

Feel the DREAMS Spirit

A look at a unique partnership program to promote geosciences
among underrepresented minority students

Dr. Deidre Gibson

Hampton University

deidre.gibson@hamptonu.edu

Dr. Maurice Crawford

Elizabeth City State University

mcrawford@mail.ecsu.edu

Dr. Kam Tang

Virginia Institute of Marine
Science

kamtang@vims.edu



DREAMS is the acronym for Diversity in Research in Environmental And Marine Sciences, but the word DREAMS also reflects what we strive to achieve with this program: To promote geosciences among underrepresented minority students through education and research. In 2003 Dr. Gibson and Dr. Tang created the first DREAMS program with funding from the National Science Foundation UMEB program. Over the next five years the program supported 18 talented undergraduate students, and garnered eleven prestigious student awards in science conferences. The program was widely recognized for its innovation and success in increasing the participation of underrepresented minority students in environmental and marine sciences. Many of the former DREAMS students have gone on to graduate/professional schools or employment in the research/education sectors. In 2008 Dr. Crawford joined the other two to launch the second DREAMS program with new funding from the NSF GeoEd program. With experience and determination, we will make the program even better!

To learn more about the DREAMS program, please visit our website:

<http://sites.google.com/site/vimsdreams/>

Coastal Environmental Challenges in the 21st Century

The new DREAMS program focuses on the theme “Coastal environmental challenges in the 21st century”. Although coastal counties account for less than 20% of the land in continental US, they are home to over 50% of the total population. In Virginia the coastal population increased by 48% during 1980-2003; some of the coastal counties in North and South Carolinas have 10-17% projected population growth by 2008. Rapid population growth is creating enormous pressure on the social infrastructure, natural resources, environmental quality, public health and security in these coastal areas. The coastal populations are also at increasing risk due to global climate change that leads to rising sea level and a likely increase in frequency and strength of storms and hurricanes. A hard lesson we have learned from Hurricane Katrina is that coastal disasters often affect disproportionately ethnic minorities from low-income families. To ensure proper understanding and management of our precious coastal resources, we need to provide the new generations of coastal residents with the knowledge that will empower them to address environmental issues that deeply concern them.

DREAMS activities at a glance

Seminar series. We successfully concluded the 2008 Fall semester DREAMS seminar series. Five invited speakers and nine Hampton University students presented a wide range of topics. Responses from the student audience were very positive (see table below), and we look forward to continuing the seminar series in the near future.

DREAMS seminar evaluation results (2008)

Date	Speaker	Abbreviated title	Attendance	Average score						Seminar average
				Q1	Q2	Q3	Q4	Q5	Q6	
22-Sep	CCPC	College is a different world: making the right adjustments	34	3.14	2.7	3.75	4	4.2	4.4	3.70
29-Sep	Robyn Day	Iron cycling at the sediment-water interface	20	4.13	3.38	3.06	3.81	3.56	3.94	3.65
6-Oct	Jim Yoder	Careers and educational opportunities in ocean science	23	4.29	3.5	3.57	4.21	3.86	4.43	3.98
13-Oct	Carissa Wilkerson; Brittany King	COSEE coastal trends; Fecal indicator bacteria	22	4.67	4.67	4.07	4.13	4.4	4.6	4.42
20-Oct	Kam Tang	Studying a unique phytoplankton species in Antarctica	26	4.77	4.38	4.15	4.15	4.08	4.46	4.33
27-Oct	Brent McKee	Marine sciences at UNC-CH: from the equator to the poles	30	4.27	4.18	3.64	3.64	4	4.36	4.02
3-Nov	Courtney McGeachy; Diara Townes	Algae vs. corals; Aquacultures	24	4.5	4.08	4.14	3.57	3.93	4.5	4.12
10-Nov	Ashley Smith; John London	Zebrafish embryos; Metacaspase induction	26	4.15	3.31	3.62	3.85	3.69	4.31	3.82
17-Nov	Chris Burrell	Seasonal hypoxia in Chesapeake Bay	40	4.67	4.67	4.56	4.56	4.56	4.67	4.62
24-Nov	Kelly Kershaw	Habitate influences on Littorina irrorata	23	4.8	4.2	4.2	4.33	4.5	4.6	4.44
1-Dec	Stacey Etheridge	Paralytic shellfish poisoning in the US	21	4.2	4	3.7	3.7	3.7	4	3.88
Notes:			Semester average	4.33	3.92	3.86	4.00	4.04	4.39	4.09

Student presenters are highlighted in red.

Score scale: 1 = strongly disagree; 5 = strongly agree

Average scores are calculated based on returned questionnaires.

Q1. The seminar broadens my understanding of marine science.

Q2. The seminar helps me understand the environmental challenge facing the coastal zones.

Q3. I want to learn more about the topic after the seminar.

Q4. I feel motivated by the seminar to do research.

Q5. I enjoy interacting with the speaker.

Q6. I want to see more seminars in the future.

Computer skills workshop. The computer skills workshop was successfully held at ECSU on February 21, 2009 (Saturday) from 10 a.m. to 4 p.m. in the Jenkins Science Center. Our goal was to teach several basic computer skills to DREAMS students so that they could function more proficiently in a PC environment. During the workshop DREAMS students were introduced to PCs and taught the basics of

desktop management, Microsoft Word, PowerPoint, Excel, and completing online applications. It was also the first time students from HU and ECSU met each other.



To evaluate how well we met the workshop goals, we conducted a pre and post workshop assessment of the students' PC skills. Between the pre and post workshop assessments the mean grade improved from 74% on the pre-assessment test to 83% on the post-assessment test (paired $t(7) = 3.28, p = 0.0136$). In addition, the students evaluated the workshop by giving a score of 1 to 5 to a list of questions:

Average score of students' responses to the following questions	
The workshop improved my computer and Microsoft Office skills.	4.8
The workshop improved my understanding of computer best practices	4.8
I am more knowledgeable on using formulas in Excel and using Excel for simple calculations.	4.6
I enjoyed interacting with the other students	4.9
I enjoyed interacting with the instructors.	5.0
Overall the workshop was a positive experience.	5.0

Instrumentation workshop. The workshop was conducted at VIMS on April 4, 2009 (Saturday) between 9 a.m. and 6:30 p.m. This workshop introduced to DREAMS students some of the commonly used instruments in geosciences: YSI data sonde, Secchi disk, Li-Cor light meters, hand refractometer, compound microscope, dissecting microscope, inverted microscope, balance, pipettes and pipettors, and spectrophotometers. Students learned about the basic working principles, proper use and maintenance, and had hands-on practice with the instruments.



According to our pre- and post-workshop assessments, the workshop has significantly improved the students' knowledge of instrumentation (Paired t-test; $t = -11.849; df = 7; p = <0.001$). Students also evaluated the workshop by giving a score of 1 (strongly disagree) to 5 (strongly agree) to a list of questions:

The workshop improves my skills in using and caring th specific instruments.	AVERAGE	5
The workshop improves my understanding of proper use of instruments in general.		4.75
I feel motivated by the workshop to do research.		5
I enjoy interacting with the other student participants.		5
I enjoy interacting with the in structors.		5
This workshop overall is a positive experience.		5
I want to attend more instrumentation workshops in the future.		5
	AVERAGE	4.96

Geoscience summer camp. The Geoscience Sumer Camp took place at the VIMS Eastern Shore Lab in Wachapreague, Virginia between May 8 and 12, 2009. This camp provided a combination of in-door and out-door activities, including lectures and discussions, boat trip, sample collection, hands-on research, student presentations, excursion and fun activities. Students also produced a documentary of the camp, and created DREAMS action plans for the coming year.

Day One: Dr. Crawford used the surrounding as his natural classroom and lectured on “Coastal ecology and current challenges”. Later on Dr. Gibson continued the theme with "Lessons from Hurricane Katrina". Every day the students shared kitchen duties, including cooking and cleaning.



Day Two: In the morning Dr. Tang talked about “Why diversity matters in marine science”. Afterward, ESL director Dr. Luckenbach took us onto a boat trip to visit barrier island, oyster reef, mud flat and tidal creek. We observed and collected different organisms, and studied the physical and geological environments. The students were getting dirty and muddy under the blazing sun, but the hot weather did not diminish their adventurous spirits!



Day Three: The students conducted a research project to compare the filtration rate of oysters versus mussels, two major groups of filter feeders in the Chesapeake Bay. They also examined the different planktonic organisms that they collected in the previous day. In the evening, they attended a round-table discussion where DREAMS directors shared stories of their academic journey as underrepresented minority scientists, and tips on how students should prepare themselves for future challenges.



Day Four: We went on a field trip to the Chincoteague National Wildlife Refuge. The refuge is well known for its interactive education center, diverse habitats and wildlife, and the famous Chincoteague ponies. In the evening we had a barbecue to celebrate the many days of hard work and great fun!



Day Five: Our summer camp finally came to an end. The students spent the morning cleaning up the dormitory, kitchen and lab, and filling out a questionnaire. Everyone was a bit tired and eager to go home, but we'll always treasure the time we had in Wachapreague!

Below are the average scores (on a scale of 1-5) of student evaluation of the summer camp:

- Q1. Lecture "Coastal ecology and current challenges" (4.88)
- Q2. Lecture "Lessons from Hurricane Katrina" (5.00)
- Q3. Lecture "Why diversity matters in marine science" (5.00)
- Q4. Discussion "The leaky pipeline--- student diversity in marine science" (4.88)
- Q5. Boat trip to various coastal habitats (4.75)
- Q6. Research project (4.88)
- Q7. Action plan work groups (4.88)
- Q8. I am eager to carry out the action plans as discussed (4.75)
- Q9. I enjoy making the documentary of the camp (5.00)
- Q10. I enjoy working with the other DREAMS students (4.88)
- Q11. Location of the summer camp (3.75)
- Q12. Variety of camp activities (4.13)
- Q13. Duration of the camp (3.13)
- Q14. ESL staff's performance (4.63)
- Q15. DREAMS directors' performance (4.50)
- Q16. Your overall experience (5.00)

Average score for the entire questionnaire = 4.63



Summer research internships. One of the important goals of the new DREAMS program is to provide our student scholars with the tools to be successful in internships and graduate school. Internships are usually geared toward rising juniors and seniors. However this summer, four of our rising sophomore DREAMS students will participate in research internships. One student from ECSU will participate in the NSF funded REU program at the Duke Marine Lab. All of HU students will participate in internships at the following locations: University of Maryland Eastern shore's REU program, NOAA NE National Marine Fisheries Service internship program, and University of Miami/RSMAS. These students will bring their new knowledge and experience back to the campuses after the summer, and help improve the program!

Looking ahead

While the students are enjoying their summer break, the DREAMS directors are already hard at work to prepare for the coming year. Here is a preview of some of the upcoming activities:

Action plans. During the geoscience camp DREAMS students used their boundless energy and creativity to produce two action plans:

1) Creative ways to engage K-12 students and parents in marine science

2) Creative ways to promote DREAMS on and off campus

These plans will become the blue-print for DREAMS activities in the coming year. DREAMS students will carry out the specific action items, help the program grow and make real impacts on geoscience education!

K-12 outreach. DREAMS students will actively reach out to the local communities and promote geosciences education among K-12 students and parents. They will partner with local schools to bring

their knowledge and enthusiasm into the K-12 classrooms. They will also organize GeoTrek--- a special geosciences field trip for grade school students and their parents.

Campus tours. Special campus tours will bring pre-college students and parents to the HU and ECSU campuses, showcase the success of the DREAMS program and the excitement and career opportunities in geoscience disciplines.

Workshops and seminars. We will continue to offer workshops and seminars to further the education of our DREAMS students, and help them prepare for graduate schools.

Dream on til our DREAMS come true

DREAMS' success thus far reaffirms our belief that we should and we can increase student diversity in geosciences. Much has been accomplished, and much more still needs to be done. Looking back at the students' achievements, their pride, their upbeat and positive attitude, their growing love of science and the DREAMS program makes all of our hardwork and personal sacrifices worthwhile. While we are anxious of future challenges, we are even more excited about the possibilities that lie ahead!

The Dreamers



Dr. Kam Tang --- After receiving his B.Sc. and M.Sc. degrees in Biology from the Chinese University of Hong Kong, Kam ventured to the University of Connecticut for his doctoral degree in Oceanography. After having cheered for the Huskies basketball teams (both men and women) for years he took up a postdoctoral fellow position in Denmark, where he learned to make (and eat) "open sandwich" with pickled herring. In 2002 he said goodbye to the Little Mermaid and moved to VIMS, where he has been a faculty member since. His research is on plankton and microbial ecology, and his work has taken him to places such as Brazil, Turkey, China, Denmark, Sweden, Germany, Greenland and Antarctica. The picture here is Kam enjoying a cup of latte at the U.S. McMurdo Station in Antarctica.

Dr. Maurice Crawford --- Maurice holds a B.S. in Biology from the University of Massachusetts at Dartmouth. He began his career as a Fishery Biologist studying the age and growth of fishes with the National Oceanic and Atmospheric Administration (NOAA) in Woods Hole, MA. He received his M.S. in Ecology from Rutgers University, where he studied the population genetics of weakfish and later investigated stream fish assemblages at the University of Georgia. Maurice received his Ph.D. from North Carolina State University, and was awarded a post-doctoral fellowship with the American Association for the Advancement of Science (AAAS), where he assisted the Agency for International Development (AID) on their Climate Change Initiative. He returned to NOAA in 1999, where he worked with the National Centers for Coastal Ocean Science and later with the National Estuarine Research Reserves. He left NOAA in 2005 and traveled for seven months visiting the countries of Mexico, Guatemala, Belize, Peru, Bolivia and Chile. Afterwards he worked with Conservation International's Marine Management Area Science Program. He is an Assistant Professor in the Biology Department at Elizabeth City State University. His research interests include estuarine habitat conservation/restoration; impacts of land use on coastal systems; the dispersal and movement of organisms; and the interplay between science and policy.



Dr. Deidre Gibson --- Deidre left the Gumbo in New Orleans to obtain an A.A.S in Marine Science and Oceanography Technology from Shoreline C.C. in Seattle, WA. She then transferred to the University of Washington to receive a B.S. in Oceanography. Seattle was a different world from New Orleans, but she learned to love backpacking, cycling and snow. She moved back to Louisiana and the crawfish, and worked as a Research Technician at the Louisiana University Marine Consortium (LUMCON), studying the effects of nutrient enhancement, from the Mississippi River, on the zooplankton community in the Gulf of Mexico. During her tenure there, she also worked as a NMFS observer in the Bering Sea, AK. That was exciting! She later decided to pursue a PhD from the University of Georgia/Skidaway Institute of Oceanography, studying doliolids. Deidre graduated in 2000 and completed two post-doc positions at Savannah State University and the University of Connecticut-Groton. During a WHOI/UConn Salp cruise, she was featured on the Science of the Deep-Midwater Mysteries documentary. She is now an Assistant Professor in the Marine and Environmental Science and Biology Departments at Hampton University in Virginia. There she has worked hard to provide programs for underrepresented students to increase the diversity in the Marine Science field. Her research interests include gelatinous zooplankton ecology, and microbial and hypoxic effects on the zooplankton foodweb.

This material is based upon work supported by the National Science Foundation under Grant No. GEO-0806806, 0806533 and 0806561. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.