

Annual Report 2008-2009 Academic Year

**Center for Earth System Education
(CESE)**

Submitted to...

Chair of the Department of Geology & Meteorology

Dean of the College of Natural, Applied, & Health Sciences



Prepared and submitted by Paul J. Croft

August 1, 2009

Kean University

INTRODUCTION

The 2008-2009 academic year represented the second full year of leadership of the Center for Earth System Education (CESE) by Dr. Paul J. Croft since the first year of transition (2006-2007; see prior annual reports and online archive). Presently CESE programs are closely aligned with Kean University initiatives (e.g., Sustainability Program; Earth Week) and related to the New Jersey Center for Science, Technology, and Mathematics Education (NJCSTME) within the Nathan Weiss Graduate College at Kean University. The CESE mission and program were revised, its website updated, and new activities initiated in order to acquire both internal external grant support and base funding, and community and professional partners. These efforts were intended to build CESE capacity and capabilities to enable and foster new activities each academic year.

CESE MISSION & PURPOSE STATEMENTS

CESE Mission: The mission of the Center for Earth System Education at Kean University is to encourage, support, and promote earth system education at all levels. The earth system, comprised of both natural and human components, constitutes our world and determines the nature of our interactions and mutual impacts every day.

CESE Purpose: To earth scientists, learners, and teachers these components include the land (lithosphere), the water (hydrosphere), and the air (atmosphere). These are all interactive and dependent upon one another and with the biosphere. The biosphere includes plants, animals, and human populations worldwide. All are ultimately governed by the Earth's astronomical behaviors. These components must be understood in terms of their properties, behaviors, processes, and interactions; particularly with people in all settings (e.g., urban, rural, marine, and others). To accomplish this, scientists must observe, diagnose, and model each component of the system so that impacts may be avoided, mitigated or prevented. This suggests that everyone must know about the full geosphere, care about its impacts, and be prepared to act. The best manner to achieve this synthesis is through Earth System Education. Using relevant pedagogy and select teaching methods, as well as careful and targeted use of technology, teachers may help students truly understand the science that affects them everyday.

SUMMARY HIGHLIGHTS 2008-2009

During the 2008-2009 academic year the CESE program included various outreach, research, and developmental activities as well as new initiatives. Critical to these were funding provided by the Kean University Foundation (Faculty Research Award), cooperative and collaborative leveraging with internal and external partners, and the strategic development and cooperative efforts of additional contacts. These are summarized below with further elaboration in the text of this report.

- Outreach: Symposium, Website, & Collaborative (NJESTA, NJCSTME, KU)
- Research: Grants/Projects, white papers, preprint, & publication
- Development: Curricular support, proposals, programs, students, & media
- New Initiatives: Sustainability Program, advocacy, & strategic leveraging

Outreach activities were focused on delivery of the first-ever “WE CARE Symposium” at Kean University (supported through a QFI grant) as well as a variety of invited speakers during the year in cooperation with the Student Chapter of the AMS/NWA (part of Student-Org). These were supported by undergraduate students and various faculty and staff members. In addition the [CESE](#) website and its associated information and products were further enhanced to improve its use as a resource for teachers (i.e. K-12 and college level) and the general public. Coordination with the NJCSTME and Kean University’s “Blue goes Green” Earth Week program led to the delivery of an interdisciplinary student seminar.

Research activities were guided by internal and external funding (e.g., FFRA, UFRI, McNair, SpF, and COMET) and related projects so as to build [CESE](#) capabilities and capacity. These were coordinated in order to deliver additional information, products, and teaching support (or curricular) materials to a broad audience. The research activities also allowed for technical reports and documentation including publication (i.e. a conference preprint and acceptance of a manuscript in a peer reviewed journal) and posting of white papers. The overarching theme of the research projects is operational prediction and planning with regard to a variety of environmental conditions, including urban areas.

Development activities included creation of earth system science curricular guidance documents, and presentation of the new research outreach program for middle and high school students (“CARPE DIEM!”). As part of this effort [CESE](#) has incorporated grant-funded efforts (e.g., LSAMP, McNair, SEED, and other programs) into its operations in order to support research-based outreach and education. In order to enhance these efforts students within the Department of Geology & Meteorology have been involved in the production, development, and dissemination of Keancast products (e.g., Kean University radio, television, and print/online media) with an expansion in progress for webcast, podcast, blogs, and other delivery mechanisms.

New initiatives for [CESE](#) include the recently approved Sustainability Program within the College of Natural, Applied, and Health Sciences; educational advocacy (e.g., NJ Department of Education support letter), and strategic leveraging of resources (i.e. for proposals to various agencies in cooperation with other Kean University units/divisions). All of the above activities have allowed [CESE](#) to become more competitive and to develop its role as a key stakeholder and leader in the region and among the educational communities of New Jersey.

CESE 2008-2009 ACTIVITIES

Outreach activities focused on the delivery of the first-ever “WE CARE Symposium” at Kean University (supported through a QFI grant). The “Weather & Environmental Hazards – The Challenges of Awareness, Research, and Education in NJ (WE CARE about NJ!)” was conceived by [CESE](#) and produced through the New Jersey Center for Science, Technology, & Mathematics Education (NJSTME, NWGC), and the Center for Professional Development. The program was designed to attract external communities, provide outreach to those communities, and strengthen the recognition of Kean

University as a science leader in the state. Significant coordination among the university community was required as well as the efforts of undergraduate students and a graduate assistant who worked for CESE during the academic year.

The symposium addressed weather and environmental hazards, particularly in urban settings in New Jersey, and the challenges faced by stakeholders in terms of community awareness, operational research, and education for the improved understanding, monitoring, assessment, prediction, warning, and mitigation of these for real-time management and decision-making. Over 200 people were involved in the event including Kean University faculty, staff, and students; middle and high school students; professional community members; and volunteers. Artifacts, information, and outcomes related to the symposium remain available online (www.kean.edu/~wecare).

Aside from the symposium CESE also co-sponsored a variety of seminar/guest speakers during the year in cooperation with the Student Chapter of the AMS/NWA (part of Student-Org). These included Paul Kocin (winter weather expert), Mike Utley (lightning survivor) and a student-led presentation “Fluid Dynamics, Meteorology, & Visualization” as part of Earth Week activities in coordination with the NJCSTME and “Blue goes Green” as part of the President’s Climate Sustainability program for campus. The joint presentation by students included atmospheric science, computer science, and teacher education (teacher-scholars). The CESE program also presented at the NJESTA annual conference and supplied two workshops for teachers as part of the “Round Table Earth” program.

Research activities were guided by internal and external funding (e.g., FFRA, UFRI, McNair, SpF, and COMET) and related projects so as to build CESE capabilities and capacity. The final year of the FFRA project “Kean University: Weather Hazard Education & Research for Ecosystems of Urban Relevance in NJ – Working in a Community of Outreach Research Experiences (Kean University: WHERE – UR – in New Jersey! The Working CORE)” was leveraged with the UFRI project “Kean University: Weather and Ecosystems Monitoring, Assessment, and Prediction for Integration and Training (KU: WE MAP IT): Environmental Management by Portal Outreach for Weather Education and Research by Students with Media Experiences (EMPOWERS ME!)” in order to deliver online materials and resource links for the K-12 and general public communities.

These were coordinated in order to deliver additional information, products, and teaching support (or curricular) materials to a broad audience and provided for technical reports and documentation including the white papers “Earth System Education – Urban Ecosystems for Teaching & Research in New Jersey; Suggested Curriculum Plan – Urban Ecosystems for Earth System Science; Collaborative Atmosphere for Research Practicum in the Environment: Direct Interactions, Education, and Modalities!; Weather & Ecosystem Monitoring, Assessment, & Prediction for Integration & Training; and Weather & Ecosystem Monitoring, Assessment, & Prediction for Integration & Training [Kean University: WE MAP IT! – KU EMPOWERS ME!]” available online. In addition a conference preprint “Working in a Community of Outreach Research Experiences (The

Working CORE)” and a peer reviewed manuscript “Investigation of the Air Quality Index as Related to Weather Regime” were accepted for publication.

The recurring theme of the research projects was operational prediction and planning with regard to environmental conditions, including urban areas. Other research projects that incorporated the overarching theme continued in progress with students (e.g., fog, GIS, UrbanNet, convective initiation, and others). These activities also supported the development of grant proposals that combine educational and research experiences that incorporate multi-disciplinary subjects and that immerse students in the research process. Such programs also focus on communication between sciences to engage the public to improve scientific literacy and create citizen scientists capable of making well-informed decisions on key local and relevant issues.

Development activities included creation of several earth system science curricular guidance documents, and presentation of the new research outreach program for middle and high school students (“CARPE DIEM!”). The “CARPE DIEM!” program is designed to engage high school students in research projects and activities prior to their entry into a college environment. Students involved in the program are expected to identify and select a research project during the winter to work on interactively beginning in the spring of the school year. The student would then conduct a majority of the research during the summer so that in the fall they may present their efforts at their school.

Other development efforts CESE has incorporated include grant-funded and volunteer efforts (e.g., LSAMP, McNair, and SEED programs) which serve to create interactive research environments for students including career experiences and activities. Some of these are enhanced within the Department of Geology & Meteorology by students working in the production, development, and dissemination of Keancast products (e.g., Kean University radio, television, and print/online media). These efforts are currently being expanded to create webcasts, podcasts, blogs, and other delivery mechanisms to more effectively reach today’s learners and learning communities. General and specific public service announcements are also being conceptualized for possible production. Several articles with regard to the environment were prepared and appeared in The Cougar’s Byte, The Tower, and online.

New initiatives for CESE this year included work in the creation of the recently approved Sustainability Program within the College of Natural, Applied, and Health Sciences. The program considers environmental systems in terms of their interactions and responses to human systems (physical as well as social, political, economic, et cetera) and requires a strong basis in earth system science and its associated applications. Such an approach also demands a strong trans-disciplinary learning style and applications which are central to the CESE mission. CESE also advocated for educational policy and revision with regard to the study of earth system science as per the New Jersey Department of Education revised curricular requirements for K-12 education. Activities will continue to be leveraged strategically with various Kean University units/divisions in order to secure base funding of activities.

FACILITIES & RESOURCES

There continues to be no dedicated office space for CESE, and limited resource materials as housed in the Department of Geology & Meteorology. No direct secretarial or administrative support is provided to CESE. Opportunities to share resources through the NJCSTME and other Kean University programs continue to be explored. The recent reorganization of the Department of Geology & Meteorology library into a student Professional Development Lab will assist CESE in its ongoing activities including the use of a phone line as part of its outreach communications.

STRATEGIC INITIATIVES, ACTIVITIES, & PLANS FOR 2009-2010

During the 2009-2010 academic year, CESE will continue to emphasize the online integration of resources, teacher workshops and educational training sessions. As part of this process the virtual linkage that is being established will encourage cooperative & collaborative research workshops and to support a website hub with pedagogy constructs. The focus will continue to be on hazardous weather and the impacts of various atmospheric conditions with regard to urban locations through the use of observational data, conceptual and analytic diagnoses, modeling, and prediction. The center will continue to seek external support for its mission and programs in order to secure base funding as well as release-time for the Director.

DOCUMENTATION

The following documentation is provided in support of this report but is not exhaustive. Additional information and documentation may be available and/or obtained through the program website and/or by request.

- ❖ WE CARE Symposium materials
- ❖ Seminars and Guest Lectures
- ❖ NJESTA Annual Conference materials
- ❖ White Papers & Curricular Guidance documents
- ❖ Conference preprint article
- ❖ CARPE DIEM!
- ❖ Earth System Science advocacy/support