# Progress on Climate Change Education Activity at Delaware State University

**By Dr. Gulnihal Ozbay**

Following activities summarized in this document were as results of series workshop, research and outreach faculty preparation efforts via workshops of NASA NICE, AMS Diversity Project, and University Strategic Planning. I provided some details on the selected grant activity, presentation, workshop or publication and classroom activities.

**Number of Grants Activity**

"CCEP-II: MADE-CLEAR- Maryland - Delaware Climate Change Education, Assessment, and Research." NSF Grant. Amount: $300,000 in 5 million dollar award. Period: 08/01/2012-07/30/2017. DSU Institutional PI. Lead Institution: University of Maryland College Park.

"Chesapeake Bay Climate Study Partnership for Sustainable Agriculture." USDA-NIFA CBG Grant. Amount: $299,714. Period: 09/01/2013-08/31/2015. DSU Institutional PI. Lead Institution: Virginia State University.

"Phragmites Impact Assessments on Blue Crab (*Callinectes sapidus*) in the Blackbird Creek Reserve, Delaware. DuPont C. Clear into the Future Environmental Stewardship Grant. Amount: $35,000. Period: 06/01/2013 – 05/30/2014. PI.

"Climate Change and Adaptation: Curricula Design, Student and Faculty Development through International Experience in Australia, And Precollege. USDA-NIFA CBG Grant Program. Amount: $299,998. Award Period: 09/01/2011-08/30/2014. DSU Institutional PI. Lead Institution: Virginia State University.

**About NSF MADE-CLEAR Program**

Dr. Ozbay received funding from the NSF funded MADE-CLEAR Program CCEP-II: MADE-CLEAR-Maryland - Delaware Climate Change Education, Assessment, and Research." NSF Grant. Amount: $300,000 in 5 million dollar award. Period: 08/01/2012- 07/30/2017. She has leveraged this funding to expand the climate change education among the faculty members teaching science and general education courses in DSU campus. One of the goals in this program is to reach out as many faculty and students and teach fundamental topics and issues in climate change and better prepare them in their responses to climate change issues. Following are the websites to this program and my website information regarding this climate education grant:
http://www.madeclear.org/
http://www.madeclear.org/about/staff/gulnihal-ozbay/

**Courses taught**

Following courses were offered by Dr. Ozbay:
(30-302-03) Climatology
(30-103-01) Introduction to Environmental Science
(29-350-03) Special Problems (Water Quality and Climate Change)
(29-560-60) Research Problems (Aquatic Ecology & Biodiversity)

Climatology course is offered first time in spring 2013 officially but non-traditionally as part of Special Problems class to the students in the fall of 2012. Total of 10 students participated in the Climatology and Climate Studies and Response Science courses. Introduction to Environmental Sciences has a strong Climate Change and Sustainability components and total of 12 students participated in this class in spring 2013. Dr. Bill McIntosh also covered Climate Change Literacy in his Science Education Classes.

I included NASA NICE Program workshop tools and materials in my Introduction to Environmental Science class (103-01) for both major and non-major students. This class has 2 credits class and 2 credits lab components and has been offered every spring. Also, as part of the three funded grant activities (two USDA-NIFA grants and one NSF MADE CLEAR Program Grant), the new course "Climatology (302-03)" was developed and first time offered to the students in fall 2012 and spring 2013. During the fall 2012, existing Microclimatology course was proposed to be changed as "Climatology course" and students interested in this class was given opportunity to register under "Special Problems course (350-03)". This course is offered as a 3 credit; 2 credits class and 2 credits lab component. Materials and tools I learned from NASA NICE Workshop and AMS Workshop I attended during May 2012 in Washington DC have been used to plan and teach both courses to both major and non-major students in Delaware State University.

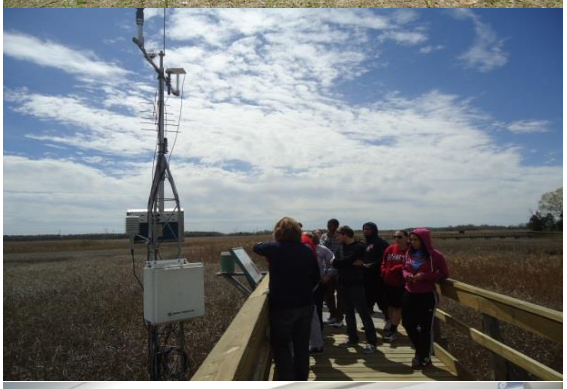
Both courses have lab sections where students are provided opportunity to do hands-on practices and also available online tools (i.e. NASA, AMS, NOAA websites and http://studentclimatedata.unh.edu/) give them a flexibility to work as a group or independently on the topics important in the climate studies. Three students in the Natural Resources Program will be given opportunity to receive hands-on training in Climate Studies Research in the University of Alaska at Fairbanks as part of the funded grant activities.

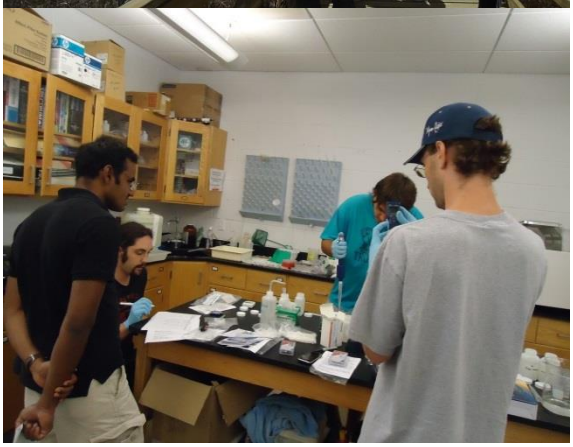
Following topics extensively discussed and become part of the student term paper projects or debate topics for all classes climate change is integrated: greenhouse gas emissions and fossil fuel uses, human population and stress the population put on our Earth, renewable energy and recycling. More specifically, coastal erosion, sea level rise and habitat lost which serve the foundation of most field trips and outdoor classes (***see the pictures below***). Considering two third of Delaware being the wetlands, impacts of sea level rise was specifically addressed due to its detrimental effects on the coastal habitat and outdoor experience enhanced students' understanding on this subject matter. I used the teaching methods Dr. Tim Moore applied during the workshop: concept map, poster with boxes and circles and each has some sort of connection with one another including ocean physical conditions, gases, human, by products, dead zone….etc. Also, the handouts with temperature and chlorophyll maps for each month in a year for the specified region with clues on species more abundance for the specific month and the temperature profile by depth for each month were excellent learning tools and successfully applied during the lab components of both classes. I also used the North Atlantic Phytoplankton Bloom Module to see the changes in the chlorophyll profiles for the Gulf of Mexico and compared to pre and post BP Deep Water Horizon Oil Spill in the Gulf (this experience later lead the presentation by Dr. Dorsey and I at the international conference, ***see the presentation section***). Currents and overall productivity in the ocean have been part of student exercises and discussed during class and teaching module presented by Dr. Moore used during the class activities. Ocean pH exercise was demonstrated in both estuarine and freshwater environment which is either highly disturbed by the anthropogenic activity or in pristine condition. I frequently used the modules and programs in the website http://studentclimate data.unh.edu. I taught my students Climate Change Data, Tree Atlas Tool Procedure, the Greenness Index, and

Biome Climate Investigation. I plan of integrating more on the changes in Seasonal NDVI and the GLOBE Carbon Cycle.

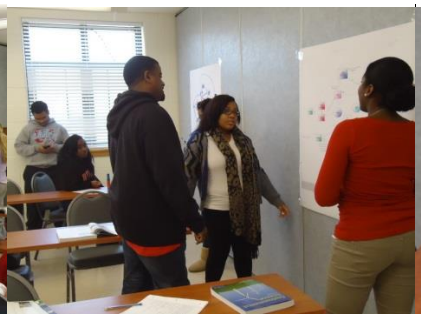
**Pictures below are the outdoor classroom activities for the Introduction to Environmental Science and Climatology classes on water quality measurements, species biodiversity, specifically for understanding the effects of pH on the aquatic species, greenness index by looking at seasonal changes in the habitat by the lake, visiting a DNREC Coastal Program Weather Station & lecture by the state official on the weather data and marsh habitat quality index, a team of two students presenting their term project at the end of the semester on the climate related topics, Dr. Ozbay showing students how to collect soil and plant samples for testing and how the disturbed ecosystem restoring. Ag Discovery Summer Program High School Students' visit to the coastal Delaware in Lewes, Delaware. Climate change and sea level rise issues were discussed with the students during their visit to the coast and students had opportunity to collect aquatic species and how we understand which habitat is healthier (habitat with more species – high biodiversity).**








**Presentations**

Ozbay G., Cannon A., Lalor P., Sriharan S., Fan C. and Warwick R. 2013. Student case study on climate change response and adaptation: Fictional Aysese Islands in the South Pacific. **2nd International Conference on Earth Science and Climate Change.** Embassy Suites, Las Vegas, NV USA. July 22-24, 2013.

Sriharan S., Ozbay G. and Fan C. 2013. Studies on Climate Change and Adaptation at Virginia State University, Delaware State University, and Morgan State University: Curriculum Development and International Experience. **American Meteorological Society, 22nd Symposium on Education.** Austin, TX USA. January 5-10, 2013.

Bielicki K. and Ozbay G. 2013. Why do we care? Native Americans and the keystone pipeline XL. **2nd International Conference on Earth Science and Climate Change.** Embassy Suites, Las Vegas, NV USA. July 22-24, 2013.

**Dorsey** E.C., **Ozbay** G. and Tchounwon P.B. 2012. The Effects of Crude Oil and Dispersant Toxicity on Marine Phytoplankton Productivity in the Gulf of Mexico. **9th International Symposium on Recent Advances in Environmental Health.** Marriott Hotel Jackson, MS USA. September 16-19, 2012.

**This presentation was prepared as a result of the training activities offered during the NASA-NICE workshop both authors met (Drs. Dorsey and Ozbay). There were various teaching modules such as the North Atlantic Phytoplankton Bloom Module**

**that allowed us to see the changes in the chlorophyll profiles for the Gulf of Mexico and compare pre- and post-BP Deep Water Horizon Oil Spill in the Gulf during this workshop used to prepare this presentation. Dr. Dorsey presented on behalf of all authors.**

Ozbay G. 2012. Theory to practice: Disseminating climate change sciences. **International Conference on Earth Science and Climate Change.** Hilton Chicago, Northbrook IL USA. August 21-22, 2012.

Ozbay G. and Reckenbeil B. 2012. Efforts to mitigate climate change repercussions on oyster populations and natural oyster recruitment in Delaware Inland Bays. **International Conference on Earth Science and Climate Change.** Hilton Chicago, Northbrook IL USA. August 21-22, 2012.

Ozbay G., Cannon A. and Hannum K. 2012. Aquatic health near wastewater discharge in Delaware Inland Bays tidal canal: Monitoring chemical and microbiological contaminants. **International Conference on Earth Science and Climate Change.** Hilton Chicago, Northbrook IL USA. August 21-22, 2012.

Reckenbeil, B. and G. Ozbay. August 2, 2013. Delaware Oysters: Potential to Purify Provide and Protect. **Remote Sensing & GIS Workshop,** University of Alaska, Fairbanks, AK, USA.

Reckenbeil, B. and G. Ozbay. July 25, 2013. Assessment of Oyster Gardening Research Activities in the Delaware Inland Bays. **2013 Delaware Oyster Gardening Workshop**, Lewes, DE, USA.

Reckenbeil, B. and G. Ozbay. October 13, 2012. A novel oyster mitigation technique to utilize shoreline riprap as a location for stocking: A study assessing oyster survival. **Atlantic Estuarine Research Society Fall Meeting** 2012, Chincoteague, VA, USA.

Reckenbeil, B. and G. Ozbay. March 27, 2012. Investigating Biological Diversity from Stocking Riprap with Oysters (Crassostrea virginica) in Jefferson Creek, South Bethany, Delaware. **National Shellfish Association 104th Annual Meeting,** Seattle, WA, USA.

Ozbay G., Cannon A. and Hannum K. 2013. Point Source Discharge Effects on Aquatic Health in Delaware Tidal Canal: Chemical and Microbiological Contaminants. **AWRA Conference**, Hartford, CT, USA. June 23-25, 2013.

Foster K, Starkenburg D, Ozbay G and Prakash A. 2013. Biological Impacts of Global Atmospheric Circulation and Water Availability. **Undergraduate Summer Internship Presentation Day,** August 16, 2013. University Alaska Fairbanks, AK USA.

Ferguson A, Waigi C, Ozbay G and Prakash A. 2013. Re-investigating the Rex Creek Fire in Interior Alaska. **Undergraduate Summer Internship Presentation Day**, August 16, 2013. University Alaska Fairbanks, AK USA.

Kluge A, Chittambakkam A, Ozbay G and Prakash A. 2013. Geothermal Exploration in the State of Alaska using Remote Sensing and GIS. **Undergraduate Summer Internship Presentation Day,** August 16, 2013. University Alaska Fairbanks, AK USA.

Cook S, Balazs M, Sriharan S, Ozbay G and Prakash A. 2013. Land Cover Classification of Selected Fjords in South-Central Alaska. **Undergraduate Summer Internship Presentation Day,** August 16, 2013. University Alaska Fairbanks, AK USA.

Stilson K, Waigi C, SanJuan F, Ozbay G and Prakash A. 2013. Investigating an Oil Shale Fire with Remote Sensing and GIS. **Undergraduate Summer Internship Presentation Day**, August 16, 2013. University Alaska Fairbanks, AK USA.

Jones E, Balazs M and Prakash A. 2013. Comparative Geomorphology of Creeks in Seward, Alaska, using Remote Sensing and GIS. **Undergraduate Summer Internship Presentation Day**, August 16, 2013. University Alaska Fairbanks, AK USA.


**Undergraduate student, Katie Bielicki is attending 2nd International Conference on Earth Science and Climate Change. Embassy Suites, Las Vegas, NV USA. July 22-24, 2013.**

**A Group of DSU Students at the Atlantic Estuarine Research Society Fall 2012 Meeting**

From October 11-13, 2012 graduate students Kristopher Roeske, Andrea Stoneman, Hillary Dean, Cory Janiak, and Brian Reckenbeil and undergraduate students Akida Ferguson, Andrew Kluge, Pam Forte, and Amy Cannon from the Aquatic Sciences lab were in attendance at the Atlantic Estuarine Research Society (AERS) meeting "Ecosystem Sustainability & Resilience: From Genetics to Populations, Habitats & Function" in Chincoteague, Virginia. In addition, Lab Technician Mr. Raju Khatiwada and Post-Doctoral Researcher Dr. Karuna Chintepenta were in attendance from the Aquatic Sciences lab. AERS is a regional section of a larger group, called The Coastal and Estuarine Research Federation (CERF). CERF is currently involved in helping the federal government make informed decisions regarding our coastal areas, their management and their protection.

Mr. Raju Khatiwada and all students presented both oral and poster presentations on a variety of topics ranging from oyster mitigation techniques to the impact of *Phragmites spp.* on the blue crab population of Blackbird Creek. During the conference students were not only provided with a venue to present their research to interested peers and mentors but were given the opportunity to hear valuable feedback and criticism that proved extremely beneficial to the students and their research. In addition to presenting students also heard talks on current estuarine and coastal environmental issues and policies which allowed them to learn about current work being done at other institutions including NASA. The AERS conference was a valuable resource for students to grow as presenters and scientists. Students were also given an

opportunity to apply for travel awards; awardees were Hillary Dean, Kristopher Roeske, Brian Reckenbeil, and Amy Cannon.


**Undergraduate and graduate students and staff members are attending the Atlantic Estuarine Research Society Fall 2012 Meeting, in Chincoteague, VA. October 11-13, 2012.**

**1st Climate Change Student Forum, Delaware State University in Spring 2013.**

On January 31, 2013, Delaware State University hosted its 1st Climate Change Student Forum which provided opportunities for the students involved in climate change and sustainability research to present their research as posters. There were over 100 students and 20 faculty members participated in this forum. Twenty five student poster presentations were displayed during the symposium. The keynote speaker of this symposium was Dr. John Byrne, Distinguished Professor of Energy and Climate Policy from the University of Delaware Center for Energy and Environmental Policy. Dr. Byrne is a 2007 Nobel Peace Price recipient and has been an active contributor to IPCC Reports and Assessment. Along with other 7 speakers, Dr. Ozbay gave a presentation on how effective we are communicating climate change to the students and public? Students from four classes (Introduction to Environmental Sciences, Climate Studies, Global Seminar and Science Education) participated in this forum and had opportunities to ask questions of the speaker and discussed the issues of their interests. Eight students from Dr. Ozaby's research group presented their research projects during this forum.

**Few pictures from this forum are presented below:**

**Undergraduate Students from Dr. Ozbay's Lab Group Attending 70th Joint Annual Meeting of the BKX and NIS "Bridging the Gap in Stem Research from Conception to Application" in Hyatt Regency Reston Hotel, Reston, VA on March 13-17, 2013.**

Total of 5 students participated from Dr. Ozbay's Lab (Eunice Handy, Akida Ferguson, Kelly Pelz-Butler, Keith Gauff and Andrew Kluge). All five students presented their research on the posters and their research projects were conducted affiliated with their classroom activities for

Introduction to Environmental Science and Climatology classes. Topics selected for the student projects addressed local climate related issues.

**Few pictures from this meeting are presented below:**

**Publications (Students & Dr. Ozbay)**

Ferguson AJ, Khatiwada R and Ozbay G. 2013. The Effect of a Small Ruminant Farm Operation and Sustainable Farm Practices: Soil Quality and Run-off at the University Hickory Hill Farm, Delaware. Professional Agricultural Workers Journal. *Accepted.*

Ozbay G, Foster K, Taylor S, Chintapenta LK and Fleming B. 2013. Overview on Sustainable Animal Farming in Relationship to Climate Change in Delmarva. Journal of Earth Science and Climatic Change. 5-1:1-8. http://dx.doi.org/10.4172/2157-7617.1000175.

Ozbay G, Reckenbeil B, Marenghi F, Erbland P. 2013. Can't Go Wrong with Eastern Oysters (Crassostrea virginica): Restoring the Delaware Inland Bays' Biodiversity. Journal of Biodiversity and Endangered Species. 1:109. doi:10.4172/jbes.1000109.

Ozbay G. and Cannon, A. 2012. The State of Delaware Facing Significant Impacts due to Wetland Loss Resulting from Sea Level Rise: A Microcosm of the Macrocosm. Journal of Earth Science and Climatic Change. 3-1. Doi:10.4172/2157-7617.1000e105.

Cannon A. and Ozbay G. 2012. Gauging social and economic benefits of oyster gardening restoration in Delaware Inland Bays USA. YSI Newsletter. YSI Multiparameter Handheld, DE. Application Note A604.

Stampul P.M. and Ozbay G. 2012. Climate Repercussions in Yuna-Samana Bay Estuary, Sanchez, Dominican Republic: Case Study on Eastern Oyster (*Crassostrea virginica*) Exposure to Different Salinity Regimes. Journal of Earth Science and Climatic Change. DOI:10.4172/2157-7617.S12-003.

**Climatology Class Students' Publication**

Three undergraduate students took Climatology course in spring 2013 submitted review article to the Journal of Earth Science and Climatic Change. Following is the article published in 2013.

Ozbay G, Foster K, Taylor S, Chintapenta LK and Fleming B. 2013. Overview on Sustainable Animal Farming in Relationship to Climate Change in Delmarva. Journal of Earth Science and Climatic Change. 5-1:1-8. http://dx.doi.org/10.4172/2157-7617.1000175.


**Undergraduate students (also co-authors to this publication were presenting their term project on "Overview on Sustainable Animal Farming in Relationship to Climate Change in Delmarva." This article is published in the Journal of Earth Science and Climatic Change.**

**Workshops and Other Activities**

Number of students participating in Earth Day/Arbor Day activities on April 18, 2013 were much higher (twice as much) than previous years (about 500 students).

DSU hosted 1st 2013 DSU Faculty Training & Preparation Workshop in Integration of Climate Studies & Sustainability in Science Education & STEM Courses on August 20, 2013. Total of 25 faculty members, instructors and MADE-CLEAR Program staff participated in this workshop, of this total 18 were the participants and trainees and 7 were the speakers, trainers and evaluators. The workshop was organized in ways to allow participants to get familiar with MADE-CLEAR Program, Climate Science and Response and Sustainability topics and each presentation followed by the discussion and training activities. We had 2 out of state participants; Dr. Chunlei Fan is from Morgan State University and Dr. Shobha Sriharan is from Virginia State University. Participants are faculty members of various disciplines (Education, Biology, Chemistry, Political Sciences, Journalism, Early College High School, Environmental Science, Agriculture, Business and Finance…etc.).

Science Educator Professor, Dr. Anuradha Dujari is successfully integrated climate change and global warming topics in her existing classes, primarily in her Global Seminar Class.

Political Science Professor, Dr. Samuel Hoff has successfully integrated environmental justice and global issues in his classes.

Dr. Daniela Radu and Dr. Cheng-yu Lai have successfully integrated Sustainability in their classes and proposed Sustainable Chemistry class.

Drs. Rebecca Fox-Lykens and Gulnihal Ozbay had discussed with Dr. Judi Coffield potential venue to integrate climate change and sustainability in the existing curricula for the Early College High School education. The planning of this integration is underway and Dr. Fox-Lykens has been working closely with Dr. Coffield on this integration.

Three students who received A+ and A were granted to have a 2 weeks internships at the University of Alaska at Fairbanks after 1 week of intensive training during the workshop in early August. Additional funding from USDA made the internship opportunity for the students. These students attended 1.5 weeks training workshop and 2 weeks follow-up internship training at the University of Fairbanks in Alaska during July 27 through August 17, 2013. These students were Andrew Kluge, Katelyn Foster, Akida Ferguson.

Two graduate students, Andrea Stoneman and Nivette Perez-Perez, currently supervised by Dr. Gulnihal Ozbay have been conducting research project on ocean acidification, atmospheric $CO_2$ and aquatic health.

Drs. Leonard Davis, Gulnihal Ozbay and Rebecca Fox-Lykens attended the Chesapeake Project on May 21-23. Information was gathered and ideas for implementation were discussed during this this two day workshop. The workshop was cosponsored with the Chesapeake Bay Foundation and NOAA Center for Weather and Climate Prediction, College Park, MD. The workshop addressed issues of sustainability, climate change and resilience with presentations from the National Center for Weather Prediction and the Chesapeake Bay Foundation. Core competencies needed for understanding sustainability and climate change were discussed. Ideas for integration of sustainability topics into college coursework were developed by having faculty identify sustainability competencies within their disciplines.

Three faculty members including Dr. Ozbay participated in the Climate Academies hosted by the University of Delaware on July 14-19, 2013. Two faculty participants, Dr. Nirmaljit Rathee and Dr. Sathya Elavarthi have integrated climate change and sustainability topics in their existing courses: Movement Sciences and Sustainable Agriculture. Follow up meetings with both participants are scheduled mid-September and additional assistance will be provided to both faculty members along with the faculty participants attended DSU Faculty Workshop in August.

On January 31, 2013, Delaware State University hosted a Climate Change Student Forum which provided opportunities for the students involved in climate change and sustainability research to present their research as posters. Over 50 students and 20 faculty members participated in this forum. There were eight speakers with one as a keynote speaker, Dr. John Byrne, Distinguished Professor of Energy and Climate Policy from the University of Delaware. Students from four classes (Introduction to Environmental Sciences, Climate Studies, Global Seminar and Science Education) participated in this forum and had opportunities to ask questions of the speaker and discussed the issues of their interests.

Dr. Ozbay attended the Faculty Training Workshop on January 23, 2014 at Towson University, Towson, MD. This workshop provided general overview on climate change and how to teach climate change effectively to the junior faculty in Towson University. Dr. Ozbay attended this workshop to provide her view on how effective teaching and student learning of the climate change can be be if local examples are frequently used to engage the students.

Dr. Ozbay also attended the 14$^{th}$ National Conference and Global Forum on Science, Policy, and the Environment: Building Climate Solution by NCSE on January 28-30, 2014 in Washington DC. This workshop provided detail overview on the solutions to global climate change and effective communication tools. This global meeting provided opportunity to Dr. Ozbay to meet the leading climate scientists, administrators, and policy makers in the globe, especially presentations by IPCC scientists.

The student training in climate change and adaptation teaching efforts further disseminated as part of the teaching grant awarded to VSU-DSU-MSU to enhance students' understanding on the global issues as their participation at the Climate Change Studies Program at the University Of Sunshine Coast (USC), Australia. This was accomplished through the participation of the undergraduate students (6) from VSU, DSU, and MSU in the 3-credit intensive course, "Climate Change and Adaptation Response-ENS 310" course at the University Of Sunshine Coast (USC) during the summer (July 4-21, 2012). The students participated in the 10-day intensive course

taught by Professor Richard Warrick (USC) and worked on simulating extreme case scenarios due to the climate change projections between 1990 and 2100. They were divided into groups and assigned roles of fictional consulting groups that were hired to carry out the assessments for natural resources such as water supply, coastal zone, and tropical cyclones. The students analyzed the data and synthesize a report to help the Ministry of Environment, a fictitious nation, in deciding how to improve the governmental actions for informed decisions in the future. By using SimCLIM and TrainCLIM, they examined the effects of climate variability and change over time and space. This software includes tools for the spatial analysis of climate variability and change and associated impacts on various social economic sectors. Its "open-framework" feature allowed the users to customize the model for their own geographical area and spatial resolution and to attach impact models. The students used this software for current climate variability and extremes; assess risks - present and future; investigate adaptation – present and future; create scenarios of climate and sea-level change; and conduct sensitivity analyses. Students gained international experience through their participation in the academic program on climate change at the University Of Sunshine Coast, Australia.

**Pictures below were taken during students' visits to the various environmental centers in the Sunshine Coast in Australia.**


Three students in the Natural Resources Program were given opportunity to receive hands-on training in Climate Studies Research in the University of Alaska at Fairbanks as part of the funded grant activities. Using GIS and Remote Sensing technology, climate change related issues and adaptation response were discussed with the students during their participation to the Summer Workshop at UAF in 2013 which was a very successful workshop with a number of activities and strong student engagement. The website was developed for this workshop: http://www2.gi.alaska.edu/~prakash/usda_gis_workshop/participants.html. Active recruitment of fellow faculty and staff from other minority institutions and development of the partnerships were the strong outcomes of this workshop. In order to enhance retention of minority undergraduates in GIS and RS courses through their participation in training programs and 2 graduate and 6 undergraduate students in DSU, 3 undergraduate students in VSU and 2 undergraduate student in ECSU have involved in the summer Internship Programs at their respective institutions and federal agencies and later at the UAF for 2 weeks after 1.5 weeks of their training with the additional internship money students received during the summer. Each

student was teamed with a student mentor (either MSc. Or Ph.D. students) during their 2 weeks of internships at UAF during their participation in the GIS workshop hosted at UAF from July 27 through August 17, 2013. Student research projects and their mentors and projects they involved in provided in the publication list sections. Two faculty members, Dr. Valentina David from Bethuna Cookman University and Dr. Shobha Sriharan (Co-PI) from Virginia State University who attended 1.5 weeks workshop at UAF also participated in the faculty internship project during August 5 through 17, 2013. Two graduate students and one undergraduate student in DSU and one undergraduate student in VSU had conducted research in their own institutions and utilized all the resources provided by the previously funded GIS Training Grant. Total of 28 faculty, students and staff members participated during the Remote Sensing and GIS Workshop and Internship during July 27 through August 17, 2013 at UAF. Of this total 6 students were undergraduate students, 4 were graduate students, 3 were post-docs, 11 were faculty members, the rest were professional staff members from various institutions including DSU, VSU, ECSU, MSU, BCU, UAF, DNREC, and the private sectors at UAF.

**Pictures of students with Drs. Ozbay and Dr. Anupma Prakash**

Environmental Sciences Minor Degree is currently is under review by the Department of Agriculture & Natural Resources faculty curriculum members. Dr. Ozbay proposed to integrate Sustainability in this minor and include the Sustainability as part of the minor program title.