

Unit Productivity Award Application For Academic Departments, 2007-2008

**Academic Unit Name: Department of Geography and Geology
Department Head: David J. Keeling
(Key Indicators of Productivity for 2007-2008):**

SUMMARY OF APPLICATION:

- 🌐 **Margaret Crowder received the 2008 Ogden College Award for Outstanding Public Service**
 - 🌐 **The Department hosted an International Conference on Karst Hydrogeology and Ecosystems.**
 - 🌐 **The Kentucky Mesonet added more data-collection stations around the state.**
 - 🌐 **Faculty and students were featured 100+ times in media print, in online articles, and on WKYUFM radio.**
 - 🌐 **Over 100 students participated in study-abroad programs, field camps, special field projects, and field trips during the year. Study abroad field-camp programs visited the Bahamas, Mexico, Slovenia, Turkey, Italy, and Greece.**
 - 🌐 **The Department awarded 20 GIS Certificates this year; and 30 students have completed half of the requirements. A new BS in GIS major is enrolling students.**
 - 🌐 **The new BS in Meteorology degree is now enrolling students, with 40 majors currently active in the program.**
 - 🌐 **The Kentucky Geographical Alliance received a \$50,000 grant from the National Geographic Society for the third year in succession.**
 - 🌐 **Geoscience graduate student Nathan Rinehart was recognized at the regional North-Central GSA conference for best presentation.**
 - 🌐 **Forty students were actively engaged in applied research with faculty through the ARTP and through externally funded research projects.**
 - 🌐 **Faculty and students visited multiple overseas locations for conferences, research, professional development, study-abroad programs, expedition study tours, and collaborative activities, including multiple visits to China and Europe, and visits to Mexico, Colombia, Slovenia, South Africa, Bahamas, Turkey, Russia, Gabon, Cambodia, Malaysia, and Singapore.**
 - 🌐 **Chris Groves visited Nigeria to assist the government with cave protection and tourism development.**
 - 🌐 **The Department received nearly \$2.5 million in external research funding.**
 - 🌐 **Student and faculty research was featured in a special Kentucky issue of the International magazine *FOCUS on Geography*.**
 - 🌐 **Kevin Cary, WKU's GIS Center Director, created a website for the Warren County Blueways project and provided Internet GIS expertise.**
 - 🌐 **MS Geoscience graduate student Andrea Croskrey had research published in the international *Environmental Geology* journal with co-author Dr. Groves.**
 - 🌐 **The Department was featured in an article on WKU's international reach written by Department Head David Keeling in the Spring 2008 WKU alumni magazine.**
 - 🌐 **David Keeling lectured on an international study tour for the American Geographical Society, and served as Assistant Treasurer of the organization.**
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Department of Geography and Geology Unit Productivity Award Application – 2007-2008

The Department excelled in myriad areas this past academic year, particularly in student learning beyond the classroom, in faculty research, and in peer-reviewed publications. Students and faculty were featured over 100 times in local media outlets, on the WKU public radio and television stations, in the community, and in the national media. The Department is a proven leader on campus in preparing students for success in a global society and has an enviable record in extending WKU's regional and international reach through research, lectureships, and other professional activities.

I. Increasing Student Learning

The primary goal of the Department for the 2007-2008 academic year has been to engage students more effectively in learning beyond the traditional classroom environment. This strategy advances QEP initiative one: to ensure that students can demonstrate their capacity to apply knowledge and training in their discipline to address relevant societal concerns. This goal is reached by focusing on three parallel processes: (1) creating opportunities for independent, supervised research outside the classroom; (2) supporting student attendance at local, regional, national, and international workshops and conferences; and (3) providing field camp and study abroad opportunities that engage students in communities other than their own. A second important goal focused on the enhancement of programs and courses to support WKU's mission of "preparing students for success in a global society." The Department also focused increased attention on strategies to: (a) ensure that students can demonstrate an understanding of their opportunities as responsible citizens living and working in a global society (QEP goal 3), and (b) ensure that students can demonstrate an understanding of the diversity of peoples, ideas, and cultures (QEP goal 2).

Throughout the academic year, approximately 40 students were actively engaged in directed research projects and other activities related to the ARTP and Programs of Distinction (Kentucky Climate Center, Kentucky Mesonet, Hoffman Institute, Center for Cave and Karst Studies, and the Water Resources program), and with research projects directed by department faculty in various programs such as the Kentucky Cave Survey, GIS Center, and several geography, geology, and geoscience projects. Several examples serve to illustrate the success of the Department's focus on student engagement – undergraduate student Andrew Quilligan helped to develop an online forum that allows Kentucky citizens to input and discuss information on drought impacts. At the annual Kentucky Academy of Science conference, geoscience graduate student John Walker received the first place award in geography for his research on rural ground-level ozone in Kentucky, and five other students presented the results of their recent research. Six planning students presented their semester-long research results to members of the Scottsville community in December, 2007. In April, graduate geoscience student Nathan Rinehart was recognized as the outstanding student presenter at the 42nd North-Central conference of the Geological Society of America convened in Evansville, IN, for his presentation titled "Application of GIS in Watershed Condition Assessment" resulting from thesis research in the Little River Canyon National Preserve, Alabama. Finally, several students were co-authors on articles published in a special issue of the American Geographical Society's *FOCUS on Geography* journal that featured student and faculty research projects in Kentucky.

The Department mentors student researchers and encourages both undergraduates and graduates to attend and present their research results at conferences and workshops. More than forty students gave research presentations during the academic year. A few examples illustrate the success of this mentoring program: graduate geoscience student Ronnie Leeper and undergraduate CS and GIS major Brandon Fowler were awarded prestigious Environmental Systems Research Institute (ESRI) scholarships to attend the 27th annual international user

conference in San Diego, August 2007. Faculty, staff, and students from the Hoffman Institute's China Environmental Health program, in addition to undergraduate and graduate geology students, presented their research at the International Conference on Karst Hydrogeology and Ecosystems convened in Bowling Green, August 2007. Undergraduate and graduate students enrolled in Fall 2007 semester geology courses participated in the annual field conference of the Kentucky Society of Professional Geologists, which included research presentations and a special analysis of the Kyrock area in Edmonson County. Graduate and undergraduate students presented their research at the annual conference of the Southeastern Division of the Association of American Geographers convened in Charleston, SC., at the North-Central GSA meeting in Evansville, IN, and at the annual Posters at the Capitol. Six undergraduate and three graduate students presented their research at the annual WKU Student Research Conference in April, with geology students Jake Henderson and Samantha Kramer receiving honorable mentions for the quality of their presentations. Also in April, eight graduate and undergraduate students journeyed with faculty to Boston to present their academic-year long research projects at the annual conference of the Association of American Geographers.

The third pillar in the Department's primary goal of enhancing student learning involves developing more opportunities for experiential learning and project-based learning. The Department continues to restructure its curricula offerings to ensure that all students have the opportunity to study abroad and/or participate in field camp, internship, practicum, or supervised research experiences as part of their major program. Over two hundred students have enrolled in study abroad and field camp programs offered by the department over the past six years. The Department now offers a regular study abroad curriculum, with programs offered either in Winter and Summer, or occasionally both semesters. In Winter 2008, 30 students participated in the joint Sociology and Geography Yucatán, Mexico, program, and fourteen students participated in the Bahamas program, now in its fourth year. During the May term, ten students participated in the Department's Eastern Mediterranean program, visiting Turkey, Greece, Italy, and Slovenia. Geology faculty have a long tradition of engaging students in field-based experiences, and field programs are run every Fall and Spring semester as part of the regular curriculum. In addition, geology field camps are offered on a regular basis during the summer. In recent years, students have worked in Utah, Wyoming, and Montana with Drs Wulff and Siewers, as well as in the Bahamas with Dr. Siewers and in Alaska and China with Dr. Groves. The Department also offers regular spring break or fall break geoscience field programs to the U.S. southwest, with recent programs to the Mojave Desert, Death Valley, and other great locations. Over twenty students also participated in internship activities during the year, contributing to research and policy development in such organizations as the National Weather Service, Barren River Area Development District (BRADD), the City and County Planning Agency, and the Kentucky Mesonet, among others.

New programs developed during the previous academic year also featured prominently in the Department's efforts to enhance the quality of its educational mission, including the new BS in Meteorology and the professional BS in Geographic Information Science. These curriculum changes were introduced partly as a result of ongoing research opportunities through the Department's various Program of Distinction centers (Kentucky Climate Center, MesoNet, Hoffman Institute, and Center for Cave and Karst Studies) that require new sets of skills for students. Moreover, ongoing feedback from employers, business people, and alumni suggests that significant career opportunities continue to present themselves in the areas of GIS applications and analysis, climate-related activities, geophysical techniques, and environmental management and consulting. Faculty also have been active this past year in attending conferences and workshops that highlighted the need for greater relevancy in academic programs. Students graduating over the next decade will need skills not only to be successful in a global society, but also to help address critical societal challenges related to global climate change, human-earth interaction, global resource security, and geopolitical threats. The

Department continues to see these challenges as wonderful learning opportunities for current and future generations of students.

II. Developing the Student Body

Employment opportunities in GIS, climate change, geophysical techniques, mining and energy, and environmental consulting positions continue to drive enhancements and changes in the Department's program offerings. The new B.S. programs in Meteorology and Geographic Information Science are beginning to attract students to WKU who would otherwise have enrolled at other universities. Over 40 students are now enrolled in the BS Meteorology program, with 25 new students recruited to the program for the 2008-2009 academic year. The Department continues to work with the KCTCS to develop 2+2 programs in GIS. Planning is well underway to have the GIS Certificate program completely online by Fall 2009, providing more students throughout the Commonwealth with an opportunity to get trained in this important technology. The two foundation courses, GEOG 316 and 317, will be fully available this coming academic year. The introductory GIS course (316) was offered at Glasgow and Elizabethtown in Spring 2008 as part of the Department's initiative to make GIS courses more widely available to students, and is scheduled to be offered again in Fall 2008.

STUDENT ENROLLMENT IN GIS COURSES

YEAR	Students	Sections
2001-2	93	6
2002-3	189	11
2003-4	169	11
2004-5	243	16
2005-6	270	18
2006-7	273	22
2007-8	275	24
TOTAL	1,512	108

GIS Certificates	
Year	Total
2002-3	14
2003-4	20
2004-5	15
2005-6	30
2006-7	22
2007-8	20
Grand Total	121

Assessment activities continue to reveal that students still are not engaging effectively with the scientific method and with the major theories and advancements in the geosciences. As a consequence, greater attention is being paid in the undergraduate and graduate research methods courses to key theories and methodologies in order address this deficiency. Graduating seniors are required to complete a 499-Professional Development course for senior assessment and are also required to demonstrate their ability to apply concepts, theories, and skills through an independent research project or a supervised internship experience. As an example of "closing the loop" between assessment and program quality enhancement, the ongoing evaluation and restructuring of courses in the Department demonstrate how valuable regular assessment and refining of course content, pedagogy, and technology can be. The quality of the Department's majors continues to be enhanced as a consequence of this process.

Enrollment in the Department's programs has stabilized in recent years as the requirements for graduation have been enhanced, although enrollment in the new BS Meteorology program is attracting new students to WKU. All students are required to pass GIS, statistics, field or general research methods, and mathematics courses as part of their major program, which has resulted in a higher dropout or failure rate among sophomores and juniors. Nonetheless, the overall rate of graduation remains acceptable, with approximately 40 students receiving undergraduate geography or geology degrees and seven graduate students receiving the MS Geoscience degree each academic year on average. Until this year, the Meteorology concentration within Geography remained the most popular major for pre-declared freshmen coming to the Department, but it also has the highest non-completion rate, primarily because of the mathematics, physics, and advanced meteorology course requirements. New students in the

BS Meteorology program are expected to show a higher retention rate over the coming years as they enter the program much better prepared in Mathematics and basic science. Of the 65 students who have dropped out of the Department's majors over the past six years, 42 initially enrolled in the meteorology major. Not all of these students have left WKU, however; 24 of these students are still enrolled at WKU in other majors. Several students left WKU to attend other universities in the region, but the Department has no data on these students. The Department aims to reduce the dropout rate over the coming years, through better advising, a recitation lab program (see discussion above), and more rigorous recruiting and orientation strategies. The Department has also enhanced its GEOG 175 University Experience course to address many of the issues that contribute to poor academic performance and, ultimately, dropping out from the university (including, study habits, attendance, learning techniques, reading for the discipline, and critical thinking skills).

The Department graduated 38 students during the past year (24 in geography and 14 in geology, with 36 minors completing their programs). Since the 1999-00 academic year, the Department has graduated 341 students, with 95 majoring in Meteorology, 78 in Environment, 69 in geology, 42 in general geography, 34 in city and regional planning, 18 in GIS, and the remaining in programs since deleted. The Department has approximately 300 majors and minors enrolled for the Fall 2008 semester.

The Geography, Geology, Meteorology, and Geoscience clubs play important roles in the recruitment, retention, and development of students. These student-led organizations provide mentoring, peer support, research opportunities, seminars, and field-trip experiences for members. For example, Geology Club students raised money and fostered interest in their activities through rock and gem sales, seminars, and tee-shirt sales, and regularly attended annual regional and national geology meetings and conferences. Additionally, this year both undergraduate and graduate geography students helped to run the state-wide National Geographic Bee for grades 4-8 (organized by the Kentucky Geographical Alliance), with faculty and students involved in administering the event. The Bee was held for the sixth consecutive year at WKU, with 100 students and about 150 parents and teachers in attendance. Faculty are also active in the Kentucky Society of Professional Geologists, developing statewide initiatives to introduce students to the geological sciences. Three faculty are engaged in the Kentucky Geographical Alliance (which received a third year of NGS funding for \$50,000) and the Science Alliance respectively; both initiatives are designed to help improve the content knowledge of K-12 teachers and to improve the geoscience knowledge base of students preparing to attend Kentucky universities. The Department remains hopeful that initiatives such as these will help to attract more students to the geosciences in the future. Finally, the Department continues to offer non-traditional courses in partnership with other programs to appeal to a wider cross-section of the campus community. The Center for Cave and Karst Studies summer program (now in its 30th year) offered eight different courses centered on Mammoth Cave

III. Assuring High-Quality Faculty and Staff

Departmental faculty registered significant accomplishments during the academic year. Two major funded research projects continued to grow this past year. Drs. Stuart Foster and Rezaul Mahmood continued to invest significant energy and resources in the Kentucky Mesonet project, with more than a dozen data-collection sites around the state active or scheduled for imminent installation. Their partnerships with local governments and other constituencies have received widespread praise and support around the state over the past year, with several media outlets regularly featuring Mesonet successes. Dr. Groves recorded many successes directing the China Environmental Health Project, with several international conferences, publications, and research visits to various locations in China. External funds generated by the Hoffman Institute, Water Resources Program, Kentucky Climate Center, the Center for Cave and Karst Studies, and individual faculty from agencies such as the USDA, Foreign Military Studies Office (FMSO), the

American Geographical Society, Mammoth Cave, NSF, NASA, the Commonwealth of Kentucky, and other sources continue to help support graduate students, student-centered research, provide new equipment, and facilitate the development of research exchange programs in China, Puerto Rico, Chile, Colombia, Southern Africa, and within the Commonwealth and wider region. Dr. Chris Groves was inducted into WKU's \$1 Million Club for grants, and earned recognition from Sponsored Programs as recipient of the largest grant in 2007 for his China Environmental Health award from USAID. Dr. Keeling received a grant for \$105,000 from the Foreign Military Studies Office (FMSO) to conduct urban- and transportation-centered research in Colombia.

A key goal of student-centered research is the publication of results in journals, books, and other outlets. Faculty achieved significant success during the academic year in disseminating research in journals and books, not only as sole authors but as co-authors with students. Faculty also served as editors or co-editors of professional academic journals or book series and seven faculty reviewed manuscripts for academic journals or publishers. Geography and geology faculty research articles appeared in such diverse journals as *Monthly Weather Review*, *Journal of Applied Meteorology and Climatology*, *Journal of Geography*, *Climate Research*, *FOCUS on Geography*, and *Journal of Hydrology*, among others. Over fifteen faculty research articles or book chapters are either currently in review, revision, or awaiting publication, an exceptional level of productivity indeed. For example, Dr. Chris Groves and former graduate student Andrea Croskrey were featured in the May 2008 issue of the international journal *Environmental Geology* for their research on groundwater sensitivity in Kentucky using digitally vectorized geologic quadrangle (DVGQs) maps. Department Head David Keeling published research on transportation in the international journal *Progress in Human Geography*, Dr. Aaron Celestian published the results of research on ion exchange selectivity in the *Journal of Materials Chemistry*, and Dr. Katie Algeo published "Teaching Cultural Geography" in the *Journal of Geography*, a leading national pedagogical publication. Students and faculty co-authored several articles appearing in a special Kentucky issue of *FOCUS on Geography*, and graduate student Caitlin Hager published the results of her thesis research on Bowling Green's commuting patterns in the *Papers of the Applied Geography Conferences*.

Geology instructor Margaret Crowder received recognition as the Ogden College Outstanding Public Service recipient for 2007-2008. Dr. L. Michael Trapasso opted for optional retirement effective July 1, 2008, Dr. Yanmei Li left her position as assistant professor of city and regional planning for a planning department in Florida, and Dr. Steve Kenworthy resigned to follow his spouse to Oak Ridge, TN, where Renae has found a new career with the Oak Ridge National Laboratory. A recent geology Ph.D. (South Florida), Dr. Lee Florea, has been hired effective August 15, 2008, to take responsibility for the Center for Cave and Karst Studies under the umbrella of the Hoffman Institute. Dr. Joshua Durkee, a recent Ph.D. Geography graduate from the University of Georgia, also joins the Department in August 2008 as part of the Meteorology program enhancement and will contribute to the ongoing development of the weather and climate programs. Three visiting instructor and assistant professor positions were filled during the 2008 summer while the Department searches for a new meteorologist and cultural geographer/planner. The Department search committees *addressed diversity and gender goals* during the recruitment process, contacting qualified individuals through listservs, conferences, and special mailings, and ultimately recommended the most qualified individual for the position. The Department has every expectation that the new generation of faculty will continue to strengthen the Department's accomplishments in scholarship, creative activities, and externally-sponsored research and grants.

Throughout the year, faculty from the Department have been featured in a variety of WKU and regional media, including stories in *Echo* magazine, *Western Scholar*, the *Bowling Green Daily News*, *WKU Spirit*, and in a number of other regional media outlets. Faculty continued to excel in scholarship, research, and professional development, convening and/or participating in myriad professional workshops and presenting approximately 40 papers at local, regional,

national, and international conferences. Faculty also were significantly engaged with the local community, serving on committees, task forces, running for public office, participating in WKU-sponsored community outreach events such as the *Far Away Places* series at Barnes and Noble, sharing geoscience expertise on WKYU-FM's Midday Edition program, and giving talks at churches, community organizations, and for service groups.

Faculty also gave over 40 academic and community talks during the academic year, including presentations at universities, workshops, and conferences across the United States, in Latin America, China, and Europe. In addition, faculty visited more than 30 overseas locations for research, professional development, study abroad programs, professional study tours, meetings, and collaborative activities with other institutions (including the Bahamas, Belgium, Botswana, Britain, Burkina Faso, Cambodia, Cameroon, Central African Republic, China, Colombia, France, Gabon, Greece, Italy, Malaysia, Mali, Mexico, Morocco, Namibia, Netherlands, Nigeria, Puerto Rico, Russia, Singapore, Slovenia, South Africa, Spain, and Turkey). Four faculty led the Department's study abroad programs to Mexico (winter 2008), the Bahamas (Winter 2008), and the eastern Mediterranean (Summer 2008), the Department Head served as a Study Tour Lecturer on an educational program co-sponsored by the American Geographical Society to Western Africa, and five faculty led field trips for students within the U.S. Indeed, the Department has led the university in departmental Study Abroad program development and participation over the past decade, with nine faculty leading over 200 students to more than a dozen destinations around the planet, and it has the most globally focused faculty in the Commonwealth; they have visited over 130 countries on research, expedition, and lecture trips in recent years! This Department personifies WKU's aspirations for international reach.

IV. Enhancing Responsiveness to Constituents

A major focus of the Department this past year continues to be a focus on issues that are relevant to society generally and to our communities specifically. Several geology faculty are involved with a geology outreach group for the Commonwealth, establishing a 'speakers bureau' to better serve the public. There are many issues from land-use management and fossil fuel resources to hazardous site mitigation that would benefit from a geological perspective. Through cooperation between the Kentucky section of the American Institute of Professional Geologists (AIPG-KY) and the Kentucky Society of Professional Geologists (KSPG), a series of lectures, demonstrations, and experiments are being made available through the AIPG-KSPG Geology Outreach group. Geography and geology faculty are helping to bridge the gap between civic groups, schools, clubs, and their respective professions. The Department also is expanding course offerings at WKU's satellite campuses (Glasgow, Owensboro, Elizabethtown/Ft. Knox) to meet the growing demand for skill-based courses, especially by non-traditional students looking to retrain or enhance their skills.

Public service, as exemplified by the Kentucky Climate Center and the MesoNet project, continued to be a central pillar of the Department's contributions to the community, with activities in 2007-2008 reaffirming the faculty's commitment to productive engagement with a wide variety of constituents. The Department, through the MesoNet project, is pioneering interactive and demonstrative student and public learning activities as part of its long-term goal to develop a state-wide climate monitoring system. Faculty continued to devote thousands of hours to the educational, social, cultural, and economic development needs of the city, county, region, state, and other countries. Faculty are involved in numerous community and regional activities, from historic preservation in Scottsville and GIS support for various community projects (the Warren County Blueways Project, for example), to local planning and economic development issues around Mammoth Cave National Park. During the summer, the Center for Cave and Karst Studies offers several cave-based courses for continuing education credit, aimed at professionals across the region and nation.

Alumni development continues to be an important source of funding for the Department and it also provides employment opportunities for future students. Many alumni in positions of leadership frequently contact the Department with information about job opportunities for graduating seniors. WKU's Spring 2008 alumni magazine, *WKU Spirit*, featured the Department's international activities in an article prepared specially for this publication and written by Dr. Keeling. The Department circulates its annual Geogram newsletter to approximately 1,400 alumni, it hosts alumni and current students at the annual Homecoming alumni reception, and it offers continuing education training in a variety of fields (Hazmat, Stormwater Mitigation, GIS, Karst Management, etc.). The Department again received record unrestricted contributions from alumni and faculty (over \$20,000) this past year, and it hopes to break that record again this coming academic year. Earnings from endowments support student enrollment in field camps, help faculty and students attend more conferences and workshops, and provide significant support to the Department's programs overall.

V. Improving Institutional Effectiveness

The Department continues to run efficiently and effectively. Improvements to classrooms and laboratories continued throughout the year, supported by funding from Academic Affairs, the Ogden College Dean's office, faculty research grants, and departmental funds. Renovations were completed in EST 349 and 350 with table-chair configurations, and funds were received to construct a new state-of-the-art remote sensing laboratory in EST 356. Each of the Department's five primary teaching rooms are now configured with rolling chairs and tables to facilitate better use of teaching materials, with white boards, projectors, and computer equipment. Space has been developed to support the MesoNet project and the China Environmental Health project, with renovations in several rooms to support the growing number of staff, students, and post-doctoral researchers hired to work on these funded programs.

The Department has completed the second year of its second five-year strategic plan (2006-2011) and is on schedule with a number of programs and projects. The strategic plan forms the basis for the Department's ongoing expansion in a number of important areas, including research, extramural funding, student engagement, and alumni relations. The Department seeks to double the level of financial support received from alumni over the coming years. The Department continues to participate proactively in all aspects of the institutional planning process, in the implementation of QEP strategies, and in promoting programs that help prepare students for success in a global society. Finally, the Department has an active program to promote and advertise the many successes of its faculty and students, with over 100 media stories published during the academic year. Faculty regularly appear in print, on the radio, and on local television stations discussing teaching and research. For example, Dr. May contributed to community-wide education about earthquake hazards following a recent temblor in the region. Dr. Trapasso can be heard regularly on local public radio discussing weather conditions, and several faculty were interviewed for WKYU-FM's popular *Midday Edition* and appeared on WKU's public television program *Outlook*. The Department continues to build its reputation as a leading Department at WKU and one of the best combined human-earth programs in the state and across the region.



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