The Center for Water Sciences (CWS) at MSU was established in April 2005. The mission of CWS is to advance scientific research and knowledge for understanding, protecting, and restoring water resources and their sustainable use by humans and ecosystems around the Great Lakes and the world. Membership in CWS is open to MSU faculty who work or have an interest in water resources. In the past year, CWS gained 28 new faculty members. The Center currently has 62 faculty members from 15 departments across campus. This report highlights accomplishments made by CWS in 2005. More information is available upon request.

High Quality, High Impact Scholarship

CWS faculty increase the impact of their research by presenting findings at professional meetings, publishing research results in peer-reviewed scientific journals, writing scholarly books, and supporting efforts by government agencies. CWS is developing a database of these scholarly activities. As an indicator of CWS activity, faculty presented research results at 12 prominent professional society meetings and published six papers and reports in 2005.

CWS is raising the international profile of water resources science at MSU. Center faculty developed reports on water quality of the Great Lakes for the International Joint Commission. The Center supported the establishment of an international team of researchers to collect baseline data for a project on coupled human-ecological systems in China. Partnerships were initiated at 2 major Universities and the Chinese Academy of Sciences. CWS collaborated with the International Programs Office, with ongoing efforts by the MSU administration, for developing a joint education and research program at a prominent Chinese University. CWS is also bringing international expertise to campus to facilitate development of international programs. The Center is co-sponsoring a seminar in April 2006 with the MSU Global Area Thematic Initiative featuring Dr. Jamie Bartram, Coordinator of the World Health Organization’s Water, Sanitation and Health Program, who is an international expert on global water issues.

CWS transferred MSU scientific expertise to government agencies in at least 2 important efforts. Drs. Rose and Dreelin organized a workshop series, entitled Shaping Future Water Policy: The Role of Science. The workshop and resulting report raised awareness among participants and audiences in government, academic, and non-government agencies about the need for science to inform water resources policy in Michigan. Drs. Stevenson, Soranno, and Cheruvelil are facilitating federally-mandated development of nutrient criteria for all state waters by the Michigan Department of Environmental Quality. They have helped MDEQ develop a nationally recognized example of how nutrient criteria should be developed, which has lead to additional funding from other states.

CWS Internal Programs: Promoting Cross-campus Collaboration

CWS has initiated two internal grant programs and is planning a third: (1) post-doctoral fellowships with CWS faculty on projects addressing priority research areas; (2) venture grants to develop preliminary data to increase the likelihood of garnering external support; and (3) technical infrastructure support for laboratories conducting analyses for CWS projects and
activities. Review criteria for all CWS proposals focus on the quality of the research proposed, relationship to CWS mission, multi-disciplinary work supporting junior faculty, and the likelihood of garnering external support.

CWS issued its first RFP for the venture grant program in summer 2005. CWS awarded five venture grants in 2005 for a total of $54,816. Venture grants were awarded to investigate:

1. Application of whole-ecosystem $^{15}$N tracer approaches to investigate N removal by wetlands: Pilot experiments and methods development (Steve Hamilton, KBS);
2. Exploring dynamic interactions between surface water and groundwater in the Muskegon River Watershed (David Hyndman, Geological Sciences);
3. The development of a rapid culture-independent system for the assessment of aquatic phototrophic communities (Terry Marsh, Zoology);
4. Mass Balance Study (Victoria McGuffin, Chemistry); and
5. Coupling human and ecological systems across an economic gradient within the Yangtze River Watershed in China (Jiaguo Qi, Geological Sciences).

Venture grant recipients stated that the funds were used to refine methods, build collaborative teams, and gather preliminary data to establish a strong foundation with which to seek external funding. EPA STAR, Centers for Disease Control, the National Science Foundation, and private foundations including the Ford Foundation and Nestle Fund for Environmental Research are potential targets for seeking external funds. CWS received 5 new proposals from a second request for proposals during early 2006.

The Center began its post-doctoral fellowship program in winter 2005 and is currently reviewing applications from potential post-docs and faculty host teams. Over 50 post-doctoral candidates applied for the CWS Fellowship Program. The program will create five new collaborative research teams at MSU by funding up to five post-doctoral researchers for two years. The awards provide approximately $150,000 in support for post-doctoral fellow salary, benefits, supplies, and travel. Eight high-quality proposals were received from MSU faculty for the program, which are now being reviewed extramurally. Award decisions will be made in May 2006.

The CWS Laboratory Infrastructure Program will support the development of technical expertise at MSU and make it more widely available to all MSU faculty for their research. The program will offer partial support for laboratory technicians with the goal of making labs self-sufficient in a short period. The existing Algae Lab and Water Quality and Health Lab are examples of revenue generating laboratories that support other research.

“Meet and Greet” sessions (informal seminars) have been started on a monthly schedule for CWS faculty and affiliated students. The first 3 highlighted climate modeling, geographic information systems (GIS), and aquatic ecosystems. Next year we plan to co-sponsor monthly seminars by internationally recognized authorities with other centers and departments on campus as part of the CWS seminar series. A Center web site and an electronic newsletter have been established. CWS faculty also have been actively engaged with other center and program efforts at MSU. Drs. Rose, Stevenson, and Dreelin participate on workgroups and help teach classes for the ESPP program, GATI, SMEP, climate change workgroup, the risk assessment workgroup. Two visiting scientists from Japan will be supported by the Center for Advancing Microbial Risk Assessment and are expected to collaborate with CWS faculty members.

**Garnering External Support: Revenue Generation**

CWS is already demonstrating progress in generating external funds. Recently, CWS
faculty member Dr. Evangeline Alocilja, CWS Associate Director Dr. Erin Dreelin, and Dr. Stephanie Molloy were awarded a $600,000 grant from the EPA STAR program. During the three year project, the investigators will develop and validate an innovative combination of rapid, sensitive, specific, and quantitative methods for detecting pathogens in well water. Drs. Stevenson and Soranno received approximately $250K to develop nutrient criteria for the MDEQ. The Florida Department of Environmental Protection awarded Stevenson $250K to determine nutrient regulation of nuisance algae in Florida’s clear water springs. MSU faculty Merrit, Benbow, Qi and Stevenson garnered a $2 million NIH grant to study how ecological health affects safety of water resources for human health in Ghana. The project will assess the likely relationship among human activities, nutrient enrichment, algal growth, invertebrate food webs, and buruli ulcer which is an emerging infectious disease with extensive effects in Ghana.

Center faculty submitted grant proposals totaling an additional $650,000, which are pending. Proposals were submitted to the Japan Foundation Center for Global Partnership ($200,000), USDA ($400,000), and the Institute for Public Health and Water Research ($50,000). The Center is supporting development of an NSF IGERT proposal; a proposal to the USDA Integrated Research, Education, and Extension Competitive Grants Program - National Integrated Water Quality Program ($600,000); and an EPA STAR proposal for Collaborative Science and Technology Network For Sustainability ($300,000). Two venture grant awardees have submitted proposals and additional proposals by grantees are in preparation. The grant proposals pending are Jiaguo Qi, Lead PI, submitted to the Asian Pacific Network ($30,000); and Steve Hamilton, Lead PI, submitted to NSF DEB ($383,161). In summary, CWS has invested $54,816 and has $750,000 pending in its internal funding programs, has received $1.1 million in external funds directly and assisted in garnering an additional $2 million, has $650,000 in pending support, and $900,000 in grants under development.

CWS is assisting the Water Quality and Health Laboratory in becoming the first laboratory in Michigan to be EPA certified for Cryptosporidium/Giardia testing. Under a new federal rule, all 70 utilities in Michigan will be required to sample their water. This will account for approximately 700 samples (~ $250,000 per year). Similar levels of revenue generated by the Algae Lab from the USEPA and many state agencies have supported assessment of the biomass and species of algae in water samples from around the US.

**2006 CWS Goals and Expectations**

CWS expects to award 10 venture grants, with an average award of $10,000, to its faculty members in 2006. The infrastructure support program is under development and we expect to issue an RFP before the end of spring 2006. The Center expects to see a return on its investments, in the form of publications and grants awarded, as the first projects funded by the Center are completed in June 2006. CWS is also creating an online water resources database for the state of Michigan, a need identified by researchers, state agencies, and stakeholders of Michigan.

CWS is supporting development of a MSU Water Science Park. This will provide the core of expertise and resources needed to obtain major funding from a new NSF initiative (WATER INC.) combing hydrologic sciences and pollution/engineering science. Joan Rose is leading an effort to brainstorm the development of the state-of-the-art water research facility for MSU. The facility would provide innovative technology for water-related research as well as serving as an educational facility.