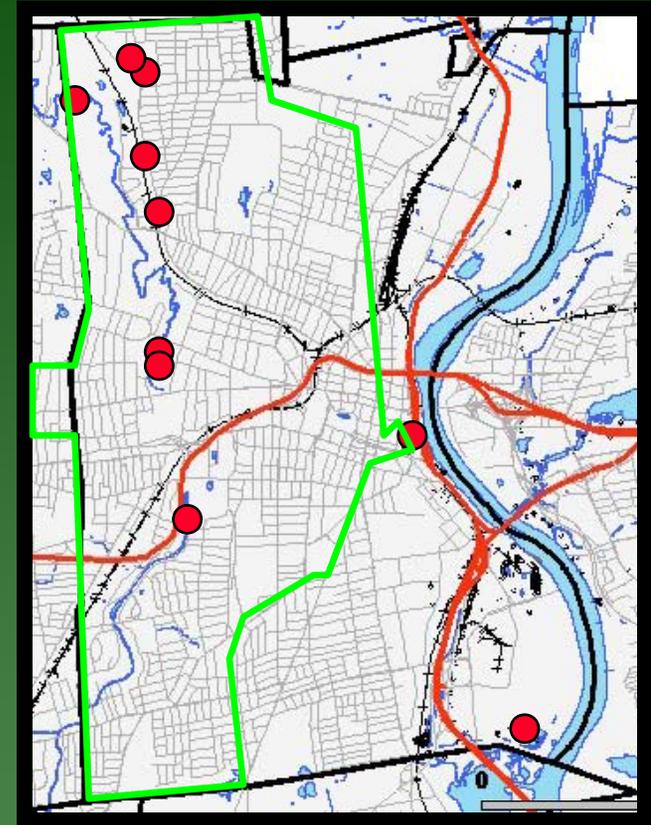
# Hartford CSO Monitoring

## Collaborative Project

- CT-DEP
- N-Credit Advisory Board

## Management Questions

- How is N-loading & cycling affected by combined sewers?
- What are impacts of management decisions, development & global change



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# Crumb Rubber Infill

## Collaborative Project

- CT-DEP
- CT-DPH

## Risk Assessment Framework

- Volatilization
- Aging
- Leaching



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# Partnering Opportunities

Environmental Commons

Environmental Observatory

Knowledge Networks

Multidisciplinary Graduate Fellowships

Minority Undergraduate Research

School Yard Science



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# Environmental Commons

*Collaboratory & Synthesis Center*

## *Intramural Interactions*

Scholarly Research  
Grantsmanship

## *Extramural Interactions*

Visiting Scientists  
Industrial Partners  
Government Personnel  
NGOs



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# Environmental Commons



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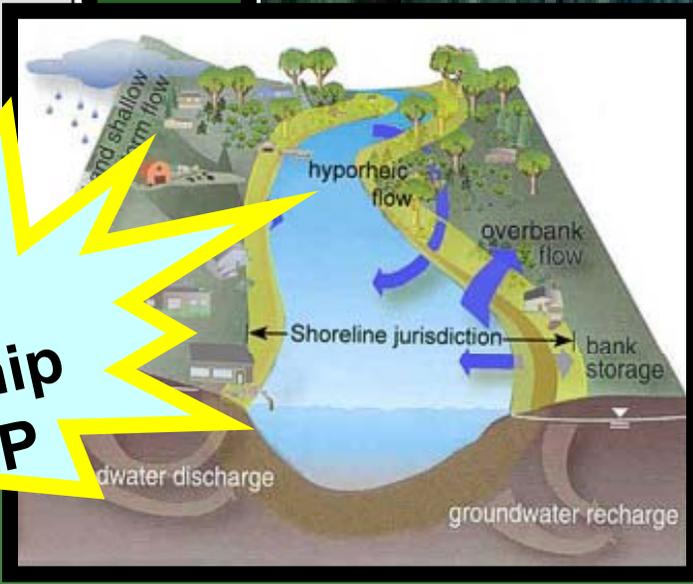
# Environmental Observatory



**Global  
Change**

**Universities  
Agencies  
Corporations  
NGOs**

**2009  
Partnership  
with DEP**



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# Knowledge Network for Sustainability in CT

*Spatio-Temporal Analysis*

*Statistical Prediction*

*Modeling*

*GIS*

*Change Scenarios*

*Environmental Sensing Systems*

*Cyberinfrastructure*

**2009  
Partnership  
with DEP**



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# Multidisciplinary Graduate Research Fellowships

## *2007 & 2008 Grants*

- *40 Students*
- *68 Mentors*
- *3 Colleges*
- *11 Departments*
- *\$200,000*

**2009  
Partnership  
with DEP**



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# Undergraduate Experiences in Multidisciplinary Research

2009  
Partnership  
with DEP

Students from CT & PR at UConn  
Students from CT & PR at UPR

Cultural & Social Experience  
Scientific Experience



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# Addressing Nature Deficit Disorder



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# School Yard Science

2009  
Partnership  
with DEP



*Graduate Student & Middle School Teachers  
Curricular Modules & Experiential Learning*



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# Environmental Understanding



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# Contact Information

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