CWS Mission & Programs

• Center began in 2005
• Currently has 80 members
  – 8 Colleges
  – 24 departments
• Mission:
  – To advance scientific research & knowledge for understanding, protecting, and restoring water resources and their sustainable use by humans & ecosystems around the Great Lakes and the world
85% of the funding goes to faculty
  – Venture grants
  – Post-doc grants

<table>
<thead>
<tr>
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<th>Numbers</th>
<th>Dollars</th>
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<tbody>
<tr>
<td>Venture Grants</td>
<td>25</td>
<td>$250,000</td>
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<tr>
<td>Post-doc Grants</td>
<td>9</td>
<td>$1,350,000</td>
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Funds Generated & Leveraged

- OVPRGS has invested $1.5 million
- CWS has generated $15,855,585 in external funding
  - CWS-led contracts and grants: $12,577,569
  - CWS-facilitated grants: $1,665,698
  - Funds generated by our grantees
    - Venture program: $415,167
    - Post-doc program: $1,197,151
Impacts: Publications & Presentations

• Over 30 publications
  – Applied and Environmental Microbiology (Impact Factor: 3.532)
  – Geology (Impact Factor: 3.477)
  – Journal of Phycology (Impact Factor: 2.58)
  – Freshwater Biology (Impact Factor: 2.502)
  – Water Research (Impact Factor: 2.459)

• Venture grant program: 11 publications & 16 scholarly presentations

• Post-doc program: 12 scientific publications & 30 presentations
CWS also produces publications such as the Water Fellows Reports and an upcoming book on transboundary monitoring.
Collaborations

• Created new collaborations on campus
  – 67% of our members have created new collaborations through the Center

• Require new collaborations for post-doc grants

• Working with Center for Global Change & Earth Observations, ESPP, Land Policy Institute, GenCen, CSIS

• Faculty services
  – Newsletters
  – Seminars & Events (Co-Sponsored 2 seminars each semester)
“The benefits of being a CWS member are many, but I think that the thing I value the most is the ability to get to know (and potentially work with) a very wide variety of scientists researching water. We are so spread out over this huge campus and many departments that without the CWS I am sure that I would not even know about important and relevant (to my) research that is being conducted right here on campus!”
Faculty Working Groups

- Clusters of faculty working on specific topics
  - Create research “nodes” on campus
  - Support publications and grant proposals

- Current active groups
  - Harmful Algal Blooms (HABs)
  - Emerging contaminants in water
  - Algal-based Biofuels

- Participation in Graham Environmental Sustainability Initiative (GESI) at the University of Michigan the Water, Health + the Environment Conference
Value to the State & GL region

- CWS worked with MDEQ to analyze state’s *E. coli* data for surface waters
- Helped Water Quality & Health lab become only lab certified for *Cryptosporidium* analysis in MI
Source Tracking: Human & Bovine Markers

Saginaw

20%

80%

Bovine

38%

62%

HUMAN

Human Bac-

Human Bac+

ESP-

ESP+

HUMAN
Water Fellows Series

• First two series extremely successful
  – Created statewide network of Fellows
  – Largest audience for MSU webcasts
  – Information being used across state & by EPA

• Next fellows series: stormwater
  – Focus on the largest water quality problem in the nation: nonpoint source pollution
• Cutting-edge science in water
• CWS funds projects in 9 priority research areas
  – Antibiotics in water and development of microbial resistance
  – Viral pathogens and waterborne disease
  – Effects of stressors with global origins
  – Ecosystem services and human activities in lakes and their watersheds
  – Microbial biodiversity and biogeochemical processes in complex aquatic landscapes
  – Watershed influences on coastal ecosystems of large lakes
  – Algal toxins and water supply
  – Perfluorinated organic compounds
  – International programs investigating effects of climate, landscape, and cultural diversity on the coupling of human and ecological systems
Environmental Fate, Resistance Development and Toxicity of Antibiotics in Natural and Engineering Systems

- Hui Li (lead PI), Irene Xagoraraki, Brian J. Teppen, Stephen A. Boyd, James Tiedje, Syed Hashsham, James E. Trosko, and Brad L. Upham

Key Findings & Results

- Developed analytical methods to determine trace level of veterinary pharmaceuticals in water
- Found 2 pharmaceuticals persistent in surface runoff
- Soils are the primary reservoir for many pharmaceuticals
- Generated grants from USDA & Pfizer
• Application of whole-ecosystem 15N tracer approaches to investigate nitrogen removal by wetlands
  – Stephen Hamilton (lead PI), Nathaniel Ostrom, Merritt Turetsky, and Jay Lennon

• Key Findings & Results
  – Wetlands can have a significant impact on stream-water concentrations of dissolved organic nutrients, nitrate and phosphate
  – In the warm season, these wetlands and impoundments remove an average of 50% of the nitrate from the streams flowing through them
  – Generated NSF funding
CWS-funded research addresses issues of national importance.
Future of CWS

• **Continue high-impact scholarship**
  – Faculty working groups
• **Explore innovations in water education**
  – IGERT
  – “Blue Planet” water game
• **Build on successful outreach programs**
  – Water Fellows
• **Ensure long-term sustainability**
  – CWS Sustainability Initiative
International Collaborations

THE SAFE TAP INITIATIVE
INTEGRATING ENVIRONMENTAL HEALTH AND INSTITUTIONAL CAPACITY
Dr. Anne Ferguson and Dr. Leo Zulu

- Malawi pilot project
- University of Malawi scientists
- Malawi’s Ministry of Irrigation & Water Development
- Environmental Clinics & Health Outposts
International Collaborations

• Coupled human and natural systems
• Focus on nutrient and algae problems and global change
• Collaboration with Zhejiang University and multiple MSU research centers, departments and colleges
Michigan Corridor Collaborations

• CIMBS Proposal: The National Center for Interdisciplinary Biomathematics Research (NCIBR)
  – University of Michigan collaboration with MSU & Wayne State University
  – Create an NSF funded Center at the Interface of the Mathematical and Biological Sciences
  – $16 million for 5 years

• URC competition
  – $574,000 proposal for algae and biofuels with WSU and WMU
NSF IGERT Proposal

• Aquatic coupled human & natural systems
• Comparisons across 3 settings:
  – Malawi
  – China
  – US and Canada
• Pre-proposal passed internal review
Students receive interdisciplinary training & experience with development of new models & experience in an international setting.

Students also receive in-depth training in a chosen discipline.

**Social Sciences**
- Public Policy
- Risk Analysis
- Governance
- Equity
- Community based management

**Engineering**
- Water treatment
- Wastewater treatment
- Best Management Practices

**Water Quality**
- Water quality & stressor characterization
- Fate & transport of contaminants
- Risk assessment

**Ecology**
- Aquatic ecosystems
- Nutrient dynamics
- Watershed management
Blue Planet Game

- CWS Collaborating with College of Education and Communication Arts & Sciences
- Create state-of-the-art
- Multi-player educational game
- Internet based so classrooms or individuals can play
- Target middle school students
- Address national educational standards
Long-term Sustainability

CWS Sustainability Initiative

Center Support Fund (expendable) Admin. Web site Internal collaborations

Fund for Excellence in Water Science Research (Endowment) International Water Initiative

Outreach Fund (expendable) Water Fellows program

Water Science Park Initiative Fund
http://cws.msu.edu