



DEPARTMENT OF GEOGRAPHY AND GEOLOGY

STRATEGIC PLAN

**Meeting Society's Geoscience
Needs for the 21st Century**

2006-2011

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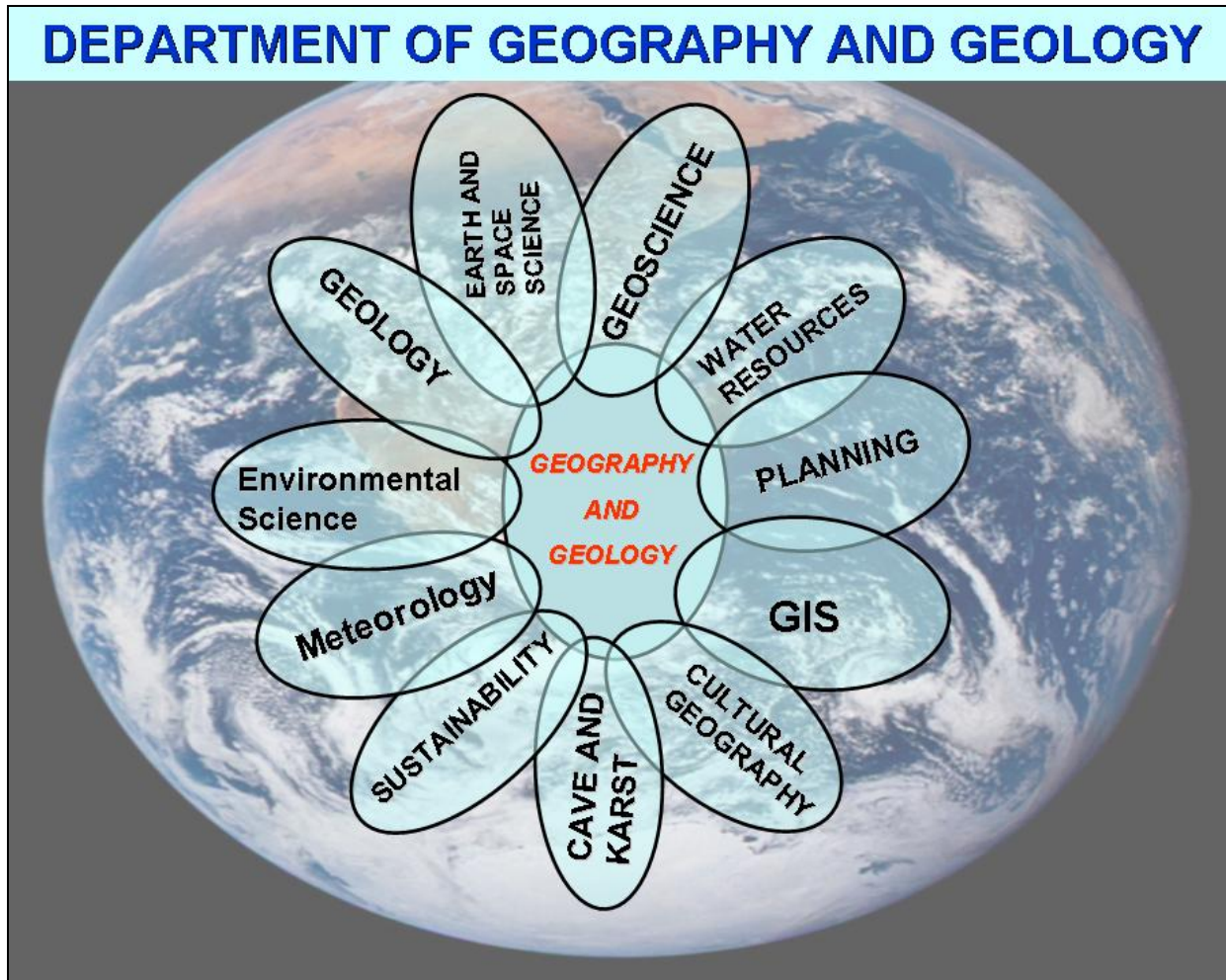
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Executive Summary

Department Goals, 2006-2011

-  Add four tenure-track faculty for program expansions.
-  Add two geoscience labs, two wired instructional classrooms (20 seats each), a 20-seat GIS laboratory, and a 20-seat Remote Sensing laboratory as programs grow and change.
-  Purchase or lease a Departmental van for field trips.
-  Improve environmental conditions in EST, including air quality.
-  Enhance instructional, office, and research space as programs and research activities grow, accommodating an additional 100 majors.
-  Add full-time laboratory manager for geoscience courses.
-  Add full-time computer and equipment manager for the Mesonet, departmental server, GIS lab, and instructional classrooms.
-  Implement a B.S. Meteorology program, with a target of 50 majors.
-  Enhance the capacity of students to apply knowledge and training to address relevant concerns in community or society (QEP).
-  Enhance students' awareness of their opportunities as responsible citizens living and working in a global society (QEP).
-  Enhance the ability of students to demonstrate respect for diversity of peoples, ideas and cultures (QEP).
-  Require a research project, internship, practicum, field camp, or study abroad course of every undergraduate geography major in the Department, as part of the QEP initiative.
-  Offer Winter Term and Summer Term Study Abroad programs and field camps every year, with all faculty able to participate.

DEPARTMENT MISSION



The Department aligns its mission with the strategic goals and objectives of the University to become a leading department with international reach:

The mission of the Department of Geography and Geology is to enable its graduate and undergraduate students to achieve their full potential as educated global citizens, skilled professionals, and well-qualified technical employees in a diverse range of companies and governmental organizations, and to become effective teachers and community leaders. Through applied research, community outreach, and student-faculty-industry partnerships, our programs provide students with a comprehensive understanding of the range and depth of geography and geology. These are complementary scientific disciplines that encompass, respectively, the human and physical domains of geography, and the physical and historical domains of geology. Our programs produce students that are informed users of a range of technologies, prudent stewards of our natural resources, life-long learners, and successful participants in a global society.

DEPARTMENT OF GEOGRAPHY AND GEOLOGY

GEOGRAPHY

- City and Regional Planning
- Human / Cultural Geography
- Regional Geography
- Globalization and Sustainable Development
- Geospatial Analysis (GIS)

ENVIRONMENTAL SCIENCE

- Meteorology and Climatology
- Hydrology and Geomorphology
- Human – Environment Interactions
- Global Change
- Environmental Planning and Management
- Water Resources
- Geographic Information Science (GIS)

GEOLOGY

- Earth History
- Paleontology
- Mineralogy and Petrology
- Sedimentology and Stratigraphy
- Tectonics and Volcanism
- Oceanography
- Economic Geology and Fossil Fuels

The Department aligns its objectives with the strategic goals of the University relevant to student learning. These goals are:

(1) Promoting active learning in the course setting, especially as it advances development of critical and integrative thought processes and/or advances students' appreciation for the diversity of viewpoints.

(2) Cultivating opportunities for academic engagement within the context of students' coursework, especially through independent research, scholarship, or creative activity related to the discipline, and project-based learning.

(3) Developing students' appreciation of the historical context of the discipline and/or the relationship of the discipline to a global society.

Students and Faculty of the Department of Geography and Geology:

✦ Recognize science as a way of knowing, including its values and limitations;

✦ Achieve a depth and range of knowledge and skills in their discipline or in a multidisciplinary area;

✦ Develop abilities of reason and imagination; collect and analyze data, synthesize and draw conclusions; effectively communicate with others;

✦ Experience discovery, design, or application within the discipline and beyond;

✦ Evidence a commitment to an examined and evolving set of values and professional ethics, leading to informed decisions and including contributions to the discipline and to society;

✦ Are knowledgeable in the discipline, prepared for the future, and competitive in a global society.

In achieving this mission, the Department of Geography and Geology creates an academic environment of rigor and achievement, cultivates a community of scholars and contributing citizens, and enhances interconnections among the disciplines.

QEP Goals:

(1) Students will demonstrate the capacity to apply knowledge and training to address relevant concerns in community or society.

(2) Students will demonstrate awareness of their opportunities as responsible citizens living and working in a global society.

(3) Students will demonstrate respect for diversity of peoples, ideas and cultures.

Full-time Instructional Faculty

David J. Keeling, Ph.D.	Department Head, Professor of Geography
Catherine Algeo, Ph.D.	Associate Professor of Geography
John All, Ph.D., J.D.	Associate Professor of Geography
William Blackburn, M.S.	Instructor in Geography
Kevin Cary, M.S., GISP	Instructor in Geography, GIS Director
Aaron Celestian, Ph.D.	Assistant Professor of Geology
Margaret Crowder, M.A.	Instructor in Geology
Scott Dobler, M.A.	Instructor in Geography
Joshua Durkee, Ph.D.	Assistant Professor of Geography
Xingang Fan, Ph.D.	Assistant Professor of Geography
Lee Florea, Ph.D.	Assistant Professor of Environmental Geoscience
Stuart Foster, Ph.D.	Professor of Geography Kentucky State Climatologist Director, Kentucky Climate Center & Mesonet
Gregory Goodrich, Ph.D.	Assistant Professor of Geography
Peggy Gripshover, Ph.D.	Assistant Professor of Geography
Christopher Groves, Ph.D.	Professor of Geography Director, Hoffman Institute and CCKS
Debra Kreitzer, M.S.	Instructor in Geography
Kenneth Kuehn, Ph.D.	Professor of Geology University Distinguished Professor Emeritus
Rezaul Mahmood, Ph.D.	Associate Professor of Geography Associate State Climatologist & Mesonet
Michael May, Ph.D.	Professor of Geology
Jason Polk, Ph.D.	Assistant Professor of Geography
Daniel Reader, M.S.	Instructor in Geography and Sustainability
Amy Seymour, M.S.	Instructor in Geography, Extended Campuses
Fred Siewers, Ph.D.	Associate Professor of Geology
Andrew Wulff, Ph.D.	Associate Professor of Geology
Jun Yan, Ph.D.	Assistant Professor of Geography



Programs Offered

Major Programs:

- B.S. Geography (#674) – Six specialty concentrations available, plus Honors.
- B.S. Meteorology (#578) - Effective Fall 2007.
- B.S. Geographic Information Science (576) - Effective Fall 2007
- B.S. Geology (#577, 677) – Professional and Extended majors available.
- B.A. Geology (#676) – Earth and Space Science and Geoscience options.
- M.S. Geoscience (#072) – Six specialty concentrations available.

Minor Programs:

- City and Regional Planning (#339)
- Geographic Information Systems (#366)
- Geography (#374)
- Geology (#377)
- Water Resources (#491)
- Floodplain Management (#361) (with the Engineering Department)

Other Programs:

- Undergraduate Certificate in Geographic Information Science (#174)
- Graduate Certificate in Geographic Information Science (#203)
- A.B. Meteorology Technology (#269)
- Annual Field Camps and Study Abroad Programs



Departmental Goals, 2006-2011

1. Develop and implement a new BS Meteorology Program (See Appendix A.)
UPDATE APRIL 2007: BS Program approved by Board of Regents.
UPDATE December 07: BS Program active, 13 majors enrolled.
UPDATE September 08: 46 students enrolled effective Fall Semester.
UPDATE July 2009: 54 students scheduled for Fall 09 enrollment
2. Increase the number of majors and minors by 30% over five years.
UPDATE September 2007: Number of majors and minors remains steady.
UPDATE September 2008: Slight growth in overall number of majors.
UPDATE July 2009: Number of majors and minors remains steady at 300
3. Add two tenure-track geologists to enhance the Geology program.
UPDATE APRIL 2007: Environmental Geologist scheduled for Fall 2007.
UPDATE September 2007: Dr. Aaron Celestian hired effective August 2007.
UPDATE September 2008: Dr. Lee Florea hired effective August 2008.
UPDATE July 2009: Goal achieved.
4. Add two tenure-track meteorologists/climatologists to build the new BS in Meteorology program.
UPDATE September 2007: Approval received to advertise for a Ph.D. tenure-track meteorology position for Fall 2008.
UPDATE September 2008: Hired Dr. Josh Durkee effective August 2008.
Replacement position for Dr. Trapasso (Transitional Retirement June 2008) approved and advertised for Fall 2009.
UPDATE July 2009: Dr. Xingang Fan hired effective August 2009.
5. Enhance the GIS program (see Appendix B).
UPDATE APRIL 2007: Funds obtained to replace IE301 GIS Laboratory computers.
UPDATE September 2007: Computers replaced. Proposal submitted to purchase new printer-plotter. New BS GIS program effective Fall 2007; three students enrolled. Fundamentals course (217) replaced with GEOG 316 to reflect level of engagement required. New general education course, GEOG 216 GIS and Society, proposed and approved. GEOG 317 fully operational online.
UPDATE December 2007: Funds received to replace large-format plotter-printer.
UPDATE July 2009: Server updates completed. Full GIS Certificate program now offered exclusively online effective Fall 2009.

6. Require a research project, internship, practicum, field camp, or study abroad course of every undergraduate geography major in the Department, as part of the QEP initiative.
 UPDATE APRIL 2007: Geography programs revised to require GEOG 475 or 495 of every major effective Fall 2007.
 UPDATE July 2009: Goal achieved.

7. Offer Winter Term and Summer Term Study Abroad programs and field camps every year, with at least six faculty participating on a rotating basis and receiving a full course stipend.
 UPDATE APRIL 2007: Winter 2007 study abroad program completed; Spring Break 2007 Mojave field camp completed. Winter Term 2008 Mexico program in development.
 UPDATE September 2007: Winter 2008 Study abroad program to the Yucatan, partnered with Sociology, fully subscribed (30 students). Winter 2008 Bahamas program fully subscribed (14 students). Summer 2008 Mediterranean program in development. Four faculty engaged in study abroad program offerings.
 UPDATE September 2008: Summer study abroad program completed with 10 students enrolled. Programs in development for AY 2009.
 UPDATE July 2009: Winter and Summer 2010 programs in development.

8. Enhance the Kentucky Climate Center and Mesonet (see Appendix C).
 UPDATE APRIL 2007: MesoNet project proceeding on schedule.
 UPDATE September 2007: Additional funding support received from NOAA.
 UPDATE September 2008: Additional sites up and running.
 UPDATE July 2009: Over 20 sites now up and running.

9. Build the Hoffman Institute's China program.
 UPDATE September 2007: Significant progress through the USAID grant. Other resources received to continue this project. Multiple faculty visits to China include Drs Groves and Yan, Kevin Cary, and Pat Kambesis, as well as students.
 UPDATE September 2008: Multiple visits to China by Drs Groves and Yan, and Hoffman staff.
 UPDATE July 2009: Multiple visits to China – conference scheduled for August 2009.

10. Enhance the educational mission of the Center for Cave and Karst Studies.
 UPDATE September 2007: CCKS absorbed into the Hoffman Institute. Permission received to advertise for a tenure-track Ph.D. assistant/associate position effective Fall 2008. CCKS Summer program in development through a partnership with DELO and the Mammoth Cave Learning Center.

UPDATE December 2007: Recruitment process underway for Cave and Karst position, with a top ten list of candidates identified.

UPDATE September 2008: Dr. Lee Florea hired and assisting in CCKS activities.

UPDATE July 2009: Summer courses offered; others in development.

11. Revise the MS in Geoscience curriculum (see Appendix D).

UPDATE September 2007: Environmental science option, cross-listed with Chemistry and Biology, approved and ready to proceed. Staffing not yet identified or agreed between the departments. An educational option in Integrated Sciences designed for P-12 teachers in development. GEOG 530 added as an acceptable field methods course for cultural concentration students (substitute for GEOG 502).

UPDATE July 2009: GEOS designation for all graduate courses effective Fall 2009. New courses and program options in development.

12. Increase alumni contributions by 100% over the next five years to approximately \$25,000 per annum.

UPDATE September 2007: On target – over \$31,000 in foundation receipts for the 2006-2007 academic year.

UPDATE December 2007: Contributions and earnings pass \$17,000 for the first five months of the academic year.

UPDATE September 2008: On target – over \$34,000 in foundation receipts for the 2007-2008 academic year.

UPDATE July 2009: Gifts flat for academic year due to global recession.

13. Enhance the geography curriculum in the areas of cultural analysis, planning, and the environment.

UPDATE September 2007: New geography concentration in Cultural Geography added Fall 2007, and the sustainable development and environmental planning concentration combined into one new option – Environment and Sustainable Development. An option in Honors Geography also added effective Fall 2007.

UPDATE September 2008: Revision of Geography concentrations effective Fall 2009 – Planning and GIS combined, and Meteorology renamed to Land, Weather, and Climate. Permission received to advertise for a cultural geography position effective Fall 2009.

UPDATE July 2009: Dr Peggy Gripshover hired effective August 2009 to enhance cultural program. New courses in development, including Tourism Geography.

14. Enhance the physical environment of the department's teaching and research space, including air-conditioning, furniture, and technology. Support with a full-time geoscience laboratories manager/instructor and a full-time computer/equipment manager/instructor.

UPDATE APRIL 2007: Rooms EST 338, 349, and 350 scheduled for May/June 2007 renovation.

UPDATE September 2007: EST 338, 349, and 350 renovated, with new chairs and tables, LCD projectors, and other AV equipment, and whiteboards in 338 and 350. No progress on other staff/instructor support positions.

UPDATE December 2007: Consolidation of Hoffman Institute and Center for Cave and Karst offices and facilities on the fourth floor of EST. Lab space on the 3rd floor previously occupied by the Hoffman Institute to be dedicated as a materials science research and lab space shared between Drs Wulff and Celestian. Computers for student lab work moved from the geomorphology lab in EST 339 to EST 323.

UPDATE September 2008: Room 356 remodeled to become the new Remote Sensing Laboratory.

UPDATE July 2009: Room 425 remodeled to become new meteorology instructional laboratory. Improvements are ongoing to the HVAC plant.

15. Enhance community outreach, service opportunities, and economic development contributions.

UPDATE September 2007: Progress achieved through the Kentucky Climate Center, the MesoNet, and individual faculty initiatives. Refer to individual faculty annual productivity reports and ARTP reports.

UPDATE December 2007: Significant research and outreach activities during the Fall semester. Refer to the WKU media web pages for news items.

UPDATE September 2008: Significant research and outreach activities during the Spring semester. Refer to the WKU media web pages and the 2008 GEOGRAM for news items.

UPDATE July 2009: Significant research and outreach activities during the academic year. Refer to the department's media web pages and the 2009 GEOGRAM for news items.

Resources needed to achieve these goals -
Anticipated profile of the Department, Fall 2011

1. A B.S. in Meteorology program with 50 majors enrolled is offered. The extended major requires 52 hours and will need the addition of four new advanced atmospheric science courses to the curriculum.
2. Five hundred majors and minors are enrolled, requiring access to an additional 100-seat classroom and two 20-seat instructional labs.
3. Seven full-time instructional faculty in Geology, serving 100 majors and 30 minors, requiring access to an additional shared 100-seat classroom and two 20-seat instructional labs.
4. Six full-time equivalent instructional faculty in Meteorology and Climatology, serving 50 majors in the BS program and 60 majors in the BS Geography (meteorology) concentration.
5. Eight instructional faculty with GIS teaching capabilities, two GIS instructional labs, and an advanced Remote Sensing lab, serving 50 GIS majors, 40 GIS minors, and 100 GIS certificate students.
6. Each student graduating from the Department has a research project, internship, practicum, field camp, or study abroad experience as part of the major program. Need to add a specific course fee to those classes that require a field experience.
7. At least three study abroad and field camp opportunities provided each academic year to program majors and minors, with a minimum of 60 students enrolled in these programs annually. Need a commitment from WKU to pay study abroad instructional stipends that are equal to those paid for on-campus courses.
8. The Kentucky Climate Center provides enhanced student opportunities, the Mesonet project is fully implemented, and space improvements have been achieved.

9. New research opportunities for students and faculty (both to and from China) through the Hoffman Institute's China program have been created, and new research space has been created to accommodate
10. Center for Cave and Karst – new equipment for field methods is purchased and student research is fully integrated into the major curriculum.
11. The MS in Geoscience curriculum has been improved, with new opportunities for students in Earth Science education, GIS, Environmental Science, and planning.
12. Alumni contributions have increased by 50%. Naming rights for the GIS center have been negotiated, and an Endowed Chair in Geoscience has been fully funded.
13. Five instructional faculty specializing in cultural geography, planning, and the environment are on staff, with significant growth achieved in undergraduate and graduate majors (25%).
14. Institutional investment in rehabilitating the building's physical environment and teaching space. Departmental investment in classroom technology and aesthetic improvements. Two support-staff positions to manage geoscience laboratories and computers/equipment and to serve as instructors.
15. Department outreach opportunities in the community and beyond.

Proposed Budget Changes, 2006-2011

Expenses E&G:

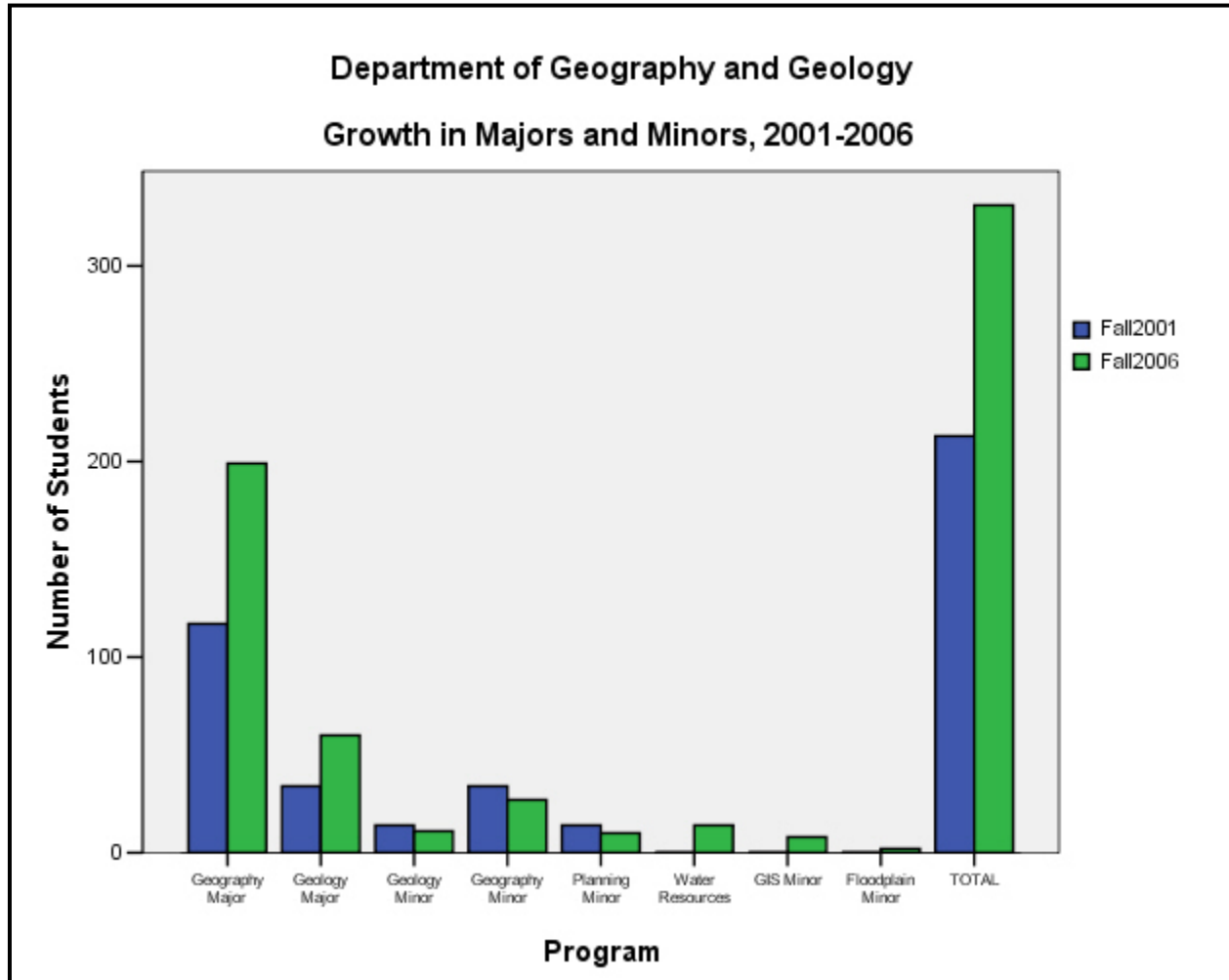
2006-2007: Temporary Full-time Instructor	\$ 43,000
2007-2008: New Meteorology Faculty (plus Fringe)	\$ 62,500
New Geology Faculty	\$ 62,500
Full-time Office Assistant	\$ 27,000
Room Renovation Projects (one-time)	\$ 20,000
Equipment Needs (one-time)	\$ 27,000
2008-2009: Full-time Laboratory Assistant	\$ 46,500
Full-time Instructor Regional Campus	\$ 46,500
Room Renovation Projects (one-time)	\$ 25,000
2009-2010: Second Meteorology Faculty (plus fringe)	\$ 70,000
Second Geology Faculty	\$ 70,000
Room Renovation and Equipment Needs	\$ 40,000
2010-2011: Geology Center (Room renovation – one time)	\$ 60,000
	\$ 600,000
Budget Increase	\$ 600,000

Projected Revenue E&G:

2006-2007: Buyout Funds from Grants/Incentives	\$ 37,000
2007-2008: 10 New BS Meteorology Students Tuition	\$ 62,500
30 FTE Students enrolled with new faculty	\$ 187,500
Buyout Funds from Grants/Incentives	\$ 38,000
2008-2009: 15 New BS Meteorology Students Tuition	\$ 95,000
2009-2010: 20 New BS Meteorology Students Tuition	\$ 135,000
2010-2011: 10 New BS Meteorology Students Tuition	\$ 45,000
Projected Revenue:	\$600,000

SUMMARY OF KEY ACHIEVEMENTS, 2001-2006

(1) Total enrollment in majors and minors has grown by 50% (Table 1).



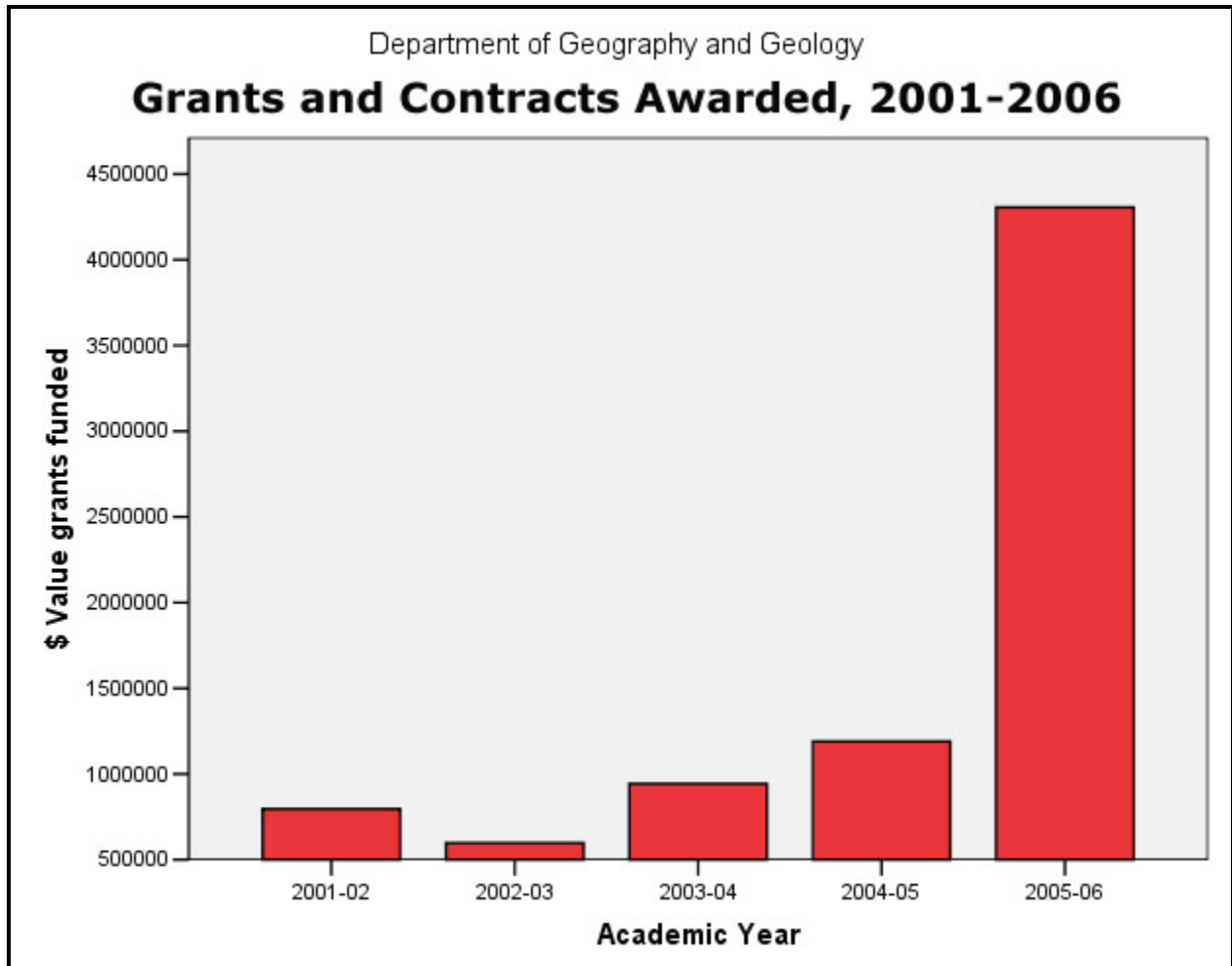
(2) New minors in GIS, Water Resources, and Floodplain Management (with Engineering) have enrolled 29 students since Spring 2005.

(3) Seventy-five GIS certificates have been awarded.

(4) Overall retention rates in the majors have averaged 95%, with 184 degrees awarded in the majors.

(5) Seventy-seven students have participated in departmental study abroad programs, and several hundred students have participated in local and regional field trips as part of their course work.

(6) The Department has been awarded over \$7.5 million in grants and contracts (Table 1).



(7) Faculty and students have visited over 50 countries for research, instruction, and service purposes.

(8) Students continue to demonstrate the effectiveness and relevance of their educational experience in the Department through career development, advanced graduate study, and other contributions to society. Selected student comments are appended below:

Selected Comments from Student Alumni

“Quite obviously, I would not be where I am today without the support of WKU's Geography and Geology department. Which is to say, I wouldn't be working on my Master's degree at one of the better geology programs in the country, the University of Texas at Austin's Jackson School of Geosciences. I was a little nervous at first, making the transition from a small program with limited resources to a HUGE program with a multi-million dollar endowment, but the skills that I learned while at WKU probably prepared me for this experience better than the undergrads here at UT are prepared! In fact, although the available resources here are virtually unlimited, I had more access to analytical equipment and field experience as an undergrad at WKU than do the undergrads here. I honestly feel that's because of the high level of community within the department, and the genuine commitment the faculty have to providing their students with every available opportunity. In my time at WKU, I was able to participate in a summer internship with the Kentucky Geological Survey, assist with physical geology labs, work as an undergraduate researcher, be involved with the department through geology club and social activities, and attend professional meetings. All of these experiences helped me to prepare for life at graduate school, so much so that I have been fortunate enough to become involved with incredible leadership experiences at UT and was actually chosen as a graduate student representative on the search committee for the new Jackson School Dean. Without the encouragement of the faculty at WKU, I probably wouldn't be as confident in my abilities as I am now.

“Earth science education is becoming a necessity for the modern world. Every day, the earth is changing, and many changes are occurring as a result of humanity's influence on the world. As more and more people are becoming aware of this impact, it becomes more and more necessary to step up the public's education of the earth sciences. This is an area where WKU's department has always been on the forefront, and with each tsunami, earthquake, and hurricane, this aspect becomes even more important. The faculty in the department were the first step in showing me how important geosciences outreach is, and have always been a wonderful example in how to better inform the world about our subject. Besides giving me a geoscience education every bit as good as one from my current program, my time at WKU really gave me the confidence to succeed in any arena of life, by teaching me how to be a good scientist.”

“My background in geomorphology greatly enhanced my understanding of ground water especially in karst terrain. Of particular note was my deployment during the war in Kosovo. If it were not for my WKU education, I would not have been able to solve one of our biggest challenges - a secure fresh water source that would produce 650,000 gallons a day. The contractor hired to find water drilled 11 wells without producing enough flow for our base camp. Using the field techniques I learned at WKU, I was able to identify three possible well sites which exceeded our requirement.”

“I am not really sure what to focus on....I can tell you that my two years as a grad student at WKU were a great social and educational experience. I had the opportunity to work closely with faculty and grad students in a way that fostered friendships and positive learning experiences.

A few points: I was able to talk with any faculty members about anything at (almost) any time. I felt (and experienced the fact) that the department was fully committed to providing funding for grad students for research, travel, and equipment. Importantly, I feel that the emphasis placed by the department on encouraging students to attend conferences has helped me tremendously in the UK PhD program. And while I thought that the intro to grad school class (500 I think) was tough and torturous at the time, I don't think I would even be thinking about pursuing a PhD right now if it

were any less demanding. If anything, I would suggest making the Geo 500 students read more (easy to say now I suppose)."

"I owe my success here at WKU to the entire Geog/Geol department for being a great place to find my path in school and career."

"I am very proud to be a graduate of WKU's Department of Geog. and Geol. and tell people whenever I get the chance. I can't wait to further my education and know beyond a reasonable doubt that my time at WKU has more than prepared me to do so."

"Being on San Salvador provided me with many great opportunities. It gave me a chance to interact with students and faculty from all across the nation and to hear about their various areas of research. It also provided me with an insight into the area of carbonate or sedimentary geology. The field work, and especially the coring, provided me with much knowledge about what can be deduced from these cores and how to go through the whole process of an experiment from start to finish. As a future Graduate School student, I believe all of this is necessary and important for my continued success in geology. It has provided me with insights that will allow me to enter successfully a very competitive graduate student realm, and to move on to real-world jobs where I hope to do research that is relevant for years to come."

Key Indicators of Department Productivity, 2008-2009

- 🌐 **Senator McConnell officially opened the Kentucky Mesonet, with \$2.9 million in funding obtained for the project.**
- 🌐 **John All received a Fulbright Scholarship to study in Nepal in Fall 2009.**
- 🌐 **SGA recognized Margaret Crowder as Ogden College Professor of the Year and Greg Goodrich as Advisor of the Year.**
- 🌐 **Thirtyfive students actively engaged in applied research with faculty through the ARTP, Gatton Academy, and through externally funded research projects.**
- 🌐 **Hoffman Institute faculty and staff conducted research in Jamaica and Haiti.**
- 🌐 **Geology major Seth Cude won a \$40,000 “Go Green” Facebook competition.**
- 🌐 **Faculty and students were featured over 100 times in media print, in online articles, on WKYUFM radio, and on local television programs.**
- 🌐 **A GIS student received an ESRI scholarship for the eighth year in a row.**
- 🌐 **Aaron Celestian was named to the Editorial Board of the *American Mineralogist*.**
- 🌐 **Geoscience graduate student Ronnie Leeper was recognized as the Ogden College Outstanding Graduate Student for 2008-2009.**
- 🌐 **The BS in Meteorology degree continues to attract new students, with 42 majors currently active in the program. The first cohort graduates in Spring 2010**
- 🌐 **The Department exemplifies WKU’s International Reach, with faculty and students at 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 Peru, Chile, Samoa, Argentina, PNG, Cambodia, India, UAE, Tanzania, Morocco, Mongolia, and Russia, among other locations**
- 🌐 **Meteorology students won several competitive and prestigious internships.**
- 🌐 **William “Joey” Coe awarded prestigious Udall Scholarship for sustainability.**
- 🌐 **A new minor program in Sustainability Studies was approved by WKU Board.**
- 🌐 **Over 100 students participated in study-abroad programs, field camps, special field projects, and field trips during the year, including programs in Florida (2), the Mojave, the Bahamas, the Appalachians, and around the local region.**
- 🌐 **Meteorology undergraduate/graduate students established the StormTopper Network.**
- 🌐 **Thirty-three students presented research at local, regional, and national conferences, as well as in Japan and Slovenia.**
- 🌐 **Hoffman Institute purchased Cave Springs Cavern with KHLCF conservation fund.**
- 🌐 **Chris Groves appointed to Board of U.N. Karst Program established by UNESCO.**
- 🌐 **The Department awarded 24 GIS Certificates this year; and 28 students have completed half of the requirements.**
- 🌐 **The Department received over \$1.1 million in external and internal research funding.**
- 🌐 **The Kentucky Geographical Alliance received a \$50,000 grant for the 4th year in a row.**

Key Indicators of Department Productivity, 2007-2008

- 🌐 **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.**

Key Indicators of Department Productivity, 2006-2007

- 🌐 **Andrew Wulff received the 2007 WKU Award for Outstanding Teaching – he also won the Ogden College Award for Teaching.**
- 🌐 **The WKU China Project received additional funding in 2007, led by Dr. Groves.**
- 🌐 **Two students were selected for scholarships from an international competition to attend the annual ESRI global GIS conference.**
- 🌐 **Faculty and students were featured 100+ times in media print and online articles.**
- 🌐 **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 Australia and Western Europe, and are in development for the Yucatán and the eastern Mediterranean for 2008, with 40 students scheduled to participate.**
- 🌐 **The Department awarded 21 GIS Certificates this year; and 45 students have completed half of the requirements. A new BS in GIS major has been developed, with 10 students expected to enroll during the coming year.**
- 🌐 **A geoscience graduate student won presentation awards at the annual Sigma Xi student conference, at the Kentucky Academy of Science meeting, and at the regional Southeastern Geographers conference.**
- 🌐 **A geology major was selected for an REU program at the American Museum of Natural History during the summer.**
- 🌐 **Forty students were actively engaged in applied research with faculty supervision through the ARTP and through externally funded research projects.**
- 🌐 **Faculty and students visited 15 overseas locations for research, professional development, conferences, study-abroad programs, expedition study tours, and collaborative activities, including multiple visits to China, Europe, and Southern Africa, and visits to Morocco, Niger, Mali, Burkina, Chile, Bahamas, and Turkey.**
- 🌐 **The Kentucky Geographical Alliance received \$50,000 in national funding for the second year in succession.**
- 🌐 **The Department Head published multiple Op Eds nationally on geoscience issues from global climate change to immigration and transportation.**
- 🌐 **The Kentucky Mesonet developed several weather network sites during the year.**
- 🌐 **Dr. Mahmood co-edited a special issue on climate and land cover use for the international journal Global and Planetary Change.**
- 🌐 **Scott Dobler served as the Kentucky State Geographer during 2006.**
- 🌐 **Nick Crawford was appointed a WKU Distinguished University Professor in 2006.**
- 🌐 **Dr. Groves received a \$2 million grant for the China Environmental Health Project.**
- 🌐 **Dr. Keeling lectured on two international study tours for the American Geographical Society, and served as Assistant Treasurer of the organization.**
- 🌐 **A new B.S. Meteorology degree has been approved by the CPE effective July 1, 2007, and already has enrolled 10 students effective Fall 2007.**

Key Indicators of Department Productivity, 2005-2006

- 🌐 **Majors and minors in the Department have increased by about 50 % since 2001.**
- 🌐 **Over \$4 million in grants and contracts received by the Department in 2005-06.**
- 🌐 **Faculty and students were featured 30+ times in media print and online articles.**
- 🌐 **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 Tanzania and Australia in 2006, and are in development for Western Europe in Winter 2007 (with Leadership Studies), the Bahamas in Spring 2007, and China for Summer 2007, with over 50 students scheduled to participate.**
- 🌐 **The Department awarded 28 GIS Certificates this year; and 50 students have completed half of the requirements. A new Graduate GIScience certificate has been developed, with 7 students completing the program.**
- 🌐 **Two students received awards at the annual Sigma Xi student conference; 3 students won awards at the annual Kentucky Academy of Science meeting.**
- 🌐 **Three students were selected for National Science Foundation and other (NASA) funded summer research programs.**
- 🌐 **Thirty-five students were actively engaged in applied research under faculty supervision through the ARTP and through externally funded research projects.**
- 🌐 **Faculty and students visited 20 overseas locations for research, professional development, conferences, study-abroad programs, expedition study tours, and collaborative activities, including three separate visits to Chile, two visits to China, and multiple visits to Europe and Africa.**
- 🌐 **Nick Crawford developed a void-seeking robot in partnership with Engineering.**
- 🌐 **A geoscience graduate student discovered 27 new species at the Sequoia and Kings Canyon National Parks.**
- 🌐 **Rezaul Mahmood received the 2006 WKU Award for Outstanding Research and Creativity – he also won the Ogden College Award.**
- 🌐 **Geology faculty Rick Scott won the Outstanding Ogden Adjunct Faculty Award.**
- 🌐 **Sara Dalton was recognized as the SGA's Ogden Outstanding Teacher of the Year.**
- 🌐 **The Kentucky Climate Center received funding to develop the Kentucky Mesonet, approved by the legislature as the Commonwealth's official climatological center.**
- 🌐 **Graduate student Scott Schoefernacker was recognized as the Outstanding Ogden College Graduate student.**
- 🌐 **Chris Groves received UNESCO funding through 2009 for the global karst aquifers and water resources project.**
- 🌐 **Geology faculty and students engaged with approximately 1500 P-12 students during the year on issues from earthquakes to volcanoes and the earth's history.**
- 🌐 **David Keeling lectured on two international study tours for the American Geographical Society, and was elected Assistant Treasurer of the organization.**














Key Indicators of Department Productivity, 2004-2005

- 🌐 **Majors and minors in the Department increased by 15 % over the previous year.**
 - 🌐 **Faculty and students were featured 40+ times in media print and online articles.**
 - 🌐 **60 students participated in study abroad programs, field camps, and field trips during the year, with an additional 200+ students visiting Mammoth Cave National Park as a requirement for Gen. Ed. courses. Study Abroad field-camp programs are in development for the Bahamas and Tanzania for Winter term 2006, and China for Summer 2006, with over 40 students scheduled to participate.**
 - 🌐 **The Department awarded 22 GIS Certificates this year; and 30 students have completed half of the requirements. A new Graduate GIS Certificate is developed.**
 - 🌐 **Three students received awards at the annual Sigma Xi student conference; 4 students won awards at the annual Kentucky Academy of Science meeting.**
 - 🌐 **Two students were selected for NSF Research Experience summer programs.**
 - 🌐 **45 students were actively engaged in applied research under faculty supervision through the ARTP and through externally funded research projects.**
 - 🌐 **Faculty and students visited 25 overseas locations for research, professional development, conferences, study-abroad programs, expedition study tours, and collaborative activities, including three separate visits to China, two visits to Bhutan, and a rare trip to Cuba.**
 - 🌐 **Four students participated in karst research expedition to Hunan Province, China.**
 - 🌐 **A geoscience graduate student published a book on Sequoia and Kings Canyon National Parks.**
 - 🌐 **Four undergraduate and graduate students were accepted to MS or Ph.D. programs beginning Fall 2005.**
 - 🌐 **Nick Crawford received the 2005 *Award for Outstanding Contributions to Karst Science* from the national Karst Waters Institute.**
 - 🌐 **35 scientists, faculty, and students attended the inaugural Climate Services Sym-posium of the Kentucky Climate Center.**
 - 🌐 **GIS Director partnered with DELO to offer summer GIS/GPS workshop for middle-school teachers.**
 - 🌐 **Margaret Crowder recognized as Young Careerist of south-central Kentucky.**
 - 🌐 **GIS director Kevin Cary earned the Certified GIS Professional (GISP) designation.**
 - 🌐 **Chris Groves received UNESCO funding to head a five-year international project to study karst aquifers and water resources.**
 - 🌐 **Ken Kuehn received a Distinguished Service Award from the Society for Organic Petrology, an international research organization.**
 - 🌐 **Chris Groves was elected President of the national Cave Research Foundation.**
 - 🌐 **David Keeling published three Op. Eds. in national newspapers and lectured on an around-the-world expedition for the American Geographical Society.**
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Key Indicators of Department Productivity, 2003-2004

- ④ The Department's Geography program has been designated for "enhancement" in WKU's program review process just completed for the 1998-2003 period.
- ④ 54 students attended eleven professional meetings and conferences, with 45 presenting research papers or posters.
- ④ Majors and minors in the Department increased by 25 % over the previous year.
- ④ 57 students participated in study abroad programs, field camps, and field trips during the year, with an additional 200+ students visiting Mammoth Cave National Park as a requirement for the Physical Geography Gen. Ed. course.
- ④ Faculty and students were featured 30+ times in media print and online articles.
- ④ The Department awarded 21 GIS Certificates this year, while another 24 students have completed half of the certificate requirements.
- ④ Three students earned first-place awards at the annual Sigma Xi student conference; 4 students won awards at the Kentucky Science Academy meeting.
- ④ Eight faculty visited 16 overseas locations for research, professional development, conferences, study abroad programs, study tours, and collaborative activities, including three separate visits to China.
- ④ Michael May won the Ogden College Award for Public Service, in recognition of his efforts to promote sustainable development in the community and region.
- ④ 54 students were actively engaged in applied research under faculty supervision through the ARTP and through externally funded research projects.
- ④ Six undergraduate and graduate students have been accepted to advanced graduate programs beginning this Fall.
- ④ Grant funds from the National Oceanic and Atmospheric Administration (NOAA), along with internal support, secured an advanced Mesoscale Meteorological Model to enhance student and faculty research.
- ④ A Geology alumnus was featured prominently in a Smithsonian *Air and Space Magazine* article on asteroid impacts.
- ④ A geology faculty member won a research award from the Oak Ridge Associated Universities for a multidisciplinary project in Java, Indonesia.

Key Indicators of Department Productivity, 2002-2003

-  **47 students attended eight professional meetings and conferences, with 32 presenting research papers or posters.**
-  **40 students participated in departmental study abroad, field camps, and field trips during the year.**
-  **A \$100,000 endowment to support the Geology program was received this year.**
-  **The Department awarded 14 GIS Certificates this year, while another 25 students have completed half of the certificate requirements.**
-  **The Department “closed the loop” by using assessment data to revise and restructure a core course in the geography curriculum.**
-  **Faculty visited 15 overseas locations for research, professional development, meetings, study abroad programs, study tours, and collaborative activities.**
-  **The Department organized and hosted the annual National Geographic Bee, attended by 100 middle-grades students and 200 parents and teachers.**
-  **The Department organized and hosted an International Karst conference, attended by the world’s foremost karst scientists.**
-  **51 students were actively engaged in applied research under faculty supervision through the Programs of Distinction.**
-  **A Master’s student has been hired by ESRI, the world’s largest GIS company, after receiving a student scholarship to attend the annual conference.**
-  **Action Agenda funds were used to set up a new rain gauge monitoring system at Mammoth Cave National Park, and to purchase Kentucky Digital Maps for student and faculty research.**
-  **The Department’s Peer Tutor program is designed to help at-risk freshmen and sophomores in the general education classes.**
-  **New short courses for non-traditional and continuing education students and community members were offered during the Summer session.**

Key Indicators of Department Productivity, 2001-2002


-  Students and faculty published six GIS-related articles in a special peer-reviewed issue of the *Journal of Cave and Karst Studies*.
-  Twenty students enrolled in the Department's first Study Abroad Program to study environmental issues in Australia during Summer 2002.
-  Seven juniors and seniors participated in the Department's newly established Peer Tutor program, providing mentoring, tutoring, and academic assistance to over 250 students.
-  The Department instructed the first group of 55 students in its new GIS-certificate program, using state-of-the-art instruction methods and the new GIS laboratory.
-  The geology faculty submitted and won a \$75,000 Kentucky EPSCOR grant to set up a mineralogy laboratory for a new faculty member.
-  Identified program strengths and weaknesses from new Senior Assessment exams, and developed initiatives to enhance technical writing, critical thinking, and analytical skills.
-  Developed a collaborative relationship with the Kentucky Geographical Alliance and the University of Louisville, and hosted 26 K-12 teachers for a June 2002 content workshop.
-  A Master's program graduate was named Federal Engineer of the Year, another graduate was admitted to the highly competitive Ph.D. program at the University of Washington, and a geology undergraduate was admitted to Vanderbilt's geology Ph.D. program.
-  A Masters student was awarded a highly prestigious and very competitive Cave Research Foundation grant from the National Speleological Society for her thesis research.
-  Faculty and students convened and/or participated in over 25 professional workshops and presented over 40 papers at local, regional, national, and international conferences. Faculty also gave about 100 academic and community talks during the academic year.
-  Over 30 students participated in conferences such as the annual AAG conference in Los Angeles, the regional GSA conference in Lexington, the annual Kentucky Academy of Science conference, and the annual Sigma Xi conference, among others.
-  Faculty visited 12 overseas locations for research, professional development, meetings, and collaborative activities (including two trips to China) with other institutions.
-  The Department completed its most comprehensive curriculum overhaul in decades.


Distinctiveness of the Department

A. Current Elements of Distinctiveness

 The Department of Geography and Geology is the only one of its kind in the Commonwealth of Kentucky and it holds the largest concentration of earth scientists in the state.


 The Department is strategically located near Mammoth Cave National Park, along the 31W Heritage Corridor, and near important coal resources. Its location offers significant research advantages.


 The Department has the only program in the United States with a specific emphasis on karst hydrogeology and on the numerous problems associated with development upon karst terrain.

 This is the only department in the Commonwealth with a curriculum in atmospheric science, and it is the only department on campus with three Programs of Distinction (The Kentucky Climate Center, the Center for Cave and Karst Studies, and the Hoffman Environmental Research Institute through the Center for Water Resource Studies).

 Faculty are diverse in training and research interests, yet provide an integrative approach to human-earth issues that spans the human and physical sciences. Several faculty are internationally respected as experts in their research areas.

 The Department's unique focus on the spatial dynamics of human-earth relationships provides an analytical perspective not offered by any other discipline on campus.

 The Department's history of successful programs in meteorology, city and regional planning, environmental management, and geologic sciences places it in a unique position to integrate business, community, academic, and governmental approaches to addressing human-environment issues.

 The Department's expertise in spatial and geologic analysis gives it a distinct advantage in teaching, developing, and promoting GIS (Geographical Information Science) approaches to problem solving.

 The Department is distinctive in providing professional public service through the State Climatologist and the Kentucky Climate Center, through its weather information broadcasts from the College Heights Weather Station, and through the Center for Cave and Karst Studies and the Hoffman Environmental Research Institute that address karst-related environmental problems.

★ The Department is internationally recognized for its well-marketed and high-quality summer research programs at Mammoth Cave National Park that address environmental problems associated with development on the karst terrain.

★ The Department is distinctive in the University for its long history of successful professional public service related to human-environment issues in the local community, the Commonwealth, nationally, and internationally.

B. Opportunities for Distinctiveness

★ The Kentucky Mesonet atmospheric sciences project creates opportunities for distinctiveness in research and service contributions to the university and community through student research, internships, and specialized courses.

★ The Programs of Distinction generally offer opportunities for distinctiveness in research and service contributions to the university and community through student research, internships, and specialized courses.

★ The Department plans to develop more distinctive curricula that focus on an integrated approach to addressing human-environment issues and problems.

★ The Department has the opportunity to become a leader of distinction in applying geotechniques to development strategies and policy formation, through a proposed innovative Earth Characterization Center.

★ The Department has the potential to enhance its distinctive self-supporting center for GIS analysis, which already is unique in the region.

★ The Department has the potential to develop more effectively the Commonwealth's only graduate program in Geoscience that takes a distinctive, interdisciplinary, integrative approach to human-environment research.

★ The Department has the potential to become a major focus for pre-service and in-service teacher training in the Geosciences.


★ The Department has the potential to become a distinctive destination for visiting groups of regional science students at the K-12 levels.


★ Through development of the Heritage Corridor Research Initiative, faculty and students can promote the concept of "Intelligent Development Solutions" in the region and engage K-12 teachers, students, and local officials in distinctive sustainable development programs.


 Development of the Lost River Research and Education Center, with its unique educational cave boat tour and an Outdoor Laboratory, has the potential to become a leading destination for school science groups.


III. Limitations


A. Institutional Limitations:


 Incoming students generally are poorly prepared to handle the rigors of the Geography and Geology curriculum. This conflicts with the University's strategic goal #2 -- to develop student excellence. *Solution:* Require geoscience instruction for teacher certification and encourage K-12 teachers to develop geoscience curricula.

 The University has made progress in providing adequate faculty and staff, yet the Department remains below benchmark on many indicators of institutional and peer-department support. This limitation conflicts with the University's strategic goals # 3 and 5 -- to assure high quality faculty and staff and to improve institutional effectiveness. *Solution:* invest in new faculty lines and bring faculty salaries and operating budgets up to benchmark levels and beyond.


 The University has allowed the physical plant of the Department (building, environment, public spaces, etc.) to deteriorate to the point where students are physically uncomfortable as they attempt to learn. This limitation conflicts with the University's strategic goal #1 -- to increase student learning. *Solution:* Repair the physical plant to an acceptable level of operating comfort and efficiency.

 The Department's ability to excel in teaching, research, and service is limited by a lack of adequate faculty travel and research support. This conflicts with the University's strategic goals #3 and 4 -- to recruit and retain high quality faculty and to enhance responsiveness to constituents. *Solution:* Allocate \$15,000 annually to the Department for teaching, research, and service support, either through E&G or grant increases.


 The Department continues to be severely limited in its ability to recruit and retain quality faculty, particularly women and under-represented groups, because of recruitment planning strategies by the University that are not timely. This conflicts with the University's strategic goal #3 -- to recruit and retain high quality faculty. *Solution:* develop recruitment strategies early in the academic year that permit effective recruiting of under-represented groups.

 The Department's ability to recruit outstanding graduate students is severely limited by the inadequate library facilities at Western. Continuing cuts in the periodical budgets are particularly devastating, as academic journals are the lifeblood of advanced undergraduate, graduate, and faculty research. This conflicts

with the University's strategic goal # 2 -- to develop student excellence and diversity. **Solution:** Restore the library's periodical budget for geoscience journals to an adequate level.


 The University further limits the ability of the Department to recruit outstanding graduate students because of its embarrassingly low graduate stipends and its failure to provide tuition remission for graduate assistants. This conflicts with the University's strategic goal #2 -- to develop student excellence and diversity. **Solution:** Increase graduate stipends 15 percent annually over the next five years to reach benchmark (\$15,000 annually, with a tuition waiver), and provide graduate assistants a tuition waiver.


 The University does an adequate job of tracking alumni for the Department, yet Alumni Affairs has not developed a specific fund-raising program for the Department. This conflicts with the University's strategic goal #5 to enhance institutional effectiveness. **Solution:** Institute a Department-specific program for alumni data management and fund-raising.


 The University's campus recruiters do not speak specifically about the Department's programs. This conflicts with the University's strategic goal #2 -- to develop the student body. **Solution:** Develop a specific marketing strategy for campus recruiters that includes the Department.

B. Departmental Limitations:

 The Department has insufficient technology support to deliver adequately its curriculum. **Solution:** Develop a fully maintained computer lab, a GIS technology center, and appropriate laboratories for geoscience courses supported by staff to administer and maintain the facilities.

 The Department is severely understaffed in terms of the faculty/FTE ratio desired by the University and in terms of the students' demand for more appropriate courses. **Solution:** Hire four additional faculty: two in geology and geoscience and two in meteorology/atmospheric sciences.

 The curriculum does not change quickly enough to meet the new demands of students and employers. **Solution:** Restructure the undergraduate and graduate curricula regularly to meet the needs of contemporary society. Streamline the curriculum revision process at the institutional level.

 The Department has a limited budget for enhancing student research and other learning activities. **Solution:** Develop additional monies through grants and service contracts; request that the University allocate \$3,000 annually to the Department specifically for student field-based activities (conferences, field trips, etc.).

✦ The faculty have limited time and expertise to develop marketing and promotion materials. *Solution:* Utilize the resources of Sponsored Programs, the College, and other divisions to develop adequate marketing and promotion materials.

✦ The Department is unable to maintain adequately its computer technology because of limited expertise and inadequate budgets. *Solution:* Hire a permanent full-time technology manager who can maintain the computer labs and GIS technology center (about \$50,000 annually).

✦ The Department relies almost exclusively on lower-division service classes to recruit majors and minors. This promotes the continuance of large service courses and limits the ability of faculty to develop more meaningful and appropriate courses. *Solution:* Develop a diversified plan for student recruitment, reduce the number of large service courses, and develop appropriate courses that will attract more students to the Department.

✦ The ability of the Department to grow has been limited by a lack of understanding by administrators, politicians, and others of the critical importance of geoscience in education and in the community. *Solution:* Continue to promote the value and importance of the Department's curriculum to all constituents.

Assessment of Current Programs

A. Overall Strengths:

✦ Successful placement of program graduates in their preferred employment fields, especially GIS, geology, hydrology, city and regional planning, climatology, and environmental geology.


✦ Geology students can graduate with all the academic credentials required for eventual professional registration at the state and national levels.

✦ Research opportunities are available in the Programs of Distinction and in the research initiatives of the Department.

✦ Students have the flexibility to focus on a specific area of interest within the Department based on organized "concentrations."


✦ The Department provides courses that focus on an integrative approach to addressing human-environment issues.

✦ The Department has a good record of developing student internships in a variety of research, government, and business environments.


 The Department has taken advantage of its location on karst terrain to develop programs in cultural geography, physical geography, and geology that take an interdisciplinary approach to environmental analysis.


B. Overall Weaknesses/Challenges:

 The Department has inadequate technology to meet the technical demands of students and employers. ***Solution:*** Develop additional computerized teaching labs with cutting-edge hardware and software (\$200,000).

 The curriculum of upper-division courses is highly diverse and in need of better integration. ***Solution:*** Restructure upper-division course offerings to emphasize higher-level content and technology that are integrated into relevant and attractive program tracks.


 Faculty interests, both topical and research, are diverse and often poorly connected. ***Solution:*** Integrate faculty interests through active involvement in the Programs of Distinction and the research centers.


 The Department is limited in its ability to offer instruction using cutting-edge technology, which reduces the effectiveness of the programs. ***Solution:*** Develop two smart classrooms (a geology/physical geography room and a cultural geography room) equipped with desk workstations, interactive faculty management tools, web links, and GIS software (\$100,000 each).


 The physical design and layout of several classrooms do not provide an attractive learning environment for students. ***Solution:*** Modernize the classrooms, redesign the seating in theater style, provide ports for laptops, and improve the aesthetics of classrooms.


 The Graduate Program has been technologically and methodologically weak and did not prepare students adequately for the demands of the market-place. ***Solution:*** Provide state-of-the-art learning technologies and engage students in activities that develop critical thinking and research skills.


C. Assessment of Major State, National, and International Trends Impacting Departmental Programs.


 The key trend in the geosciences is the adoption of GIS technologies in most fields of potential employment for our program graduates. ***Strategy:*** Continue to develop and strengthen the GIS offerings in key areas of the curriculum.


 Many graduate programs around the country are moving towards a greater level of integration between the physical and human sciences. *Strategy:* Develop an integrated geoscience curriculum for the graduate program.

 Applied research is emerging as a significant factor in the student learning process. *Strategy:* Develop a curriculum that links each student to one of the Department's Programs of Distinction or research centers and promote applied research activities as a key element of the student's education.

 The Council on Post-Secondary Education in Kentucky continues to target programs that do not meet an artificial "production of graduates" quota for elimination. This has a potentially negative impact on the Geology and Geoscience programs. *Strategy:* Continue to build the programs, recruit more majors, develop a greater awareness of the importance of a geology curriculum at Western, and enhance the programs through curriculum improvements.

 A growing trend towards increased globalization, sustainability, and integration of the regional, national, and international economies requires that the Department develop courses appropriate to the demands created by this trend. *Strategy:* Restructure the undergraduate and graduate programs to reflect this globalization trend.

 The introduction in August 2001 of an Advanced Placement Test in Human Geography may provide a larger pool of better-prepared students as potential majors and minors. *Strategy:* Identify schools in the region that offer the AP test, work closely with high school teachers, and develop specific recruitment plans for the Department's programs.

 Growth in the demand by K-12 teachers for advanced training in the geosciences provides an opportunity for the Department to enhance its Geoscience Master's Program to meet this demand. *Strategy:* Identify areas of increased demand, design specific courses to meet this demand, and recruit potential students.

Appendix A. Approved B.S. Meteorology Program

B.S. METEOROLOGY Degree (49.5 hrs)

Required Foundation Courses (30 hrs)	Title	Cr. Hrs.
GEOG 100 or GEOL 102	Intro. to the Physical Environment	3
GEOG 101 or GEOG 110	Human or World/Regional Geography	3
GEOG 121	Introduction to Meteorology	3
GEOG 217	Fundamentals of GIS	4
GEOG 300	Geographic Research Methods	3
GEOG 391	Data Analysis and Interpretation	3
GEOG 422	Physical Climatology	4
GEOG 424	Weather Analysis	3
CS 240	Computer Science I	3
GEOG 499	Professional Preparation	1

Required Professional Courses (19.5 hrs)	Title	Cr. Hrs.
GEOG 431	Dynamic Meteorology	3
GEOG 432	Synoptic Meteorology	3
<i>GEOG 4**</i>	<i>Dynamic Meteorology II (new course)</i>	3
<i>GEOG 4**</i>	<i>Mesoscale Meteorology (new course)</i>	3
<i>GEOG 4**</i>	<i>Physical Meteorology (new course)</i>	3
<i>GEOG 4**</i>	<i>Meteorological Instruments (new course)</i>	3
CS 245	Fortran	1.5

Other requirements (24 hrs)	Title	Cr. Hrs.
MA 126	Calculus and Analytical Geometry I	4.5
MA 227	Calculus and Analytical Geometry II	4.5
MA 327	Multivariable Calculus	4
MA 331	Differential Equations	3
PHYS 250/251	University Physics I	4
PHYS 260/261	University Physics II	4

NOTE: Students may not take any of the Professional Courses until the first semester of their junior year. While it is recommended that students complete MA 331 prior to this time, MA 331 may be taken concurrently with either Dynamics I or Synoptic Meteorology during the first semester of junior year. This also allows students to start with MA 118 if they are not sufficiently prepared for MA 126. If students have to start at a Math level less than 118, we may want to discourage them from the B.S. Meteorology degree. We may also want to consider having an application process after the fourth semester for enrollment into the B.S. Meteorology program to either control numbers or the quality of students.

Future Courses (any 3 hrs)	Title	Cr. Hrs.
<i>GEOG 4**</i>	<i>Hydroclimatology (new course)</i>	3
<i>GEOG 4**</i>	<i>Atmospheric Chemistry (new course)</i>	3
<i>GEOG 4**</i>	<i>Operational Forecasting (new course)</i>	3

<i>GEOG 4**</i>	<i>Satellite and Radar Meteorology</i>	3
<i>GEOG 4**</i>	<i>Severe Storms Forecasting</i>	3

Year 1 (starting 2007-08)

Fall

MA 126	4.5	
GEOG 121	3	
GEOG 101/110	3	
Gen Ed ENG 100	3	
UC 175	2	
Gen Ed Category F	2	17.5 hours

Spring

MA 227	4.5	
GEOG 100/GEOG 102	3	
PHYS 250/251	4	
General Elective	3	(GEOG 122/222 recommended)
Gen Ed Public Speaking	3	17.5 hours

Year 2

Fall

MA 327	4	
PHYS 260/261	4	
Gen Ed ENG 300	3	
Gen Ed Category B	3	
Gen Ed Hist 119/120	3	17 hours

Spring

MA 331	3	
GEOG 217	4	
GEOG 300	3	
General Elective	3	(GEOG 122/222 recommended)
CS 230	3	16 hours

Year 3

Fall

<i>Dynamics I</i>	3	
<i>Physical Meteorology</i>	3	
GEOG 391	3	
CS 245 – Fortran	1.5	
Gen Ed Category C	3	
Gen Ed Foreign Language	3	16.5 hours

Spring

<i>Dynamics II</i>	3	
<i>GEOG 422</i>	4	
CS 240	3	
General Elective	3	(GEOG 310/426/455 recommended)

Gen Ed Literature	3	16 hours
Year 4		
<u>Fall</u>		
<i>Synoptic Meteorology</i>	3	
<i>Meteorological Instruments</i>	3	
Gen Ed. Chem 120/121	5	
Gen Ed Category B	3	
General Elective	3	17 hours
<u>Spring</u>		
<i>Mesoscale Meteorology</i>	3	
<i>GEOG 424</i>	3	
GEOG 499	1	
GEOG 475	1-3	Strongly recommended
General Elective	3	(GEOG 310/426/455 recommended)
Gen Ed Category C	3	14-16 hours
Major	49.5 hours	
Gen Ed	36-45 hours	
<u>Electives</u>	33.5-42.5 hours	
Total	128 hours	

This degree program will be considered Option II (48 hours of coursework in Major)

University Degree Requirements:

- (X) Includes 48 unduplicated hours in major
- (X) Includes 42 upper-division hours
- (X) Includes one-half of hours in major at the upper-division level
- (X) Includes minimum of 128 unduplicated semester hours

The italicized courses in years 3 & 4 will have juniors and seniors in them so that they only have to be taught every two years. Some students will take the Dynamics courses during junior year while others will take Synoptic/Mesoscale during junior year.

Sample rotation of Met/Climate courses (subject to revision) through 2014-2015

GEOG 100 and 121 will be covered each semester as currently

NOTE: The sequence of courses from Fall 2006 to Spring 2009 represents a continuation of the current 3-semester rotation of GEOG 422, 431, 424 with Mahmood and the current every third semester rotation of GEOG 222, 426 with Trapasso. GEOG 432 will be every other fall starting in Fall 2006 and I plan on introducing Met Instruments in Fall 2007. There are no changes through 2009 from the current Meteorology Track except that GEOG 122 will be moved to Spring in 2007-08.

GEOG 431 & 432 will continue to have a co-requisite of MA 122 through Spring 2009.

Year 1 (2006-07)Fall

GEOG 122 – Aviation Meteorology	Hakman
GEOG 431 – Dynamic Meteorology	Mahmood
GEOG 432 – Synoptic Meteorology	Goodrich

Spring

GEOG 424 – Weather Analysis & Forecasting	Mahmood
GEOG 426 – Applied Climatology	Trapasso

Year 2 (2007-08)Fall

GEOG 222 – Observational Meteorology	Trapasso
GEOG 422 – Physical Climatology	Mahmood
GEOG 4** – Meteorological Instruments	Goodrich
GEOG 4** – Hydroclimatology	** New Faculty

Spring

GEOG 122 – Aviation Meteorology	Dobler/Hakman
GEOG 431 – Dynamic Meteorology	Mahmood
GEOG 4** – Operational Forecasting	** New Faculty

Year 3 (2008-09)Fall

GEOG 424 – Weather Analysis & Forecasting	Mahmood
GEOG 426 – Applied Climatology	Trapasso
GEOG 432 – Synoptic Meteorology	Goodrich
GEOG 4** – Satellite and Radar Meteorology	** New Faculty

Spring

GEOG 122 – Aviation Meteorology	Dobler/Hakman
GEOG 222 – Observational Meteorology	Trapasso
GEOG 422 – Physical Climatology	Mahmood
GEOG 4** – Thermodynamics	** New Faculty

Fall 2009 represents the official “start” of the B.S. Meteorology program with regards to the advanced Meteorology coursework. GEOG 431, 432, Dyn II, and Mesoscale Met., will all have MA 327 and PHYS 260/261 as prerequisites. Aside from the new coursework, the major change is that GEOG 122 & 222 will move to an every other spring rotation and GEOG 426 will be taught every 4th semester like all the other 400-level Meteorology courses.

GEOG 100 and 121 will be covered each semester as currently

Year 4 (starting 2009-2010, then 2011-2012, 2013-2014, etc.)

Fall

GEOG 431 – Dynamics I	Goodrich
GEOG 4** – Physical Meteorology	Mahmood
GEOG 4** – Severe Storm Forecasting	** New Faculty
GEOG 4** – Hydroclimatology	** New Faculty

Spring

GEOG 122 – Aviation Meteorology	Dobler/Hakman
GEOG 422 – Physical Climatology	Mahmood
GEOG 426 – Applied Climatology	Trapasso
GEOG 4** – Dynamics II	Goodrich
GEOG 4** – Operational Forecasting	** New Faculty

Year 5 (starting 2010-2011, then 2012-2013, 2014-2015, etc.)

Fall

GEOG 432 – Synoptic Meteorology	Goodrich
GEOG 4** – Meteorological Instruments	Mahmood
GEOG 4** – Satellite and Radar Meteorology	** New Faculty

Spring

GEOG 222 – Observational Meteorology	Trapasso
GEOG 4** – Mesoscale Meteorology	Goodrich
GEOG 424 – Weather Analysis & Forecasting	Mahmood
GEOG 4** – Thermodynamics	** New Faculty

Courses with 4 represent new preps**

New faculty will teach new advanced specialty courses such as...

Hydroclimatology
Atmospheric Chemistry
Operational Forecasting
Satellite and Radar Meteorology
Severe Storms Forecasting
Thermodynamics

Appendix B. GIS Strategic Plan

- I. Vision: Provide a collegiate GIS program of national prominence.
- II. Mission: The Department of Geography and Geology is dedicated to strengthening the GIS program by meeting the needs of students and employers in GIS education and in today's GIS businesses.
- III. Goals:
 - a. Goal 1: Strengthen our Remote Sensing Program
 - i. Develop a state-of-the-art remote sensing lab.
 - 1. Workstations (at least 20)
 - 2. After hours computer lab
 - 3. Remote Sensing Software and relevant software
 - 4. Plotter
 - 5. Large-format Scanner
 - 6. Printer
 - 7. Server
 - ii. Increase/hire the amount of faculty with expertise in remote sensing.
 - iii. Acquire more licenses for ERDAS Imagine software.
 - iv. Offer a concentration in Remote Sensing within the Bachelor of Science Degree in Geography as well as other specialty programs in remote sensing such as a certificate and minor.
 - b. Goal 2: Upgrade the GIS Facility
 - i. Existing GIS Classroom Lab (IEB 301)
 - 1. Upgrade workstations
 - 2. Upgrade printer
 - ii. Center for GIS (IEB 304)
 - 1. Upgrade workstations
 - 2. Acquire a Large-format Scanner
 - 3. Acquire more survey-grade GPS units
 - 4. Service contracts for the following hardware
 - a. HP Plotter
 - b. Trimble GPS Units
 - 5. Acquire more workstations
 - 6. Hire at least two full-time GIS specialist for the growing need of the Center for GIS as a result of projects and GIS support in the WKU community and region.
 - 7. Purchase a vehicle for use by the Center for GIS.
 - 8. Acquire own GPS Base station for data processing and instructional use.
 - 9. Acquire additional server to supply the growing needs in GIS for the WKU community and region.
 - iii. Add additional GIS Classroom Labs. Purpose: Our GIS program is growing, the number of students is increasing, and the job market is increasing.
 - 1. General use GIS lab like the existing one.
 - 2. Advance GIS Lab
 - c. Goal 3: Offer GIS program online
 - i. GIS Certificate
 - ii. Graduate GIScience Certificate
 - d. Goal 4: Hire additional faculty with different specialties in GIS or strong skills in GIS, either in geography or geology.
 - i. GIS:

1. Input, collection and correction of geospatial data
 - a. GPS
 - b. On screen digitizing
 - c. Databases
 2. Storage and retrieval of geospatial data
 - a. Database Management Systems
 - b. Networking
 3. Analysis and Modeling
 - a. Data Models
 - b. Spatial Analysis
 - c. Statistical Analysis
 4. Cartography
 - ii. The Various Applications of GIS
- e. Goal 5: Develop GIS Specific Degrees
- i. Bachelor of Science in GIS
 - ii. Master of Science in GIS
- f. Goal 6: Increase GIS Outreach
- i. Elementary Schools
 - ii. Middle Schools
 - iii. High Schools
 - iv. Local Governments
 - v. Local, national, and international conferences.
- g. Goal 7: Increase Faculty GIS public service opportunities.
- h. Goal 8: Increase funding for faculty and students for GIS-based conferences
- i. Goal 9: Develop team-taught GIS courses with existing faculty from inside and outside of the Department as well as with practitioners.
- j. Goal 10: Seek an endowment for the I.E. Building.
- IV. Initial reason for WKU's GIS program (year 2000): GIS technology has expanded rapidly over the past decade. The GIS software market now exceeds \$1 billion annually, and is growing about 17% annually. As a result, there is a growing demand for GIS professionals and others using GIS as an analytical tool. A study in 2000 for the Bowling Green/Warren County GIS Consortium identified 20 organizations in the local community alone that currently use or plan to use GIS. The Department's GIS program is being developed to meet the demand for GIS professionals in Western's service area, and was designed based upon input received from an Alumni Advisory Committee consisting of GIS professionals.
- V. History of the GIS Program in the Department of Geography & Geology
- a. Existing "mapping" courses before 2001, which were offered (some if not all) in the 1980s, 1990s, and in the year 2000.
 - i. GEOG 315, Cartography
 - ii. GEOG 404(G), Computer Mapping
 - iii. GEOG 410(G), Advanced Cartography
 - iv. GEOG 415(G), Air Photo Interpretation
 - v. GEOG 416(G), Remote Sensing
 - vi. GEOG 493(G), Geographic Information Systems
 - b. Year 1999: Bachelor's degree in Geography track title changed from Cartography to Cartography & GIS.
 - c. Year 2000:
 - i. Cooperative effort by the departments of Geography & Geology, Architectural & Manufacturing Sciences, and Agriculture with an Action Agenda and Grant:
 1. Action Agenda: GIS Computer Hardware

2. Action Agenda: GIS Software (ESRI University Site License (beginning in 2000) and 15 Licenses of ERDAS Imagine (beginning in 2002))
3. Grant: Renovation of the Industrial Education Building
4. Grant: 21-Seat Teaching/Student computer labs and The Center for GIS.
- ii. Two faculty positions that include teaching GIS courses, which makes 4 faculty members teaching GIS courses.
- d. Year 2001:
 - i. New GIS Courses Approved and Existing Courses Deleted
 1. GEOG 319 - Cartographic Design for GIS and GEOG 404(G) Cartography are deleted.
 2. GEOG 317 - Introduction to GIS - is approved, and GEOG 493(G) – GIS - is deleted.
 3. GEOG 417(G) - GIS Analysis and Modeling is approved
 4. GEOG 419(G) - GIS Application Development is approved
 - ii. GIS Certificate #174 Approved (12hrs): GEOG 317, 319, 417, and 419. Implemented in the Fall 2001 semester.
 - iii. GIS Instructor / GIS Director (for The Center for GIS) hired in July 2001, which makes five faculty members teaching GIS courses.
- e. Year 2002:
 - i. Center for GIS awarded \$10,000 to digitize network cables on Campus
 - ii. Action Agenda: 15 user licenses of ERDAS Imagine Pro. Renewable yearly along with ESRI University Site License.
- f. Year 2003
 - i. Bachelor's degree in Geography concentration title changed from Cartography & GIS to GIS & Spatial Analysis.
 - ii. Two graduate students taught one section of GEOG 317 in the spring.
 - iii. The Center for GIS awarded \$5,000 to digitize WKU main campus parking lots.
- g. Year 2004
 - i. An existing Geography faculty member is now teaching GIS
 - ii. An existing Geography faculty member is now teaching Remote Sensing.
 - iii. A new GIS faculty member is hired.
 - iv. An adjunct GIS faculty is hired, which now makes nine faculty members teaching in the GIS program.
 - v. New course approvals and course changes
 1. GEOG 319 (3 hrs) - Cartographic Design for GIS - is now GEOG 217 (4 hrs) - Fundamentals of GIS
 2. GEOG 317 title change: Introduction to GIS changed to Geographic Information Systems.
 3. GEOG 415 is deleted
 4. New Course approved: GEOG 414 - Introduction to Remote Sensing (4 hrs).
 5. GEOG 416 title change: Remote Sensing changed to Advanced Remote Sensing.
 6. New course approved: GEOG 515 - Remote Sensing Fundamentals
 7. New courses approved: GEOG 477 & 577, Special Topics in GIS
 - vi. Certificate in GIS #174 is now a 13-credit program: GEOG 217, 317, 417, and 419.
 - vii. New certificate approved: 12-hour Graduate Certificate in GIScience #204 (GEOG 417G, 419G, 515, 520, 577, 590, or 595 with a maximum of 6 hours from the 400G level).
 - viii. The Center for GIS awarded \$10,000 to digitize network cables and telephone wires on WKU main campus.
- h. Year 2005
 - i. GIS Instructor/GIS Director is awarded GISP designation in February 2005 from the GIS Certification Institute.
 - ii. New minor approved: 22-hour GIS Minor #366.
 - iii. New course approved: GEOG 318 - GIS for Engineers, is created in conjunction with the Department of Engineering. This course is a requirement for engineering students pursuing the Floodplain Management Minor, which is offered by both the Engineering and Geography & Geology departments.

- iv. New course approved: GEOG 418 - Internet GIS.
 - v. Center for GIS offers weeklong workshop for Mammoth Cave staff (17). Revenue generated: \$5,000.
 - vi. Center for GIS awarded \$5,000 for a GIS server.
 - vii. GIS Graduate student teaching GEOG 317
 - i. Year 2006
 - i. GIS graduate student teaching GEOG 317.
 - ii. New adjunct GIS instructor with GISP certification hired to teach GEOG 317 beginning Spring 2006, which makes 9 faculty members (two of which have a GISP designation) and one graduate student teaching in the GIS program.
 - iii. Center for GIS awarded \$5,000 to continue mapping telephone wires.
 - iv. 441 student credit hours in all GIS courses for the Spring 2006 semester. That is a 488% increase since the Fall 2001 semester, which only had 75 student credit hours in all GIS courses.

- VI. Certificates completed to date (August 2006): 77 (between Fall 2002 & Summer 2006).
 - a. 70 Certificates in GIS (Program #174)
 - b. 7 Graduate Certificates in GIScience (Program # 203)
 - c. Average: 20 certificates awarded per year.

- VII. Center for GIS (through June 2006):
 - a. Total money awarded/earned: At least \$50,000.
 - i. GIS Projects: (1) Network cable mapping project, (2) telephone wire mapping project, (2) parking lot mapping project and (3) GIS projects per individual case basis.
 - ii. GIS Workshops
 - iii. Poster printing services: \$2,500 per year average revenue generated.
 - b. Total number of Graduate Student Assistantships that the Center for GIS has funded (through June 2006): 4 (3 Assistantships awarded to work in The Center for GIS).
 - c. Total number of undergraduate student support (i.e., employment):
 - i. GIS Lab: 6 (Funded by the Department of Geography & Geology)
 - ii. Center for GIS: 3 (Funded by The Center for GIS)
 - d. Total number of internships: 3
 - e. Has provided funds for equipment to the Department of Geography & Geology and for travel to Geography, Geology, Geoscience, and GIS students and faculty.

- VIII. Students in GIS program after graduation or awarded certificate:
 - a. Very competitive in gaining positions in GIS as a profession.
 - b. Very competitive in gaining positions using GIS as an analytical tool.
 - c. Those who were in a temporary job position are now permanent.
 - d. Positive feedback on GIS program due to students being well prepared for the GIS sector.
 - e. The salaries of our graduates are competitive.
 - f. Excellent job satisfaction in GIS and GIS-related positions.

- IX. Stand-out facts about the GIS program at WKU:
 - a. GIS courses have been offered through the Department of Geography & Geology at WKU since 1992.
 - b. The first university in Kentucky to offer a Certificate in GIS
 - c. The first university in Kentucky to offer a Graduate Certificate in GIScience
 - d. The first university in Kentucky to offer a minor in GIS
 - e. The first university in Kentucky to offer a GIS track at the Bachelor's Degree level in Geography
 - f. The first university in Kentucky to offer a single course that combines the disciplines of GIS and Civil Engineering, which is appropriately titled GIS for Engineers (GEOG 318).
 - g. Since 2001, seven of our GIS students have been awarded a nationally competitive scholarship (50 students are selected from a pool of applicants from the 50 states per year) with ESRI for a summer assistantship: Rhonda Phaff (2001), Dan Taylor (2003), Jeremy Weber (2004), Shwu-Jing Jeng

(2005), Narcisa Pricope (2005), Shawn Marie Simpson (2006), and Jonathan Hall (2006). Two of these are currently working full-time in ESRI's headquarters in Redlands, CA.

X. GIS Program June 2006:

- a. Program offerings:
 - i. Certificate in GIS (#174)
 - ii. GIS Minor (#366)
 - iii. Bachelor of Science Degree in Geography (GIS & Spatial Analysis Track) (#674)
 - iv. Graduate Certificate in GIScience (#203)
 - v. Master of Science Degree in Geoscience (GIS & Spatial Analysis Track) (#072)
- b. GIS, GIS-related, and Raster-based Courses:
 - i. GEOG 217, Fundamentals of GIS
 - ii. GEOG 317, Geographic Information Systems
 - iii. GEOG 318, GIS for Engineers
 - iv. GEOG 414, Introduction to Remote Sensing
 - v. GEOG 416(G), Advanced Remote Sensing
 - vi. GEOG 417(G), GIS Analysis and Modeling
 - vii. GEOG 418, Internet GIS
 - viii. GEOG 419(G), GIS Application Development
 - ix. GEOG 477, Special Topics in GIS
 - x. GEOG 495, Supervised Internship
 - xi. GEOG 515, Remote Sensing Fundamentals
 - xii. GEOG 520, Geoscience Data Modeling
 - xiii. GEOG 577, Special Topics in GIS
 - xiv. GEOG 590, Experimental GIS Design
 - xv. GEOG 595, Supervised Practicum
- c. Meeting today's needs in GIS and dedicated to keeping up with state-of-the art GIS technologies.
- d. Practitioners and researchers of GIS teach GIS courses.
- e. Opportunities for students to gain real-world experience through classroom labs, internships, student employment and assistantships.
- f. GIS program has sufficient resources for opportunities in learning various GIS applications (e.g., GPS and Internet mapping systems) and software.
- g. Students graduating from our GIS program are competitive for positions as a GIS professional and positions using GIS as an analytical tool.
- h. The Center for GIS provides opportunities for students to gain real-word GIS experience and serves as a backbone to GIS projects on campus.

Appendix C. KCC Strategic Plan

Kentucky Climate Center

Vision

The vision of the Kentucky Climate Center is to be nationally recognized for innovation and excellence in the development and delivery of climate services, to attract gifted students by offering enhanced learning experiences that cultivate an appreciation of the role of science in society, and to promote a research and development program that attracts investment and encourages entrepreneurship.

Mission

The mission of the Kentucky Climate Center is to acquire, manage, archive, and disseminate Kentucky's climate data, to derive and distribute information from those data, to conduct climate research with an emphasis on issues relevant to Kentucky, to educate the people of Kentucky on matters of climate, and to engage students in learning experiences that prepare them for employment or advanced study.

Administration

The activities and initiatives of the Kentucky Climate Center are administered by the Director and Associate Director. The individual holding the position of State Climatologist for Kentucky shall serve as Director of the Kentucky Climate Center, and the director will appoint the associate director. In order to effectively administer the activities and initiatives of the Kentucky Climate Center, the Director and Associate Director will hold a 2/2 (fall/spring) course load. Each will be expected to serve as graduate faculty (1/1 course load alternative assignment) and administer the activities and initiatives of the Kentucky Climate Center (1/1 course load alternative assignment). In addition, each will be eligible for course buyouts based on the acquisition of grant funding for the Kentucky Climate Center.

KCC INITIATIVE 1

Visual Data Mining of Climatic Datasets

The goal is to develop end-user software applications to help decision makers extract information from large, often complex, spatial-temporal datasets.

The Kentucky Climate Center maintains an archive of climatic data and has access to online databases containing records dating from the present back to the 1800s. In addition, the Kentucky Mesonet will collect approximately 100,000,000 data values per years. The ability to extract valuable information from large, complex spatial-temporal datasets requires data visualization and data mining tools. These can be embedded with the structure of Internet mapping applications that provide an interface to climatic datasets. Software applications that add value to climatic data have the potential to be commercialized for use by both public and private sector decision makers.

We intend to form a multidisciplinary team of faculty and students that combines expertise in data analysis, cognitive psychology, and computer programming. We intend to create a working environment that encourages creativity and innovation. We intend to explore opportunities for commercializing decision support tools.

This initiative will be carried out in conjunction with the Kentucky Mesonet.

Actions

- Identify qualified and interested faculty
- Participating faculty recruit qualified students for internships
- Establish a relationship with the South Central Region Innovation and Commercialization Center

Resources

- A server, computers, and software
- Alternative assignment time buyout for participating faculty
- Student assistantships or hourly wages

KCC INITIATIVE 2

Community-based Hazard Mitigation and Disaster Response

The goal is to provide assistance to communities across Kentucky in developing mitigation, response, and recovery strategies for the occurrence of climate-related natural disasters.

The Kentucky Climate Center conducts research and provides information products addressing the threat and occurrence of climate-related natural hazards impacting Kentucky. In recent years, the Center has worked closely with the Barren River Area Development District to lend expertise to the community-based hazard mitigation planning throughout the ten-county district. The Kentucky Mesonet will provide valuable data in near real time to support mitigation and response programs

We intend to engage teams of students, including students in Western's photojournalism department, to document climate-related natural disasters when they occur, including their immediate impacts, initial community emergency response, and long-term community recovery. We intend to integrate knowledge gained from the documentation of natural disasters into a hazard-mitigation assistance program. We intend to involve both faculty and students in community-based hazard mitigation assistance efforts. In conjunction with the Kentucky Mesonet, we intend to develop an outreach program for emergency responders across Kentucky. This program will involve training workshops and the development of web-based products for delivering mesonet data to emergency responders.

Actions

- Establish a partnership with Western's photojournalism department
- Faculty/staff program coordinator
- Development of disaster reporting protocols
- Establish a dialogue with community-based emergency responders and relevant government agencies
- Development hazard mitigation assistance program materials
- Coordinate with Kentucky's area development districts

Resources

- Faculty/staff salary
- Equipment for multimedia rendering
- Motor vehicle
- Travel funds
- Student assistantships or hourly student wages

KCC INITIATIVE 3

Teaching Laboratory for Testing, Calibrating, and Deploying Scientific Instruments

The goal is to provide students with an appreciation and understanding of the use of scientific instruments for environmental monitoring.

The addition of a meteorological instruments course in the Meteorology and Climatology program in the Department of Geography and Geology will fulfill a requirement for certification of the curriculum by the National Weather Service. This certification will allow our students to be considered for employment at the GS-1340 level of the United States government.

We intend to expose students to the theoretical underpinnings of the various types of instrumentation available as well as methods of calibration, sensitivity analysis, and error detection. We intend to engage students in laboratory experiments which will allow them to garner hands-on experience in a problem solving context. We intend to develop an outreach program to area middle and high schools, wherein Western students will set up a portable weather station and collect meteorological measurements for use in class projects at the school.

This initiative will be carried out in conjunction with the Kentucky Mesonet.

Actions

- Develop a new course on the use of scientific instruments for environmental monitoring
- Establish partnerships with area schools to develop appropriate outreach activities

Resources

- Scientific instruments for environmental monitoring
- Calibration equipment
- Motor vehicle
- Travel funds
- Students assistantships or hourly wages

KCC INITIATIVE 4

Education Outreach

The goal is to develop an outreach program that will promote enhanced science, math, and geography education.

Data collected by the Kentucky Mesonet will be accessible in classrooms across Kentucky. Since these data will be available in near real time and relate to familiar places, students are likely to relate better to activities designed to incorporate these data.

We intend to develop learning activity modules for web-based delivery using data from the Kentucky Climate Center and Kentucky Mesonet for web-based delivery. We intend to develop workshops to help teachers to develop appropriate science, math, and geography content for their classes. We intend to develop learning activities for fieldtrips to selected mesonet sites.

This initiative will be carried out in conjunction with the Kentucky Mesonet.

Actions

- Hire an outreach coordinator
- Develop a partnership with the Kentucky Geographic Alliance to market and disseminate outreach materials
- Establish a dialogue with professional associations and centers dedicated to P-12 education.

- Develop outreach programs to be offered in conjunction with selected Kentucky Mesonet sites across Kentucky

Resources

- Faculty/staff salary
- Software
- Funds for designing, printing, and distributing outreach materials
- Funds to support travel and participation in professional conferences

KCC INITIATIVE 5

Climate Services Certificate Program

The goal is to develop and market a climate services curriculum and certificate program based upon principles of Western's Quality Enhancement Program.

The increasing number of mesonets producing large volumes of environmental data in near real time is creating demand for professionals with training and skills both in regard to the development and operation of such networks and in the application of mesonet data to meet needs in the public and private sectors.

“Western’s QEP will be implemented through a five-year plan to engage students with communities other than their own as part of their Western Experience. Our vision is to link community and classroom, living and learning, thought and action, preparedness and passion. We believe that, by bringing contemporary world issues into the curriculum, extending the reach of students’ learning opportunities into the broader community, and cultivating students’ experience within a living and learning environment rich in diversity of ideas, challenges and peoples, we will enhance their professional development, broaden their worldview, and promote their development as intentional learners, educated and responsible citizens.”

We intend to engage students in a wide range of service and applied research activities carried out in conjunction with the mission of the Kentucky Climate Center in its capacity as the State Climate Office for Kentucky. Through these various activities, students will become involved with a variety of geographic and professional communities. They will encounter community-based problems and be challenged to combine scientific knowledge, technical skills, and an understanding of social, cultural, and economic realities in order to address these problems.

This initiative will be carried out in conjunction with the Kentucky Mesonet.

Actions

- Develop an internship program that provides academic credit for students to participate in activities of the Kentucky Climate Center
- Restructure the specialty tracks within the geography major to encourage students to enroll in the internship program
- Evaluate academic programs at other universities and contact relevant government agencies to support the development of a curriculum for the certificate program
- Integrate existing courses and develop new courses, as appropriate, into the certificate program
- Develop a campus-based and nation-wide marketing strategy to attract talented students to enroll in the certificate program
- Develop contacts through relevant federal, state, and local government and non-profit organizations to support field-based internships

Resources

- Acquire additional library resources
- Funds for designing, printing, and distributing marketing material
- Funds to support travel and participation by students in professional conferences

- Funds to pay hourly wages and travel for some student internship activities

KCC INITIATIVE 6

Kentucky Mesonet

The goal is to develop and maintain a high-density statewide environmental monitoring system that achieves high standards for data quality and the delivery of data in near real time.

The Kentucky Climate Center has received an earmark of \$1.5 million through U.S. Senator Mitch McConnell to begin developing the Kentucky Mesonet. This network will provide a wide range of environmental data in near real time to support applications for public health and safety, economic development, and a broad range of other public- and private-sector applications.

We intend to complete a network of nearly 100 stations that reports five-minute observations for ingest at the Kentucky Climate Center every 15 minutes. There, data will be undergo quality assurance checks, be archived, and be disseminated via the Internet.

Actions

- Follow build-out plan developed for NOAA proposal
- Conduct meetings with potential stakeholders to develop partnerships and build a broad base of support and maximize benefits to the people of Kentucky.
- Develop a consortium of colleges and universities across Kentucky to support the

Resources

- \$1.5 million for completion of the mesonet
- \$0.8 million annual operating budget for equipment, maintenance, and personnel

KCC INITIATIVE 7

Climate Modeling

The goal is to conduct research using meso-scale climate models to better understand environmental processes that affect Kentucky.

Kentucky has diverse physical environment and is vulnerability to a variety of climate related hazards, including flooding and drought. The development of meso-scale climate models can help researchers to investigate land-atmosphere interactions and better understand the risks associated with severe and extreme weather and climate.

We intend to support efforts in conjunction with the department to enhance climate modeling research.

Actions

- Work with existing faculty to develop a program for climate modeling
- Work with the department to hire a climate lab technician

Resources

- Student assistantships or hourly wages
- Funding for a post-doctoral position
- Funding for a lab technician (in conjunction with department)

Appendix D. M.S. Geoscience Program Strategic Plan

Introduction

We take the view that an intellectually vibrant graduate program is an important part of academic life for faculty and students alike, even at a comprehensive, primarily undergraduate university such as WKU. While acknowledging the inherent limits imposed on a Master's program with this academic context, we believe that continued development of the MS in Geoscience Program is essential for achieving excellence in our efforts to engage students in the process of learning and conducting research.

Our current program has many strengths as well as some significant limitations. We face a number of important challenges and opportunities in the immediate future, including participation in the new MS in Environmental Sciences program. Here we propose broad outlines for improving the MSG program over the next several years, and list some specific objectives. It is important to develop a coherent vision and programmatic plan in order to make the MSG program more *intentional*, rather than simply a more or less haphazard aggregation of individual faculty members' contributions. By thinking carefully about what we want the program to become, we stand a better chance of achieving our goals and reaping the many benefits that will accrue to the university, faculty and students from an enhanced MS program in Geosciences.

General / Strategic Goals:

- Find ways for faculty to create better/broader range of graduate classes, seminars, and field experiences for students; encourage and reward faculty for doing so.
- Improve the quality of students attracted to and admitted to the program and thereby improve the quality of student research projects resulting from the program
- Take advantage of Departmental participation in the MS in Environmental Sciences program to strengthen the MSG program
- Increase the amount of external funding brought in to support graduate students and graduate research

Specific Issues and Objectives

a) Curriculum development:

- Re-structured core:
Reduce to 9 hrs (and thus require an additional 3 hrs graduate coursework)

Develop and implement models for team teaching 500 and 502 (possibly concurrently?) in order to get more faculty involved, draw upon the disciplinary breadth encompassed by the graduate faculty, and expose incoming students to the variety of our academic endeavors
- Develop new or revised 500-level offerings in specialty areas to give student more opportunities/options (see staffing issues below)
- Support for new MSES program (Grad level policy/planning, seminar, and "core concepts" courses), and efficient integration of MSG with this program
- Develop a graduate seminar series, so that at least one seminar-type experience is part of every student's degree program (required?)

b) Staffing Issues/Faculty Development

- Find ways to address challenges of 1) meeting SCHP/FTEF goals while offering more graduate courses (with smaller class sizes), 2) scheduling grad offerings so as to achieve minimum enrollment

- Consider graduate program development in all future staffing plans, with justification for new hires linked to opportunities for graduate-undergraduate research collaborations and the potential for increased external funding (e.g. future development of graduate level Geology courses is contingent upon additional faculty...)

c) Student Development

- Form a small (3 member) graduate program advisory committee that participates in review of applications, identification of course deficiencies and pairing of incoming students with initial faculty advisors. This group would also serve in an advisory capacity to the Dept. Head on graduate program issues such as allocation of graduate assistantships.
- Consider spring offers of departmental financial support to outstanding applicants for fall admission, in order to increase probability of attracting these students to MSG program.
- Work on advertising and marketing the program to attract students:
 - Improve descriptive materials (e.g. glossy brochures / posters) to make them stand out
 - Expand/Enhance online material for the MSG, highlighting student research experiences, faculty focus areas, etc.....
 - Disseminate program info through existing professional networks (with the existing interactions with the cave and karst community as a model)

d) Enhancement of Student Experience

- Improve *initial advising* of new students (prevent students from falling through the cracks in our assignment of initial graduate advisors)
- Make sure incoming students meet graduate faculty, other grads, and get acquainted with dept. resources and opportunities (Coordination between Graduate committee and GGS in this effort)
- Formalize procedures for written exams and oral defenses, to promote clearer communication of expectations for these assessments to students

WKU Geology Baccalaureate Programs Strategic Plan 2006-2011

I. VISION

The vision for the Geology degree programs is to provide a superior undergraduate educational experience that is recognized throughout Kentucky and the surrounding region for its excellence in instruction, its innovative programs and its outstanding learning environment.

II. MISSION OF THE GEOLOGY DEGREE PROGRAMS AT WKU

The mission of the Geology baccalaureate degree programs is twofold:

1. to prepare our majors for successful careers in a global society whether they choose to practice as professional geologists, continue their education in graduate schools, or become pre-college Earth Science teachers
2. to offer appropriate general education courses that teach learners about the nature, structure and history of the Earth System, the economic importance of Earth materials and issues relating to society's use of those materials, and the impacts of geologic processes on human activity.

Geology faculty fulfill this dual mission through diverse curricular offerings, innovative teaching, field and laboratory experiences, service learning and opportunities for independent research.

III. CURRENT ELEMENTS OF PROGRAMMATIC DISTINCTIVENESS AND STRENGTH

- Though six Kentucky universities offer baccalaureate degrees in Geology, WKU is currently the largest, accounting for 37% of all Geology graduates.
- The Geology program has an outstanding placement rate of 89% of its graduates into professional careers and graduate schools.
- Geology program is nationally competitive as evidenced by outcomes on standardized assessment (ACAT) given to exiting seniors and by the acceptance rate into top graduate programs.
- Six Geology undergraduates have earned placements into nationally competitive Research Experiences for Undergraduates (REUs) and a NASA internship in the past three years.
- Geology is the only program at WKU to offer both B.S. and B.A. degree options.
- Geology developed a certifiable B.A. degree in Earth/Space Science teaching according to the guidelines of the National Council for Accreditation of Teacher Education (NCATE).
- The Geology Program is one of only two programs in Kentucky to offer on-line professional development courses in Earth System Science Education. Geology offers dedicated courses in Field Techniques and Analytical Techniques for early immersion in the discipline.
- A full-time Geology instructor leads the Ogden College "Science Alliance" a large, interdisciplinary group of faculty that works to develop content and professional development activities for pre-college science teachers.

- The three tenured Geology PhD faculty members have earned awards and recognitions at the College level and one is a University Distinguished Professor. The one untenured Geology PhD has been a nominee for the annual Ogden Teaching Award and a part-time geology instructor won the 2006 Ogden Teaching Award in that category.
- Two of the four Geology PhD faculty members are registered professional geologists in Kentucky as is the Director of the Center for Cave and Karst Studies (Geography).
- All four Geology PhD faculty members have held, or are holding, elected leadership positions in the Kentucky Society of Professional Geologists (KSPG) and are active members of many other professional organizations on the national and international levels (AAPG, AGU, AIPG, GSA, MSA, NAGT, SEPM, etc.).

IV. LIMITATIONS AND WEAKNESSES OF THE WKU GEOLOGY PROGRAMS

Staffing/work load:

- The Geology degree programs are significantly understaffed relative to benchmark universities, barely covering the undergraduate curriculum, with little back-up in specialty areas and little flexibility to cover sabbaticals and alternate assignments.
- Senior faculty teach undergraduate laboratory sections resulting in excessive contact/grading hours.
- There are not enough graduate students with a Geology background who would be qualified to teach or assist in introductory sections.
- Geology has limited participation in the department's Geoscience graduate program.

Curricula:

- Offerings of typical undergraduate field and extramural experiences are hindered by a lack of internal funds, appropriate field vehicles, and employer-provided liability coverage for faculty.
- Significant Geology subject areas are currently not covered such as: geophysics, geochemistry (high-temp and isotopes), tectonics, basin analysis, economic geology, biogeochemistry, X-ray mineralogy and crystallography, clay mineralogy and Quaternary geology.
- Laboratory experiences are hindered due to the lack of technical support staff to maintain equipment, oversee teaching collections, and assist with laboratory-intensive instruction.

Facilities:

- The Geology program lacks basic analytical equipment to generate data necessary for routine, in-house analysis of Earth materials. As such, most analyses are run using facilities at other universities or commercial laboratories.
- Budget is insufficient to cover analytical costs as applied to student and faculty research.
- Geology faculty lack dedicated laboratory space for their research and the research of their students.

- Lecture rooms are not outfitted as ‘smart’ classrooms, lacking key technology aids that contribute to teaching effectiveness.
- Geology lacks a centralized location and effective visual presence in classrooms and hallways. Geology faculty offices are dispersed throughout the Department, resulting in inefficiencies.

Students:

- There is a lack of graduate students with Geology B.S. degrees who can function effectively as teaching assistants in undergraduate geology lab sections.
- There is a lack of graduate students with Geology B.S. degrees who are prepared to undertake geology-based Master’s thesis research topics.
- Geology must recruit its majors mostly from introductory courses because we are still receiving students who have been taught by teachers that have limited background in Earth Science.
- Most Geology majors do not pre-declare and are identified late sometimes causing issues with scheduling and timely program completion.

V. STRATEGIC GOALS FOR GEOLOGY DEGREE PROGRAMS, 2006-2011

Goal #1: Increase staffing and curricular offerings

We wish to achieve a fully staffed geology program, comparable to programs at benchmarks and other like institutions, with the necessary resources to support growth of the undergraduate geology program and potential participation by geology faculty in the MS programs in Geoscience and Environmental Science.

Action: Add two tenure-track Geology PhD faculty positions and a full-time Masters-level laboratory coordinator/instructor who has analytical and field expertise.

Action: Develop new undergraduate curricular opportunities in geophysics, tectonics, and other important discipline areas not currently represented.

Action: Increase interaction with the WKU Office of Sponsored Programs and pursue appropriate external funding opportunities.

Action: Investigate offering additional on-line modules or courses, especially those that could benefit a graduate program or professional development of in-service Earth and Space Science teachers.

Benefits/Outcomes

- Flexibility in scheduling for faculty will enhance participation in graduate programs, professional-level research and in seeking external funds. The frequency of peer-reviewed and other scholarly publications would increase as well.
- An expanded undergraduate curriculum would provide even better preparation for the “Fundamentals of Geology” portion of the ASBOG exam (nationally standardized

assessment required to become a practicing professional in the Commonwealth) and for those who wish to enter graduate schools in our quest to become nationally competitive.

- Offer more vocationally-oriented learning opportunities to provide additional certifications (e.g., GIS, HAZWOPER, and PLM/SEM/TEM for asbestos identification) useful in the Geology profession.
- The addition of a Masters-level laboratory coordinator/technician would provide support for any analytical investigations involving Earth materials, create flexibility for faculty and new learning opportunities for students, and enhance overall research productivity.

Goal #2: Improve physical facilities, classroom environment and analytical capacity

We wish to become a technically-functional Geology program with the ability to run routine analyses of Earth materials and to generate geological data sets in-house. We also wish to enhance (and in some cases create) dedicated teaching laboratories, with full access to well curated collections, computer technologies, and basic analytical equipment.

Action: Develop proposals for appropriate sources of internal funding (P.I.E. funds) and external funding to improve existing space and analytical facilities within ESTB.

Action: Investigate opportunities for re-purposing existing space within ESTB for analytical equipment, faculty laboratory space, and a student gathering area.

Action: Establish access to the existing analytical facilities in ARTP research centers.

Benefits/Outcomes

- Students are attracted to new facilities with well-organized collections, functioning (and accessible) analytical equipment, and computer technologies. These improvements will enhance enrollment in the Geology degree programs as well as the overall undergraduate experience.
- Gaining access to existing analytical facilities in the ARTP will increase students' research abilities, increase faculty research productivity, and create potential for providing analytical services to companies in the minerals, fossil fuels and environmental industries.

Goal #3: Enhance student engagement, learning opportunities and success.

We want our programs to be engaging to students, rich in innovative learning opportunities, and relevant to the existing (and future) job market and to the needs of society.

Action: Establish a Geology Alumni Advisory Board who will gather on-campus once a year for a meeting and program update and who will: 1) establish/oversee an endowed account to provide funding to support undergraduate research and field-based activities; 2) act as liaison between the program and internship/career possibilities; 3) advocate for the Geology degree programs.

Action: Increase interdisciplinary interaction with biology, chemistry, physics, engineering and agriculture for the purposes of strengthening collaborative research, service opportunities and curricular offerings.

Action: Create new learning opportunities that take advantage of WKU's close proximity to Mammoth Cave National Park, abundant coal resources, unusual mineral deposits, and significant economic non-fuel resources such as limestone, sand, gravel, and clays.

Action: Explore the possibility of establishing a joint field camp in the western US with another university.

Action: Develop new extramural experiences focused on pre-service teachers and students majoring in Earth and Space Science.

Action: Seek funding/institutional support for the purchase or routine use of a vehicle for fieldtrips, field-based research, travel to conferences, etc.

Action: Develop a Geology majors handbook to guide student success.

Action: Establish regular interaction with the new Student Success Center on campus.

Benefits/Outcomes

- An Advisory Board will ensure that the geology degree programs remain relevant and that students will have full access to (and awareness of) employment opportunities and educational opportunities in the geological sciences.
- New extramural experiences will enrich the diversity of applied and experiential learning opportunities available to our students and deepen their understanding of the Earth and its environs.
- A Geology majors handbook and strong connections to the Student Success Center will ensure that our students are fully aware of their progress in the Geology degree programs and their pathways to success both at Western and beyond.
- Strong interdisciplinary connections will strengthen the overall Geology program and lead to better prepared program graduates.

Goal #4: Enhance program enrollment

We wish to increase enrollment in the Geology degree programs in order to graduate at least 12 students per year in harmony with Kentucky CPE guidelines.

Action: Develop and distribute marketing materials for the Geology programs including program-specific brochures, posters, displays and CDs with images or PowerPoints, etc.

Action: Work with the Ogden College *Science Alliance* to enhance the professional development of pre-college Earth Science teachers and to help pre-college students develop their interest in the Earth sciences at an early age.

Action: Investigate whether a Baccalaureate degree in Earth and Environmental Science would be an attractive and viable major for students at WKU.

Action: Investigate opportunities with the new on-campus *Kentucky Academy for Mathematics and Science* for gifted pre-college students.

Benefits/Outcomes

- New marketing materials, better connection to pre-college Earth Science teachers and potential interaction with the *Kentucky Academy for Mathematics and Science* will all serve to attract students to the Geology programs.
- Creating a new major in Earth and Environmental Science would attract to students to the Department, Ogden College and WKU. Offering the degree under the auspices of the Geology program would significantly boost graduation rate. It would also expose students to the other programmatic offerings in the Department and College.