

# **Science Advisory Board Review - 2007**

Annis Water Resources Institute

March 14-16, 2007

## **Introduction and General Observations**

Firstly, the Science Advisory Board would like to thank Dr. Alan Steinman and the AWRI staff for their tremendous hospitality, the thoroughness of their presentations and the open access that we had to the staff during our review on March 14-16, 2007. We believe that having a Science Advisory Board is a creative and valuable approach and we appreciate being selected for this opportunity. The purpose of this report is to provide continued advice and counsel on how to make the AWRI a valuable asset to Grand Valley State University, the State of Michigan and the southwestern Michigan region.

Overall, the AWRI continues to make significant progress and has experienced further maturation of its programs under Dr. Alan Steinman's leadership and heightened support from the Grand Valley State University administration. Below, we provide a more detailed assessment of individual programs with additional recommendations.

## **Information Services Center (ISC)**

John Koches and the Information Services Center (ISC) staff continue to perform an important regional service through their watershed technical assistance and other GIS-related projects. The more than 70 years of combined experience in the ISC is a tribute to the group's competence and collegiality, and to John Koches' leadership.

In his presentation, John Koches remarked that the ISC current funding level (\$1.6 million) was the same total amount as it was in 2005, but was for more, smaller projects. While John noted that this is less desirable than the situation two years ago, there have been fewer opportunities for large projects. The ISC's increasing involvement in projects with other AWRI staff (such as the AWRI Sustainability Initiative) leverages the technical and scientific capabilities of all participants.

The web presence of the ISC has increased since 2005, with project products being widely disseminated via the AWRI website. The group has expanded its Watershed Interactive Map Viewer GIS portal, which now provides map data for an impressively large land area of western Michigan, pieced together from individual watershed projects. The Science Advisory Board (SAB) endorses this continued development.

The group has worked on several innovative tools: visualization techniques, PAM (Population Allocation Model) and ALURE (Aerial Land Use Resource Experiment). These tools have the potential to engage stakeholders in the planning processes, with the side benefit of making the work more fun for the ISC staff. The time spent on developing these tools should be weighed against their potential to contribute to the goals of current projects and attract new projects. The PAM is a good example of a tool that yielded subsequent benefits.

Past SAB reviews have emphasized publications, so we were pleased to learn that the ISC group has published 6 map atlases, 7 technical reports, and three peer-reviewed publications since 2005. Publishing (particularly in peer-reviewed journals) should continue to be a goal for the ISC. We were also glad to see the group's technical reports and manuals listed in the 2005 and 2006 "Water Resources Year in Review" newsletter (reports in prior years were not specifically listed in the newsletter). For the next SAB review, it would be useful to include a list of ISC publications in the notebook provided in advance to the SAB.

### **Individual Research Programs and Faculty**

#### Dr. Rick Rediske

The environmental chemistry group made a transition from its reliance on contaminated sediment related grants from the Great Lakes National Program Office to research concerning Harmful Algal Blooms and contaminants in fish which was funded by the MDEQ and NOAA. Transitions are always difficult. However, Dr. Rediske and his staff were able to develop the analytical methods and funding to support a new research program in these areas. In addition, he continued to obtain research funding in the areas of beach monitoring, TMDL's, and environmental policy related to local Areas of Concern. He also was active in collaborative research with external partners (NOAA and U of M) and with all of AWRI's PIs. His research portfolio indicates he is comfortable as a PI and a collaborator; which are important qualities for the growth of his program and AWRI. Dr. Rediske's grant record of repeat funding and his professional/community service are strong indication of quality work product and his ability to effectively network with others. His recent appointment to the Federal Detection and Quantitation Limit Advisory Board indicates his work in environmental chemistry has gained recognition outside the Great Lakes area. Dr. Rediske's laboratory remains well organized and equipped with instrumentation, including a new LC/MS for cyanotoxin research. His publication record improved with 8 peer-reviewed articles as co-author in the past 2 years. With the shift in research areas, it is critical that he strive for a minimum of two publications as primary author per year concerning cyanobacteria and/or contaminants in fish.

The laboratory currently performs a variety of research activities including trace organic chemical testing, nutrient analyses, sediment bioassays, microbiology, physical

characterization, taxonomy, field work, and public policy development. Dr. Rediske's roles are the technical mentor/manager for his group, the primary grant and report/publication writer, and the main interface with his scientific/regulatory/local community base. He should continue to encourage his staff and students to present their research at conferences and prepare manuscripts. He has an excellent staff which is necessary for the multidisciplinary nature of the research program. The number of staff and their level of experience does create problems related to funding sustainability, especially with smaller projects. Dr. Rediske was able to collaborate on one grant with NOAA that provides 50% funding for 3 years for one of his staff. It will be critical in the future to develop similar multiple year lines (from other PIs, or hard money support) to keep these positions sustainable. In addition to staff sustainability, the long term success of Dr. Rediske's program will depend on his ability to collaborate in the areas of molecular biology and contaminant modeling within AWRI/GVSU and/or externally. Molecular biology is a critical component in algal toxin research and is more desirable to funding agencies for trophic level models that are coupled with contaminant measurements.

Concerns related to promotion/tenure and the status of the graduate program were expressed by Dr. Rediske and other PIs. The recently approved Aquatic Sciences Emphasis should provide an opportunity for AWRI staff to participate in the development of new courses and in recruiting students. Given the current size and background of students in the graduate program, it may be more appropriate for Dr. Rediske to teach a course in Water Quality Assessment than Aquatic Toxicology. Resolving issues related to promotion/tenure will be critical for AWRI to continue to grow. Considering the time required for recruitment and nature of grant cycles, it may take 3-5 years for a new staff member to replace the level of external funding that would be lost if one of the existing PIs leave.

#### Dr. Bopi Biddanda

Dr. Biddanda joined AWRI in June 2000 and has addressed various aspects of carbon cycling and microbial ecology in his research program. In the past two years, he has made significant progress in research and scholarship and should be recognized for his efforts. He has two funded research projects and four pending proposals. Proposals submitted but not funded include those to the highly competitive National Science Foundation, as well as NOAA's Coastal Ocean Program, Ocean Exploration, and Sea Grant programs.

From 2005-2007, Dr. Biddanda published, or has in press, seven papers (three as senior author), has published a book chapter and a book review, and 4 popular science articles. These all appear to be work carried out while with AWRI and they make an impressive set in leading journals. He has participated in national scientific meetings, serving as co-chair of organized sessions, and was invited to participate in the National Science Foundation workshop on Microbial Observatories. He has been a prolific reviewer of proposals (6 for NSF) and journal articles (>24), and currently serves on the editorial boards for the Journal of Plankton Research and Aquatic Microbial Ecology.

Collaborations with AWRI and external scientists continue to provide contributions on the Great Lakes and Michigan lakes.

The graduate courses he teaches, Ecosystem Biogeochemistry (Fall 2006) and Plankton Ecology (Fall 2005) in the Biology Department at GVSU, reflect his broad research interests, and teaching courses on campus provides an opportunity to identify students interested in employment. He provided employment for two graduate students and mentors two undergraduates. Dr. Biddanda has given an impressive array of invited and contributed seminars across Michigan and has presented his research in national meetings. He provides significant service to AWRI and GVSU (recognized as a recipient of the 2006 CLAS Leadership and Service Award).

Dr. Biddanda has responded well to the 2005 review and has clearly become a strong scientist at AWRI. He should continue to concentrate on building and maintaining a strong research funding base and enhancing his research program. In addition, he has matured to the point that he should continue to publish at least two papers per year as a senior author. Dr. Biddanda's research on the ecology of a submerged sinkhole in Lake Huron is very exciting due to its unique features. He has been successful in obtaining NSF funding for this work and should continue his collaborations with others, particularly those interested in potential novel chemicals from these environments. This research should be pursued, but he should not forget some of the other exciting avenues related to the more traditional microbial ecology and carbon cycling.

In the future, Dr. Biddanda plans to continue studies on carbon cycling along natural gradients such as land to water and in vents from submerged sinkholes in Lake Huron. One of the challenges in his research is to utilize molecular biological and stable isotope techniques for analysis of natural and impacted microbial communities. This may require additional training in laboratories with the required expertise.

#### Dr. Don Uzarski

Dr. Don Uzarski has been at AWRI since 2001, but is leaving AWRI this year for a tenure-track position at Central Michigan University, where he enters as an Associate Professor with tenure review in 2008. This is a significant loss for AWRI and GVSU, which will be returned to later in this evaluation.

During the period 2005-2007, Dr. Uzarski attracted, with co-investigators, extramural support in the form of 8 grants and contracts totaling \$333,000 – with \$198,000 of that total directly supporting his program. Dr. Uzarski serves as PI on 4 grants and co-PI on the remaining 4 grants. In general, grants came from Michigan and regional (Great Lakes) sources, with portions going to Dr. Uzarski in the range of \$20-40,000 per grant. For the most part, research in Dr. Uzarski's laboratory has centered on coastal processes and wetlands, with development of bioassessment criteria and indices a particular focus of the research effort. Dr. Uzarski currently supports 3 graduate students and 3 fulltime or seasonal technicians. Overall, Dr. Uzarski has a well-supported and active laboratory.

In the past two years, Dr. Uzarski has published 6 papers in the peer-reviewed literature and has 6 papers currently submitted for publication. Dr. Uzarski is first author on 2 of those papers, and co-author on the remaining 10 papers, as might be expected of an active laboratory with considerable collaboration with other AWRI PIs. Dr. Uzarski also has written 3 book chapters in the past two years, and is first author on 2 of those chapters. He and his students were active at professional meetings, presenting 26 papers or posters (2003), including 8 by Dr. Uzarski, 11 by graduate students, one by an undergraduate, and 6 by co-investigators. Dr. Uzarski also had considerable professional and university service highlighted by expert testimony delivered to Michigan State Senate and House Committees concerning Public Act 14.

Dr. Uzarski has made sound contributions to the teaching mission of the GVSU Biology Department in addition to maintaining his active research program. Dr. Uzarski teaches Limnology each year in the fall semester and Wetland Ecology every other year in the winter semester. During the period 2006-2007, he served as the major advisor for 5 Master's students, who are making good progress on their research (3 students) or have completed their M.S. degrees (2 students). Dr. Uzarski is well versed in multivariate statistics, which is an asset to his teaching and direction of student research.

Dr. Uzarski's self-described goals and objectives for 2007-08 are to successfully finish his remaining Master's students and place them into positions or Ph.D. programs. His other goal is to transition smoothly into his new faculty position at Central Michigan University. His departure to CMU is a significant loss for AWRI and for GVSU. The reasons for his departure are those previously raised by him in our 2005 review of AWRI, but to which GVSU chose not to respond to his satisfaction. These include lack of a tenure-track position for him, and the failure of GVSU to provide a suitable position for his wife or to extend her term appointment. These same requirements have been sufficiently met by CMU to warrant the move, even though Uzarski would have preferred to remain at GVSU. GVSU should be cognizant of the potential for future departures by AWRI scientists if situations such as those experienced by Dr. Uzarski are not adequately addressed.

#### Dr. Carl Ruetz

Dr. Carl Ruetz joined AWRI in November 2002 and has focused his teaching and research on Fisheries Biology. At the past (2005) review the SAB recommended that Dr. Ruetz 1) concentrate on expanding his research funding base, 2) increase publications of new research conducted while at AWRI and 3) have a more balanced load between research and teaching. Dr. Ruetz has done an excellent job at achieving these recommendations by expanding his research breadth and funding portfolio. The evidence of his growth and maturation includes a substantial increase in total external funding and funding sources, expanded activity in graduate training, receptions of various awards and publication of 6 scientific (4 senior author) papers in well-recognized journals. He continues to have a very active scientific presentation record with 24 presentations that includes national conferences. Dr. Ruetz has also begun to take scientific leadership responsibilities as evidenced by his recent election as the next President of the Michigan Chapter of the American Fisheries Society.

### Dr. Mark Luttenton

Dr. Mark Luttenton has a half-time appointment at AWRI combined with half-time on campus in the Biology Department. He currently serves as Coordinator of the Graduate Program in Biology, and also provides service on University-wide committees including serving as Chair of the Graduate Council Policy Subcommittee. On campus, Dr. Luttenton teaches Scientific Methodology in the fall semester and Freshwater Algae in the winter semester. In 2006, he also solely taught General Biology II. Therefore, Dr. Luttenton's teaching duties are considerable and his direction of the growing graduate program is significant. Notably, Dr. Luttenton received the "Outstanding Educator Award" for 2006 from the GVSU Alumni Association, a very important accomplishment. He was also nominated by GVSU for the Michigan Distinguished Professor award.

During 2005-2007, Dr. Luttenton attracted \$60,000 in external funding in 2 grants – most from the Michigan DEQ in a collaboration with Alan Steinman. He also maintains several other smaller research projects with graduate and undergraduate students. Dr. Luttenton currently directs 3 graduate students, 2 of which are scheduled to finish their M.S. degrees in 2007. In the past 2 years, he has published 6 papers including 2 as senior author. He has also authored or co-authored 8 presentations at scientific meetings. Dr. Luttenton has therefore met the publication goals that he established for himself during the last AWRI review. Publication in higher-tier journals would also further enhance his scientific reputation and the fundability of his program. This year, Dr. Luttenton cites additional extramural funding as a goal for his program, with which we agree. Overall, Dr. Luttenton is an outstanding instructor and plays a vital role in the Biology Department and an important liaison between campus and AWRI.

### Dr. Michael Chu

Dr. Xuefeng (Michael) Chu has had some outstanding accomplishments in 2005-2007, the highlight of which is his receipt of a prestigious NSF CAREER award. All aspects of his program have substantially advanced since 2005, including grant funding, publications, presentations, and collaborations. The lack of emphasis in hydrology at GVSU continues to deter his efforts at pedagogy, and it is disappointing that his planned Hydrology course was cancelled due to lack of enrollment. He has correctly identified the lack of a hydrology program and hydrology students at GVSU as his biggest challenge for 2007-2008, particularly since the NSF CAREER award carries with it an expectation of pedagogical development. Conversations with Michael demonstrate that he has pursued a number of ideas on how to attract students, and his collaboration with China Agricultural University and the GVSU Department of Computer Science may prove fruitful. We are confident, given his progress to date, that Michael will be able to solve this challenge.

### Dr. Alan Steinman

Dr. Steinman's scientific record continues to excel. He has received 18 new grants and contracts (13 as P.I.) totaling \$1,500,000 from a number of agencies, has published 7

journal articles (5 senior author) as well as 3 book chapters, 1 book review, and 5 technical reports, and has made 36 scientific and community presentations. He does all of this while having full administrative responsibilities as Director – many of the grants and contracts are for lab-wide activities in addition to his personal research.

Dr. Steinman teaches BIO 680a (Emerging Issues in Water Resources) every other year and provides guest lectures on many other course. He advised one graduate student, is on the committee for another, and mentored a summer intern. He is also very active in professional and community service activities, including serving on several national, regional, and state advisory boards and committees. These are time-consuming activities but very important for the AWRI Director to do – they well serve AWRI, GVSU, the community, and the environment.

Most of his research is focused on local and regional issues, which is appropriate given the logistics and overall mission of the AWRI. His research is of high quality and provides a good example for his more junior scientific staff. It is clear he plays a mentorship role. Presently, the balance he has between administrative demands and scientific productivity seems good and highly successful in both areas. It is hard to juggle scientific, academic, and administrative roles but it is important for Dr. Steinman to maintain an active research program.

### **Technical Staff**

Members of the technical staff are clearly an important part of the overall program and, as before, continue to display comradery and a strong sense of purpose. The staff still had concerns about their funding and the year-to-year uncertainty in their positions, but this is to be expected in research organizations such as AWRI. There has been progress on educating the staff in the different position classes as the SAB recommended during the last review but there is residual uncertainty as to how one moves from one class to another.

### **Education and Outreach Program**

The Education and Outreach (E&O) program at AWRI is directed by Dr. Janet Vail, who is assisted by 8 part-time seasonal instructors (generally retired teachers) and 5 student interns from the GVSU Integrated Sciences Program. Dr. Vail's E&O projects can be broadly classified into (1) local and extended vessel cruises for educational activities, (2) sponsorship and organization of regional conferences, (3) teacher continuing education programs, (4) new curriculum development, and (5) career fairs and state and federally funded demonstration projects. In 2005-2007, the program received grant, contract, and endowment support from ~12 sources, totaling about \$200,000 in external and internal funding. In addition, Dr. Vail is involved in a \$1 million project to develop an air quality

curriculum for the state of Michigan, which is funded by the Clean Michigan Initiative. Dr. Vail is also highly engaged in science instruction at GVSU, having taught 3 specialized courses to students interested in education, along with a lab module on the Great Lakes for the General Biology course.

The E&O program is very active and well integrated into the overall objectives of AWRI. Examples of particularly important regional activities organized and sponsored by this program from 2005-2007 include the “Lake Michigan: State of the Lake” conferences in 2005 and 2007, “Making Lake Michigan Great” summer cruises, and the GLOBE and WET programs for teacher training. The program is well integrated into local, regional, and state environmental activities that focus on water, especially Lake Michigan, and now on air. Dr. Vail is also highly involved in professional service at the community, regional, and state levels, with clear benefits to AWRI and GVSU.

A particularly impressive aspect of the program is the K-12 educational program for school children in the tri-city area, which is conducted in the AWRI classrooms and onboard the AWRI vessels. The classroom and vessel instruction combines modern technology with hands-on experimentation and exploration. Over the 2-year period of 2005-2007, over 12,000 people participated in the vessel program including 2500 grade-school students in the tri-city area. An additional 1000 students and 100 teachers participated in other O&E activities. Recent innovative developments include the use of ROVs operated from the vessels. Many of these activities are subsidized by AWRI endowments to make them accessible to most participants. All reports suggest that the vessel educational program is extremely effective at reaching the local population and clearly builds good will and support within the local community. This is a very important activity because the local community is highly invested in the Lake Michigan Center, and should continue to be a strong advocate for AWRI with continued engagement.

Dr. Janet Vail is the only full time staff member dedicated to Education and Outreach. She effectively manages the many projects and activities conducted by this very important arm of AWRI, and makes considerable efforts to remain current by attending relevant meetings and workshops. Overall, the Education and Outreach program appears to be very well run and represents an excellent means of nurturing strong ties to the local community as well as with regional and state governing bodies. More integration of AWRI research findings with the on-board curriculum and other outreach is encouraged.

### **Graduate Program**

The SAB made the following observations and recommendations on the Graduate Program.

- The Graduate Program is absolutely critical to the success of AWRI as a research and educational facility
- Library access limitations at AWRI are no longer a problem (solved since last board)



- Graduate students do not have designated offices due to space limitations at AWRI
- Increased # of assistantships would allow more focus on thesis research
- Funding continues to be a challenge, such as for travel and supplies
- GVSU teaching assistantships are competitive and require a split life
- Vehicles at AWRI for fieldwork are very limited

Overall, GVSU graduate classes are often cancelled because of under-enrollment. The SAB suggests that the AWRI faculty “take over” the graduate course program to ensure that courses are full and that students can take all needed courses. The AWRI faculty could devise a two-year course schedule taught by AWRI faculty and require their students to take some or all of these courses supplemented with other course offerings to meet university requirements or student needs.

### **Faculty Tenure**

The resolution of AWRI faculty tenure (or renewable 5-year contracts) is a top priority. The salary issue was raised but subsequent reviews by the SAB revealed that faculty salary is on a par with equivalent academic institutions. The SAB also recommends the development of a sabbatical policy for faculty.

### **Facilities**

The fleet captain, Mr. Tony Fiore, and the captains, crew, and instructors of the W.G. Jackson and D.J. Angus vessels are highly professional individuals who effectively serve both the educational and research missions of AWRI with their maintenance and oversight of the fleet and other facilities. In the past two years, Mr. Fiore directed the construction of a new moorage for the Angus in Grand Haven. He also oversaw an impressive renovation of the “wet” laboratory building located at the Lake Michigan Center, which was accomplished on time and within budget. As mentioned in the assessment of the Education and Outreach program, the vessels serve 1000s of individuals annually on local and lake-wide cruises. Overall, the AWRI vessels and facilities are extremely well managed for the multiple purposes of education, outreach, and research. A five-year facilities plan should be developed as recommended in our last review.

### **Overall Scientific Direction**

The overall scientific direction is good and the continued growth of the collaboration amongst AWRI scientists and with external Great Lakes partners should continue to be promoted. The loss of Dr. Uzarski and his expertise will have a great impact on AWRI given the integrative nature of his discipline. This position should be replaced as soon as possible. During the last review, the SAB stated that “we believe that the AWRI research program has reached sufficient maturity to set its own goals by identifying priority

scientific issues that could be addressed using the breadth of expertise at the lab as a focal point, combined with regional and national collaboration. This steered research direction could be done through the vetted development of a five-year science strategic plan that would focus the efforts of the group towards cross-disciplinary issues and targeted funding (rather than opportunistic funding). Increased collaborative efforts across the scientific staff at AWRI will help promote individual scientific productivity and lead to further integration of the research science programs with the Information Services Center and Education and Outreach Programs.” The SAB still recommends that this action be taken.

### **SAB Review Process**

We repeat our request from the last SAB review that “more time should be available for one-on-one meetings with primary research staff. As an alternative, it may be desirable for two or three SAB members to meet with individual investigators.”