DEPARTMENT OF GEOLOGY
PROGRAM REVIEW COMMITTEE REPORT

The Department of Geology prepared a self study following program review guidelines. A two-person external review team visited the campus; reviewed the self-study documents; interviewed unit personnel, university administrators, undergraduate students, and graduate students; and submitted an external review report. The Program Review Committee (PRC) studied all written materials. The PRC liaison for the Department discussed the self-study materials with the department chair and faculty. The PRC discussed the Department with the Dean of the College of Arts & Sciences. This document reflects the PRC’s findings and recommendations.

SUMMARY OF THE SELF STUDY

Introduction

Mission. The Department mission focuses on providing high quality education; advancing research in the geological sciences; and serving the profession, the University, and the community. The self study emphasizes the integration of these areas.

History. The self study highlights two major changes in the Department over the past 15 years. One was a conscious choice, in response to a decline in the mining and petroleum industries, to shift in the early 1990s toward the area of environmental geology with an emphasis on geographical information systems (GIS). The Department restructured its curriculum and focused faculty research effort. The second major change was a revision of the undergraduate curriculum, in response to the last program review, conducted in 1997-98.

Description of the Unit

Programmatic and curricular offerings. The Department offers majors in both the B.A. and the B.S. degrees; in the B.S. degree the major includes specializations in Geochemistry, Geophysics, and Paleobiology. At the graduate level, the Department offers M.S. and M.A.T. degrees.

The Department maintains a close relationship with the Center for Environmental Programs, having cross-listed courses and created a joint faculty position. The Department is developing a proposal for a joint Ph.D. program with the Department of Biological Sciences at the University and with the Department of Earth, Ecological, and Environmental Sciences at the University of Toledo.

Two special programs are offered. The Summer Field Geology program is a six-week field experience for advanced undergraduates and entering graduate students who lack field experience. GeoJourney is a nine-week field experience for undergraduate majors.
and non-majors that integrates geology, environmental science, and American culture studies.

Faculty resources. The faculty has grown in the last seven years from 10 to 12, now including four professors, five associate professors, and three assistant professors as of spring 2005. In this period five new faculty have been hired and three have been lost to relocation, retirement, and tenure denial. The self study states that the faculty is more diverse in gender and ethnicity than the national average for geoscience departments. The normal allocation of effort is 50/30/20 for teaching/research/service. All faculty teach at all levels, with a load of four courses per year.

Graduate assistant resources. The number of graduate assistantships has increased from 12 to 16 over the past six years. Half of the gain was due to externally-funded research assistantships. One concern is that the University has had the lowest graduate stipends among the ten Ohio state schools with geology departments. In 2004-05 the stipend amounts were increased from $8,600 to $10,100, using Graduate College and Department funds, bringing the University up to seventh or eighth out of ten.

Staff resources. The Department has had stable staffing, with one secretary and one staff geologist. For most of the review period, one or two work-study students have helped in the office.

Students in the program. The number of majors has declined over the past six years, from 32 to 27, although the self study says the decline is less than that seen statewide. The demographics of the majors include 44% women and 11% non-Caucasian. The number of graduate students has remained constant at about 20, despite a drop of about 35% among state schools in Ohio. The graduate students include about one third women and almost 20% non-Caucasian. Graduate students have come from a wide variety of institutions; about 25% have their undergraduate degree at the University; over the past six years about 20% have been international students.

Student credit hour production. The number of student credit hours per full-time equivalent faculty (SCH/FTE) is high, roughly 30% above College of Arts & Sciences and University averages, and almost as much above that of peer institutions. (The only exception was a two-year period during which the class size of general education classes was limited.)

Recruitment and retention efforts. Recruiting undergraduates is more difficult than for other sciences because few students take geology in high school. Recruitment efforts include creative use of web resources that are tailored to students' interests and track their movement through the web site. Undergraduate students are identified from lists of admitted science students; graduate students are identified from lists purchased from the Educational Testing Service. The self study attributes the high retention rate to close student-faculty relations, fostered through numerous interactions.
Facilities and equipment. Most Department facilities are in Overman Hall, with additional storage space in Hayes Hall and the Centrex Building. Facilities include nine separate teaching labs, extensive facilities for sample preparation and analysis, and individual faculty research space. Extensive computer resources include an eight-machine student computer lab, a 14-machine GIS/Remote Sensing lab with various peripherals, and three department servers. The larger computer lab is also capable of broadcasting and receiving distance learning broadcasts. The Department operates a seismograph station and also makes use of the electron microscopy facility in Biological Sciences.

Information resources and services. The Department maintains an extensive web site on its servers. The University also participates in OhioView, a group of seven Ohio universities that collaborate in the area of remote sensing, sharing data, and developing on-line programs in remote sensing and GIS.

Resources in the Ogg Science Library are critical to the program. Journals being cancelled and books being moved to a repository off campus are starting to affect the ability of faculty and students to do research, and may impact faculty retention and recruitment.

Financial resources. While the operating budget has declined slightly, the total operating expenditures have increased by roughly 50% over five years due to increased external funding spent through the operating budget. The Department substantially improved its record of external funding from 1997-2002, although the funds received dropped back somewhat in 2002-03. Foundation funds, including scholarship and unrestricted funds, grew steadily over the past six years.

Self evaluation

Faculty quality and productivity. The self study reports that some faculty maintained strong publication records, but others did not. Except for two years, the number of refereed papers per faculty member is well below one per year, which is cited as a commonly used standard. The self study also states that most of the refereed papers are in top-tier journals, and points out that faculty were active in making presentations as measured by the number of abstracts, which was typically one and a half per faculty member per year. The number of publications is cited as an area for improvement. The performance in external funding has shown continuous improvement except for the last year cited (2002-03), and the fraction of the faculty with external funding has increased from one third to over half. The self study says a greater fraction would be desirable. The self study uses professional recognitions to measure the faculty’s research impact and their stature. It claims that about two thirds of the faculty have been invited to give special presentations at national or international meetings, about two thirds regularly review manuscripts and grant proposals, and about one third have received national awards in their discipline. The self study does not indicate which faculty fall in these categories.
The self study discusses in this section the importance of research for tenure and promotion, and expectations for faculty in this area. Two issues raised are that the existing standards for research performance lack specifics and that success in the department merit process does not guarantee success in promotion and tenure.

**Student entry attributes.** For undergraduate students, geology majors exceed the College and University averages in ACT and high school GPA by a considerable amount. The quality of entering graduate students has room for improvement. Entering geology graduate students have slightly lower average undergraduate GPAs than the College and University, and have considerably lower mean GRE scores. The self study notes two factors that affect the quality of entering graduate students: the shrinking number of geology graduate students nationally and the low assistantship stipends here. To address the latter factor, the Department has collaborated in the PRISM program, which has yielded four outstanding students, and has recently increased the stipend level.

**Assessment of student learning outcomes.** The self study lists learning outcomes for both undergraduate and graduate students, along with a variety of assessment methods. The self study states that improvements have been seen in general education courses, in proficiency in core areas in the capstone field course, and in collaborative learning skills at the graduate level, although it does not say what changes led to these improvements. The quantitative skills of undergraduate majors is still a concern, although some improvement has been seen, and it is too early to fully assess the impact of recent revisions to the curriculum.

**Additional information on quality of instruction.** The self study highlights two undergraduate programs. The six-week summer field course serves as a capstone experience for geology majors and science education majors specializing in earth science. The Department was the first in the nation to integrate digital mapping into such a course using hand-held computers, GPS, and GIS. This rigorous course provides students with an important and memorable experience, and an opportunity for close student-faculty interaction. GeoJourney is a new program this year that offers an introductory-level, interdisciplinary field experience to explore connections between the Earth, the environment, and U.S. cultures.

**Curriculum, instruction, and support services.** Seven years ago the Department began a major revision of its curriculum designed to strengthen it in several areas, particularly quantitative methods, petrology, and writing content, and to introduce a significant research experience to the BS major. The BA major was changed to provide more flexibility. These changes were completed in fall 2004, so it is still too early to fully assess them. Nevertheless there is concern that the rigor and reduced flexibility may be discouraging students from choosing geology as a major, and that there is limited exposure to the department’s research focus in GIS/remote sensing. The changes to the BA have not yet resulted in more majors.
Of the three specializations in the BS major – Geochemistry, Geophysics, andPaleobiology – only the latter has attracted a significant number of students; the other twoare cited as possible targets for elimination. Similarly, the MAT degree has not been usedin the last six years, so it might be dropped. However, the development of interest ingeoscience education in the Department and in an interdisciplinary master’s degree inscience education should be considered.

The self study claims above average performance by geology faculty in teaching and also cites the above average SCH/FTE ratio, the service teaching in general education courses, and the low reliance on instructors.

Service. Many faculty spend a far larger amount of time on service than the nominal 20% standard allocation of effort. Beyond usual service activities, faculty hold or have held several important service positions (e.g. Faculty Senate Chair, Director of Undergraduate Research, Arts & Sciences Faculty Chair, and Interim Director of the School of Communication Studies).

Comparative advantage and program distinctiveness. The Department is the only geology department in northwest Ohio and is the only one in the state to require a senior thesis. The self study also claims the Department leads the state in GIS and remote sensing. Geology majors enjoy a small student/faculty ratio and have opportunities for field trips in most courses.

Demand. Enrollment in geology general education courses has ranged from about 1900 to about 2100 per year over the past six years and is expected to remain stable. The demand for upper-level geology courses has declined along with the number of majors. The self study shows a similar national decline for 1995-2001. Small course enrollments may force offering core courses on an alternate year basis. Demand for graduate courses has remained steady because of steady graduate enrollment.

The self study states that the employment demand for geology graduates is strong. Of BS graduates, about 25% go on to graduate school, 25% to jobs in geology, especially in the environmental industry, and 50% to jobs outside geology. Many use GIS skills. Graduate schools attended by graduates include some of the best programs in the country. Of MS students, about 30% go to PhD programs, 60% to jobs in geology, and 10% to jobs outside geology. Again, most go into environmental work and use GIS skills. Geotechnology was recently identified by the U.S. Department of Labor as one of the three technologies with the greatest growth and job-creation potential.

Two programs offer service to the community. The demand has increased significantly for OhioView, which makes satellite images available on line. Demand has remained constant over the last three years for seismic data through OhioSeis.

Connection to the mission. The Department’s mission is well aligned with that of the College of Arts & Sciences, which emphasizes a liberal education, the generation of knowledge, and contributions to the community. Likewise, the Department’s mission
parallels that of the University, which emphasizes the interdependence of teaching, learning, scholarship, and service. The field camp and GeoJourney programs are notable examples.

The Department’s activities connect to three of the main themes in the Academic Plan: to leadership in learning, for instance through commitment to learning skills and modes of inquiry in general education courses; to critical thinking about values, as an active participant in BGX from its inception; and to new media and emerging technologies, as a leader on campus in the use of technology in both teaching and research.

The traditional areas of teaching, research, and service are evolving into inquiry, engagement, and achievement, where again the Department’s mission is well aligned. Inquiry is emphasized through field and laboratory experience, and the growing role of undergraduate research. The Department is engaged with the business community and public, consistent with the CHEE report, for instance through the use of remote sensing data, and through service learning projects. Achievement includes integration across disciplinary boundaries, of which environmental geology is a prime example.

Geology has a close relationship with two other programs at the University, Biological Sciences and Environmental Programs, especially through collaborative research programs. Geology and Environmental Programs even share a faculty position.

Financial considerations and adequacy of resources. The large number of SCHs per faculty member and the high subsidy category for geology generate significant revenue through teaching. Research is also cost effective, because of overhead generated by externally-funded research, and the low cost of research not externally funded. There are no significant costs for the Department’s service activities.

Operating budget and graduate stipend resources are generally adequate for routine operation, but fall short in several important areas: equipment purchase and maintenance, graduate stipend levels, and support for the Department’s computer network. Funds from OBR for purchasing major equipment have largely disappeared and there have never been funds available for maintenance or repair of existing equipment. If equipment fails it must sit idle (e.g. the X-Ray Fluorescence Spectrometer currently). It is not possible to purchase new equipment needed to take advantage of emerging technologies; such technology is necessary to remain competitive in teaching and research. An additional $10,000 per year would provide funds for maintenance and modest new purchases.

As described above, the Department recently increased its graduate stipends using Graduate College and department funds. Nevertheless the stipends are still low among Ohio state schools, and must be increased further just to keep pace. The Department’s goal is $12,000, just above the state and national medians.

The technical needs for maintaining the Department’s computer network have grown, and were the focus of one of the recommendations from the last program review. The role of the Staff Geologist has shifted to this area, but several faculty also devote time to network
administration, taking time away from teaching and research. Additional staff support is needed.

**Unit planning (next 7 years)**

The planning process. The plan was developed via two department retreats, in May 2003 and January 2004.

Goals and strategies. The plan includes three main goals.

(a) The first is to introduce a Plan II (non-thesis) M.S. degree option. The rationale for adding the Plan II option is to better meet the need for training in applied areas, in accord with a national increase in professionally-oriented graduate degrees, and to attract more students to the program. The Plan II option would emphasize the use of GIS and remote sensing for solving environmental problems. The Department expects to attract additional applicants and therefore to be able to increase the number and quality of students and to expand its graduate course offerings. Plan II is also well suited to an on-line format, which could reach a wider audience.

Program guidelines would be developed during year 1, anticipating approval of the degree in year 2, and advertising during year 3.

The academic theme of Leadership in Learning speaks of the need to redefine graduate education, by adjusting to the changing nature of the workplace, and providing students with needed technical skills in GIS and remote sensing. This emphasis is also consistent with the academic theme of New Media and Emerging Technologies.

(b) The second goal is to improve the general education offerings through several changes. First, GEOL 100 (lecture only) and GEOL 104 (lecture plus lab) would be replaced with a single lecture course and a separate lab course. At present the courses are essentially the same except for the lab component. This change would simplify the offerings. Second, new introductory-level courses would be added, such as Geological Hazards, Oceanography, Hydrology, and Earth Systems Sciences, in order to emphasize applied aspects of the discipline and to appeal to students because of the relevance to everyday life. The third and most important change would be to create a stand-alone lab course to accompany multiple introductory courses. The two introductory labs would be renovated to create more flexible, group-oriented workstations, replacing traditional lab benches, at an estimated cost of $50,000. Besides providing an improved general education curriculum, these new courses and lab format are expected to attract additional geology majors.

The plan for year 1 includes developing the curriculum and renovation plans for the new stand-alone lab, with the renovation planned for year 2. Also in year 2, approval would be sought to drop GEOL 100 and split GEOL 104 into separate lecture and lab courses. The courses would be offered in year 3. The new Natural Hazards course would be submitted
in year 4, with a goal of offering it in year 5. Assessment of the changes would continue throughout.

These changes support the theme of Leadership in Learning by stressing learning skills rather than content, and science as a mode of inquiry rather than a collection of facts.

c) The third goal is to increase collaborations with the Department of Geography and the Center for Environmental Programs. Along with Geology, these two units have grown in their use of spatial data to solve problems, especially environmental problems. All three units offer a GIS course (the GEOL and ENVS courses are cross-listed), and Geology has taught several ENVS courses since sharing a position. Because of these common interests, the Department proposes additional collaboration, possibly in the form of joint research programs, shared facilities, shared positions, new cross-listed courses, or new degree programs.

During year 1, the three units would discuss the nature and extent of future collaborations, encourage research collaborations, and possibly request a joint faculty position. Years 2-4 would be used to submit a plan for a joint GIS/remote sensing lab, and to develop plans for a new MS and BS degrees in Geotechnology.

Relationship to the Academic Plan. The self study identifies several significant ways their missions and goals align with the Academic Plan (see pp. 24-26 of the self study).

RESULTS OF PREVIOUS REVIEWS

The Department has completed nearly all of the 15 recommendations made by the Program Review Committee in 1998. Of particular note is success in increasing the number of external grants and changes to the undergraduate curriculum. The Department also implemented other recommendations regarding its seven-year plan, a research seminar, and its new advisory committee. Only two recommendations have not been substantially implemented. One (number 8) was to release faculty from performing network administration for the Department’s computers. Some progress has been made through additional staff effort, but faculty still spend large amounts of time managing the network, websites, and computers. Second, recommendation seven was to develop a policy for differential teaching loads and to modify its merit document accordingly. The self study describes modifying the merit document, but does not discuss a differential teaching load policy.

SUMMARY OF THE EXTERNAL REPORT

The external reviewers identified a number of strengths of the Department, including:

• faculty dedicated to providing the highest-quality education for majors and students in service courses;
• faculty-student interactions and a high degree of attention to individual students;
• a strong field component in the curriculum;
good use of instructional technology;
foresight in embracing GIS and remote sensing;
extensive offerings of general education courses, and contributions to the Honors and BGX programs;
effort devoted to recruiting students, and success in attracting students with high ACT scores and high school GPAs, and racially diverse students;
creative pedagogical approaches employed by several faculty;
an increase in faculty research productivity in recent years;
smooth function and governance, an effective and respected chair, and a collegial atmosphere; and
adequate resources.

The reviewers noted a number of weaknesses.

- Declining resources. The most serious need is funds for equipment maintenance, which threatens the use of existing equipment and hinders getting external funding. Insufficient staff resources and the decline of library resources also hinder faculty productivity.
- Low undergraduate enrollment. The reviewers note that this reflects a national trend, and that the Department has taken steps to increase enrollment. They recommend reexamining the sequencing of courses moved to alternate years and additional promotion of the BA degree program. They seem to endorse the Department’s proposed modifications to its general education offerings as a means of improving recruitment.
- Weaknesses in the graduate program. The reviewers cite the low stipends as a partial cause of difficulty recruiting high-quality graduate students, including those from outside the region. They note three consequences: 1) limited course offerings, including 500-level courses that former undergraduates may have taken at the 400-level; 2) uneven quality of teaching assistants, which hurts recruitment of majors; and 3) students have a hard time getting started on their thesis projects.
- Faculty workload issues. Faculty feel pulled in many directions. They carry heavy service loads, and morale may suffer for faculty who teach primarily general education courses. The reviewers suggest developing a differential workload policy.

The reviewers find faculty productivity in teaching is high, based on SCHs and student satisfaction, according to interviews with students. Faculty productivity in service is also high. They point to variation in research productivity within the Department. They conclude that “Although there is room for improvement, the scholarly output of the department is acceptable and comparable to that at peer institutions.”

The reviewers express concern about the perception by some faculty that the University does not have a serious interest in supporting the sciences.

The reviewers provided feedback on four specific issues.

1) Alignment with Geography and the Environmental Program. They cite several advantages of a possible new school, including natural research associations,
They express concern on behalf of faculty and students about the possible loss of identity of the separate disciplines, and they recommend a name for the new school that honors the diversity.

2) Non-thesis M.S. The reviewers seem to offer a mixed review. Although citing national precedent for this type of “professional geologist” degree, they express reservations because there is no documentation regarding success finding employment by students with such degrees, and because of the perception that this option might “dumb down” the entire program. They suggest creating a new M.A. degree instead. At the same time, they acknowledge that non-traditional students may find the Plan II option attractive, which in turn has both advantages and disadvantages.

3) Undergraduate curriculum issues. The reviewers identify low enrollment in upper-level courses as the major issue facing the Department. They acknowledge the key role of high quality teaching by TAs and faculty in recruiting majors, and recommend more effort in graduate training and attention to faculty teaching assignments. They recommend increasing the rigor of the BA degree and increased advertising of its availability. (See the faculty response below.) The reviewers endorse the proposed changes to the general education courses, except sharing a stand-alone lab among multiple introductory lecture courses, because the different focus of these courses would make such sharing impractical. They seem to recommend eliminating the Geochemistry and Geophysics specializations. Based on student complaints about the Quantitative Methods course, the reviewers suggest including that material throughout the curriculum rather than in a single course. (See the faculty response below.) Finally, the reviewers are enthusiastic about the field work and field trips, and recommend additional advertising of these opportunities around campus.

4) Graduate program issues. Because of the importance of TAs for recruiting majors, and because of comments by graduate students that the Teaching Pedagogy course was “too little, too late,” the reviewers recommend a different format for preparing TAs. They suggest a one-week intensive workshop before the fall semester, followed by one-hour per week for discussion through the fall semester. They also suggest faculty sit in on a class to provide each TA with constructive feedback. Also, the reviewers note that the graduate students feel overwhelmed with course work their first year, making it difficult to devote adequate time to developing their research topics. Therefore the reviewers recommend an Introduction to Graduate Studies seminar in the fall. Finally, the reviewers seem to suggest using alumni and current students to help in graduate recruiting.

In a meeting with the PRC liaison, the department faculty expressed fundamental concerns about some of the reviewers’ recommendations. In particular, the faculty felt that they relied too heavily on the input from students, which was incomplete and strongly biased by the particular students the reviewers met with. The students’ comments were discussed only briefly with a faculty member. For example, the reviewers never asked the undergraduate advisor about the B.A. degree option or how it is discussed with students. The student complaints about the Quantitative Methods course
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seem especially ill-founded given that the course has only been offered once, to six
students, and assessment in follow-up classes indicates the course was very effective. In a
couple of cases, the students reported telling the reviewers what they thought they were
supposed to rather than what they actually thought. So the faculty felt the reviewers
placed undue weight on the comments of a few students, and without the benefit of
getting a more complete picture.

Regarding the B.A. degree requirements, the faculty pointed out that those requirements
have recently been increased and now have the same core as the B.S. as prerequisites for
the summer field course. The additions to the B.A. that the reviewers suggest would bring
it very close to the B.S.

Regarding the graduate course load the first year, the faculty do not agree that three
courses represents too heavy a load as students prepare for their theses. In addition, the
Introduction to Graduate Studies seminar has been tried in the past, and some students
felt that the course did not achieve the intended goal of preparing them for their research.

**PROGRAM REVIEW COMMITTEE**

**FINDINGS AND RECOMMENDATIONS**

The Department of Geology has a number of strengths. The faculty are dedicated to
providing a high quality education for majors and students in service courses. The faculty
make good use of instructional technology and several faculty employ creative
pedagogical approaches. There is a strong field component in the curriculum. Faculty-
student interactions contribute meaningfully to student success and provide a high degree
of attention to individual students. The Department has made good use of assessment,
including adjustments to the major curriculum in response to assessment findings. There
is strong enrollment in the Department’s general education courses. The Department has
been attentive to recruiting undergraduate majors and graduate students, including the use
of innovative web recruiting. The Department has displayed foresight in embracing GIS
and remote sensing, and faculty research productivity has increased in recent years. In
addition, the Department maintains smooth functioning and a collegial atmosphere. The
PRC congratulates the Department on these accomplishments and on its effective
response to the previous program review.

1. **Creation of a School**

   *Findings.* During the course of the review, an idea was put forward to create a
school that would include the Department of Geography, the Department of Geology, and
the Center for Environmental Programs. There was little mention of the proposed school
in the self study from the departments, although the external reviewers for Geography
and Geology both commented on the idea. The PRC was also aware of the proposal
through meetings between the PRC liaisons and department faculty. However, the
clearest picture of what a school might look like emerged during the PRC’s meeting with
the Dean of Arts & Sciences, which occurred late in the review process. Because these
ideas were just taking form as the review progressed, the PRC does not feel prepared to
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make a recommendation about whether or not a school structure should be pursued. However, we do have enough information to recommend that the idea of a school should be explored.

It is clear that the Department of Geography, the Department of Geology, and the Center for Environmental Programs (which underwent a program review a year ago), all face problems, as any unit does. It is also clear that the three units share overlapping academic interests – the challenges they must solve might be met more effectively through collaboration. If the existing problems are considered in the light of a new structure, possibilities for new solutions are opened up. It is for this reason that the PRC encourages the faculty in the three units to explore a school structure.

Several new problems introduced by the creation of a school structure can be anticipated on the basis of the experiences of other schools at the University, and must be addressed at the outset if a school structure is to be successful.

1. The three units must occupy shared space. No synergy of ideas or efficiency of resource sharing will develop if the three units continue to occupy separate spaces at dispersed locations.

2. There is a delicate balance between the unity of the school and the autonomy of the constituent departments, especially regarding administrative authority for planning, hiring, promotion and tenure, merit, and operating budgets. Should authority for these administrative functions be held by the school or by the constituent departments/programs? On the other hand, it is important that faculty retain their identity as geographers, geologists, and environmentalists. In a school structure, where should primary responsibility for curriculum and research lie? Duplicating responsibilities at the school and department level certainly does not make sense. In answering the questions posed above, the faculty and administration should make clear what the role of the school is, and how the addition of this new level of administration (beyond that already provided by the college and departments) will improve the ability of the units to achieve their missions.

3. The proposed school faces a challenge in that it would span the social and physical sciences. This is particularly evident in looking at the “ends” of the continuum – sedimentology, say, compared to human geography. However, all three units have a history of interdisciplinarity. In fact, their common experience with interdisciplinary approaches to problem solving is a tremendous strength on which they can all draw as they explore the possibilities of a new school.

4. The PRC finds that the units’ culture and expectations differ around issues such as promotion and tenure standards, merit, research productivity, and workload. A challenge for a school would be to develop school-wide policies in these various areas that accommodate or reconcile these differences without lowering standards.

If the problems of creating a school can be solved, several new possibilities and opportunities will be created. For instance,

1. The school would be in a position to create a new, interdisciplinary master’s degree. At the undergraduate level, there is undeniable student interest in the
interdisciplinary approach provided by environmental studies, as evidenced by the number of majors. By contrast, Geography and Geology have both struggled to attract students as majors. It is reasonable to expect that student interest in a broadly-based interdisciplinary degree is present at the graduate level as well. An interdisciplinary master’s degree would have obvious benefit to Geography and Environmental Studies, which do not currently have a graduate program; it might also benefit Geology’s ongoing recruitment efforts.

2. At the outset, it is reasonable to think that the school would continue to offer the same set of undergraduate majors that are currently available through the separate departments and program. However, if an interdisciplinary master’s degree is created and offered, the faculty should be able to take what they learn from that experience and apply it to the undergraduate majors. Geography and Geology might even experience an immediate benefit through closer interaction with students in Environmental Programs. In the longer term, the curricula in the undergraduate majors might undergo an evolution informed by student interest from across the programmatic range within the school.

3. It has been evident for some time that all three units have a keen interest in GIS. The PRC does not want to overemphasize this common ground, as we see a danger in basing a deep collaboration on a shared tool. On the other hand, a school structure would make it easier to develop and manage a modern facility devoted to GIS. The combined interest and expertise in GIS also opens up the possibility of a minor in GIS (at the undergraduate level) or a certificate program in GIS (at the graduate level). This might be another way to tap into student interest and attract students to study the different geographical, geological, and environmental problems that can be solved with this tool.

4. It is difficult to assign duties and evaluate achievements of faculty taking on dual appointments. A school structure holds the potential for a smoother handling of these positions.

5. Research collaboration is a topic that is frequently raised as a positive benefit of a school structure. The PRC would like to temper this expectation with some cautionary comments. We note, for instance, that collaboration across department boundaries can be (and has been) achieved without a school structure. Why have such collaborations not developed previously among these three units, and how will those impediments to research collaboration be changed by a school structure? If the school is well designed, the potential for research collaboration and synergy may be increased by a school structure. However, realizing this potential is likely to take many years and require intentional planning and concerted effort. We also note that a school structure has the potential for increasing territoriality and animosity across department lines. How will this negative potential of a school structure be avoided? Will realizing one, but not the other, of these two potential outcomes require infusion of additional resources? If so, then we cannot simultaneously argue that a school structure will improve efficiency and collaboration.

However, moving beyond the cautionary comments, the PRC acknowledges that developing collaborations and synergies among these three units is an attractive
possibility. A school would be in a stronger position to propose hiring priorities designed to support innovative, interdisciplinary, and collaborative programs.

**Recommendation.** The Department of Geography, the Department of Geology, and the Center for Environmental Programs should explore the possibility of joining together to create a new school. They should attempt to develop a proposal for a school that addresses the problems anticipated in the *Findings*, above; the proposal should, of course, also attempt to take full advantage of the collaborative and interdisciplinary possibilities created by the school structure. The faculties of the three units, their chairs and director, and the Dean of Arts & Sciences should come to agreement by the end of the 2005-2006 academic year whether or not to pursue the creation of a school.

The remaining *Findings* and *Recommendations* all have to be addressed regardless of whether a new school is created or not, although the specifics will depend directly on the decision about the school.

2. Research Productivity and Faculty Workloads

**Findings.** The Department has made substantial strides in increasing external funding and the fraction of the faculty with external funding has increased as well. The external reviewers noted some unevenness in funding among the faculty, which is also evident in the faculty vitae. Further increasing the fraction of faculty with funding and increasing the total amount of funding are important goals, which the Department seems to have embraced. Of more concern is the weaker record of faculty publishing, cited by the self study as an area for improvement. Although the number of published abstracts is good, the number of refereed publications is somewhat low, even after a modest increase the past four years or so. Realistic expectations for research productivity must be set in light of overall workloads. Some faculty have carried relatively high service loads, for instance. On the other hand, the nominal teaching load for the Department is 2-2, below the University average for master’s departments. One of the recommendations from the 1998 program review included developing a differential workload policy, to give lower teaching loads to faculty with higher research productivity. It appears this has not been done. The external reviewers this year also recommended a differential workload policy. Criteria for merit and for tenure/promotion are not well aligned, and it is important that expectations be clear, especially for tenure.

**Recommendation.** The Department should continue its efforts to increase external funding among all its faculty. Additional effort should be devoted to increasing refereed publications. This effort should include a clearly stated differential workload policy regarding teaching loads in light of research productivity. Furthermore, the expectations for tenure and promotion should be revised and the criteria for merit should be brought into alignment with those expectations by the end of spring semester, 2006.
3. Graduate Recruitment

*Findings.* Graduate recruitment is a concern, based on the quality of entering students, below College and University averages, and the relatively high fraction (25%) of students who were undergraduates at BGSU. The difficulty lies in part with a state-wide decline in graduate enrollment in geology and with the low graduate stipends. The Department has developed some novel web-based recruiting and has been proactive in raising stipends. The low stipends are still a concern, and the present approach of enhancing stipends using Department operating funds has significant limitations, especially when viewed in the context of the University-wide problem. One alternative is to reduce the number of graduate assistantships in order to increase the stipend amounts, but this may have adverse effects on TA morale and teaching quality, which are especially important for undergraduate recruiting. It may be possible to increase external support for research assistants.

*Recommendation.* Additional efforts should be made to enhance graduate recruiting. Specifically, we recommend that the Department build on its past efforts to write a detailed recruitment plan, which is to be presented to the Dean of Arts & Sciences and the Dean of the Graduate College by May, 2006. The problem of low stipends can only be addressed successfully through the combined efforts of the Department, the College of Arts & Sciences, the Graduate College, and the central administration. At the department level, the recruitment plan could include grant support and affiliation agreements with external agencies, as well as other creative means to enhance graduate stipends. The Department may also decide to make some selective enhancements of RA stipends. We urge continued interaction with the Graduate College regarding strategies for raising stipends. The PRC sees this as one instance of a global problem for the University; hence the burden of increasing graduate stipends to competitive levels also rests at the college and university levels.

4. Undergraduate Recruitment

*Findings.* The declining number of geology majors is a concern, although it is similar throughout the state. The Department has developed a creative web presence to recruit majors from among science-interested students at the University. The self study does not describe efforts to attract additional science students to campus.

*Recommendation.* A recruitment plan should be developed that includes efforts to attract more science, and specifically geology, students to the University. The plan should be submitted to the Dean of Arts & Sciences by the end of spring 2006.

5. Equipment Needs

*Findings.* The Department relies heavily on expensive equipment for both teaching and research, especially to support the GIS/remote sensing focus. Higher-end computers than standard desktop machines and a fast department network are essential. The Department does not have adequate resources to maintain, repair, or upgrade
equipment, leaving the constant threat of equipment failures and an increasing challenge to keep up to date. Although these problems are not limited to this department, it is affected more than most. It may be a reasonable expectation that the Department fund an increased amount of its equipment needs using external grants.

Recommendation. The Department, the Dean of Arts & Sciences, and the Vice Provost for Research should develop a plan for funding equipment maintenance and replacement, including realistic expectations for the relative contributions of internal and external funds. This plan should be completed by May, 2006.

6. Plan II M.S.

Findings. The proposed Plan II M.S. program has some potential advantages, but also some potential disadvantages. It is intended to meet the needs of more professionally-oriented students and to increase the graduate applicant pool. Even if there is increasing student demand for applied training as the self study claims, the external reviewers point out that the demand by employers was not demonstrated. It should be before the Plan II option is offered. An important potential advantage would be the Plan II option attracting additional applicants, which if realized would allow the Department to be more selective and thereby raise student quality. It is less clear that enrollments would also increase, or with very limited funds for stipends, whether that would be desirable. Adding Plan II students, especially at the expense of Plan I students, might also have a negative effect on faculty research productivity. The reviewers related a concern by some faculty that adding the Plan II option might “dumb down” the entire graduate program.

Recommendation. The Department should weigh carefully the potential advantages and disadvantages of adding a Plan II option, informed to the extent possible by documented student and employer demand. The impact on enrollment, stipend funds, program quality, and faculty productivity should be considered.

7. General Education Course Revisions

Findings. The Department proposed several changes to its General Education offerings intended to improve the students’ experience and to help attract new majors. The first, replacing GEOL 100 and 104 with a single three-credit lecture course and a one-credit lab course is not only simpler, but as the external reviewers point out, it will also remove a barrier to current GEOL 100 students who decide to become geology majors. Second, expanding the general-education course offerings will benefit students by providing greater selection and by emphasizing the relevance to everyday life. The potential benefit to recruiting majors is obvious. The third proposed change is creating a stand-alone lab to accompany multiple introductory courses. The benefit of having a stand-alone lab course is clear, namely giving the students an easy option for adding a lab if and when they want to. The benefit of having a single lab course for multiple lecture courses is not obvious, aside from ease of scheduling and course management. The labs would necessarily be more disconnected from the lecture courses, which would presumably weaken student learning.
The proposed new lab course will adopt hands-on, active learning exercises. Although linked in the self study to the creation of a stand-alone lab course, an active learning approach could be adopted in any new or existing lab course. The self study does not attempt to describe carefully the proposed lab format, nor to justify carefully the $50,000 renovation. The cost of new equipment (e.g. computers and instrumentation) should be included in the estimated cost of renovation. The additional demands on TAs and on faculty for TA training and supervision may be significant.

**Recommendation.** The Department should proceed with the proposed changes to GEOL 100/104 and the addition of new general education courses (to be implemented by fall 2007). If a new lab course is created to accompany multiple lecture courses, the goals and design for student learning should be clearly explained along with assessment strategies. If it wishes to move forward with lab renovations, the Department should present a plan that thoroughly explains and justifies the new format, includes the costs of all new equipment, and evaluates the impact on TAs and faculty. Both the lab format and the cost of the renovation should be worked out in detail and submitted to the Dean of Arts & Sciences as a plan by May 2007, if the Department is to proceed with these changes.

8. Assessment

**Findings.** The Department has established learning outcomes for both undergraduate and graduate programs, along with a variety of assessment methods. The Department seems to be making use of assessment results to inform curricular revisions.

**Recommendation.** The Committee encourages the Department to continue their assessment activities, and to use the information gained from this process as a fundamental driver of curricular revision and pedagogical innovation. The Department should continue development on assessments for the graduate program, drawing on a wide range of student experiences, projects, and artifacts. The Department should report on these activities in their annual reports to the Student Achievement Assessment Committee.

*The Department of Geology should report annually to the Dean of the College of Arts & Sciences, with a copy to the Provost, on the implementation of these recommendations.*