

# IOWA STATE UNIVERSITY

OF SCIENCE AND TECHNOLOGY

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## Interoffice Communication

Date: February 12, 2004

To: Graduate College Curriculum Committee

From: William G. Crumpton, Chair, Water Resources Supervisory Committee  
Environmental Science Coordinator

Subject: Renaming Water Resources Major

Water Resources is an interdepartmental major providing training and research opportunities leading to the M.S. and Ph.D. degrees. The major was authorized in 1962, and since that time has been administered by the graduate college, first as an interdepartmental program and then, since 1972, as an interdepartmental major. For the first 25 years, the Water Resources Supervisory Committee provided program supervision, but there was neither faculty governance nor even a list delineating the Water Resources faculty. It was assumed that any faculty member in any participating department could recruit and train students in Water Resources. Following a review of the program in 1990, formal policies and procedures were adopted which 1) certified a list of Water Resources Faculty and established procedures for adding and removing faculty from that list, 2) defined the participating departments and their obligations, and 3) established admission procedures and degree requirements for the major.

Since certifying the Water Resources faculty and giving them control of the major in 1990, the Water Resources program has broadened in scope, curriculum, course offerings, and faculty participation, becoming what is more accurately an Environmental Science major. During our self study for last year's external review of graduate programs, the Water Resources Supervisory Committee put forward the idea of formally changing Water Resources into an Environmental Science major, an idea that received strong support from Water Resources faculty and students alike. After further discussion and review of curriculum and course offerings, the Water Resources Supervisory Committee recommended to the faculty that we formally change the name of the Water Resources major to Environmental Science. The Water Resources faculty voted overwhelmingly in favor of this change (31-2), and we now request approval of the Graduate College Curriculum Committee.

The name Environmental Science much more accurately reflects our program's curriculum, course offerings, faculty expertise, and student interests. In addition, the change would offer advantages in student recruitment, program resources, and program identity. Environmental Science is a much more common name than Water Resources and for that reason alone, many more students apply for graduate programs in Environmental Science. The graduate and undergraduate Environmental Science majors could share the existing Environmental Science office and secretarial staff, providing a physical home and helping to promote a sense of identity for both undergraduate and graduate majors. Environmental Science would be the only

interdepartmental graduate major with a corresponding interdepartmental undergraduate major. Participating departments have already indicated interest in colisting most of the courses in our current curriculum, and even by a conservative count, the Environmental Science catalog listing could include over 50 graduate courses. This would provide immediate and substantial visibility for the graduate major and would help tremendously in promoting a sense of identity among our students and faculty.

The following pages include a list of the current Water Resources faculty, our curriculum requirements, and a list of courses. The Environmental Science faculty would initially consist of the current Water Resources faculty, but it is likely that 5-10 additional faculty would apply for membership if our proposal is approved. The Water Resources curriculum and course offerings were recently revised and as stated above, the name Environmental Science much more accurately reflects the character of our curriculum and course offerings. These would become the Environmental Science curriculum and courses offerings.

There are currently 9 M.S students and 12 Ph.D. students enrolled in Water Resources. In discussions last year, most of the Water Resources students indicated interest in an Environmental Science major. If our proposal is approved, currently enrolled students would be given the option of continuing as Water Resources majors or switching to Environmental Science, but we would not admit new students in Water Resources.

I have included letters of support from six departments and a letter of opposition from one department. As could be expected from the overwhelming faculty support, there was strong departmental support for our proposed name change. Nearly all of the departments agreed that Environmental Science more accurately represents the true character of the major and nearly all expect that the proposed name change will significantly improve graduate recruitment. The single department (NREM) writing in opposition to the proposed name change expressed concern first that there would be a loss of visibility for the program and second that the major would have significant overlap with existing programs. With respect to loss of visibility, it would seem that the Water Resources faculty would be in the best position to judge the merit of this concern. They are the most familiar with the Water Resources program and have the most at stake from a loss of program visibility. By an overwhelming margin (31-2) these faculty voted in favor of renaming Water Resources as Environmental Science. With respect to the second concern, we are proposing to rename an existing major (W Res/ EnSci) with known faculty, curriculum, and course offerings. Based on an examination of courses and participating faculty in common among existing programs, the overlap between W Res/ EnSci and other interdepartmental or departmental programs seems to be minimal. There would be virtually no overlap between EnSci and Genetics or IPPM, and only about 5-15% overlap between EnSci and EEB or Sustainable Ag. Interdepartmental programs frequently raise concerns of duplicating and weakening more traditional departmental programs, but in practice, interdepartmental programs allow departments to expand the size and quality of their recruiting pool. According to ISU's Task Force to Review Small and Interdisciplinary Degree Programs, interdisciplinary programs have accounted for nearly all of the growth in ISU graduate enrollment since 1997.

# Water Resources Faculty

## **Agricultural & Biosystems Engineering**

Baker, James  
Batchelor, William  
Helmers, Matthew  
Kanwar, Rameshwar  
Lorimor, Jeffery  
Mickelson, Steven  
Richard, Thomas  
Tim, Udoyara

## **Agronomy**

Al-Kaisi, Mahdi  
Anderson, Paul  
Arritt, Raymond  
Blackmer, Alfred  
Burras, Lee  
Cruse, Richard  
Henning, Stanley  
Horton, Robert  
Killorn, Randy  
Loynachan, Thomas  
Mallarino, Antonio  
Taylor, S.  
Tabatabai, M.  
Tackle, Gene  
Thompson, Michael

## **Civil, Construction, and Environmental Engineering**

Gu, Roy  
Ong, Say  
Jones, Ladon

## **Ecology, Evolution, and Organismal Biology**

Crumpton, William  
Downing, John  
Jurik, Thomas  
van der Valk, Arnold

## **Food Science and Human Nutrition**

Pometto, Anthony

## **Geological & Atmospheric Sciences**

Chen, Tsing-Chang  
Fang, Jiasong  
Mora, German  
Simpkins, William

## **Horticulture**

Christians, Nick  
Taber, Henry

## **Natural Resource Ecology & Management**

Atchison, Gary  
Isenhardt, Thomas  
Pierce, Clay  
Schultz, Richard  
Summerfelt, Robert

## **Soil Tilth**

Burkart, Michael  
Cambardella, Cynthia  
Hatfield, Jerry  
Laird, David  
Logsdon, Sally  
Moorman, Thomas

## Water Resources Curriculum

The Water Resources curriculum is designed to provide the interdisciplinary approach needed in water resources education and research while allowing flexibility in designing individual programs. Specific degree requirements for Water Resources majors (inclusive of co-majors) and minors are listed below. In addition to course requirements, Water Resources majors are expected to attend the Water Resources seminar (W Res 690b) each semester and to give a formal presentation of their graduate research prior to graduation.

\*These courses must be selected from the Approved List of Coursework maintained by the department.

Requirements for [M.S. degree](#) with a major or co-major in Water Resources ([thesis option](#))

12 credits of course work in water resources science\*  
6 credits supporting course work  
6 credits M.S. thesis research  
5 credits of additional course work or research

Requirements for [M.S. degree](#) with a major or co-major in Water Resources ([non-thesis option](#))

18 credits of course work in water resources science\*  
12 credits supporting course work  
3 credits of W Res 599 (Creative Component)

Requirements for [Ph.D. degree](#) with a major or co-major in Water Resources

18 credits of course work in water resources science\*  
12 credits supporting course work  
15 credits of Ph.D. dissertation research  
27 credits of additional course work or research

Requirements for a [minor](#) in Water Resources for students obtaining a [M.S. degree](#) outside of Water Resources

9 credits of course work in water resources science\*

Requirements for a [minor](#) in Water Resources for students obtaining a [Ph.D. degree](#) outside of Water Resources

12 credits of course work in water resources science\*

## Water Resources Approved List of Coursework

Listed below are those courses that can be used to meet the requirements for coursework in water resources science as described for the Water Resources Curriculum. If a course is shown as being cross-listed in another department in the course catalog, it may be used towards the Water Resources requirement.

Course	Course Name	Credits
A ECL 410	Aquatic Ecology	3
A ECL 410L	Aquatic Ecology Laboratory	1
A ECL 513	Ecological Toxicology	3
A ECL 518	Stream Ecology	3
A ECL 535	Restoration Ecology	3
A ECL 544	Aquatic Toxicology	3
AE 505	GIS and Natural Resources Management	3
AE 520	Agricultural Water Quality Engineering	3
AE 521	Natural Resources Conservation Engineering	3
AE 523	Erosion and Sediment Transport	3
AE 525	Geographic Information Science	3
AE 580	Engineering Quantification of Biological Processes	3
AGRON 406	Climate of the continents	2
AGRON 485	Soil Microbial Ecology	3
AGRON 505	Biometeorology	3
AGRON 553	Soil-Plant Relationships	3
AGRON 558	Laboratory Methods in Soil Chemistry	3
AGRON 559	Environmental Soil and Water Chemistry	3
AGRON 575	Soil Morphology, Genesis, and Classification	3
AGRON 577	Soil Physics	3
AGRON 578	Laboratory Methods in Soil Physics	1
AGRON 585	Soil Microbiology and Biochemistry	2-3
BOT 564	Wetland Ecology	3
BOT 584	Ecosystem Ecology	3
BOT 587	Aquatic and Wetland Microbial Ecology	3
BOT 590	Special Topics	1-3

CE 520	Environmental Engineering Chemistry	3
CE 521	Environmental Biotechnology	3
CE 522	Water Pollution Control Processes	3
CE 523	Physical-Chemical Treatment Processes	3
CE 524	Air Pollution	3
CE 525	Industrial Wastewater and Resource Recovery	3
CE 527	Solid Waste Management	2
CE 529	Hazardous Waste Management	3
CE 571	Surface Water Hydrology	3
CE 572	Analysis and Modeling Aquatic Environments	3
CE 573	Groundwater Hydrology	3
CE 574	Environmental Impact Assessment	3
CE 575	Soil and Groundwater Remediation	3
CE 628	Bioremediation Engineering	3
EN SCI 330	Environmental Systems	4
EN SCI 402	Watershed Hydrology and Surficial Processes	4
EN SCI 403	Environmental Biogeochemistry	4
GEOL 510	Field Methods in Hydrogeology	2
GEOL 511	Hydrogeology	4
GEOL 515X	Paleoclimatology	3
GEOL 522	Environmental Geochemistry	3
GEOL 525X	Stable Isotopes in the Environment	3
GEOL 534	Contaminant Hydrogeology	3
GEOL 575	Surficial Processes	3
Ia LL 505I	Watershed Modeling and GIS	4
Ia LL 508I	Aquatic Ecology	4
Ia LL 535I	Restoration Ecology	4
Ia LL 561I	Introduction to GIS	4
Ia LL 564I	Wetland Ecology	4
MTEOR 406	Climate of the continents	2
MTEOR 504	Global Change	3
MTEOR 505	Biometeorology	3
NREM 407	Watershed Management	4
NREM 546	Integrating GPS and GIS for Natural Resource Management	3

## LETTERS/MEMOS FROM PARTICIPATING DEPARTMENTS

Agricultural and Biosystems Engineering

Agronomy

Civil, Construction, and Environmental Engineering

Ecology, Evolution, and Organismal Biology

Food Science and Human Nutrition

Geological and Atmospheric Sciences

Natural Resource Ecology and Management

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Agricultural & Biosystems Engineering Dept.  
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515-294-6633  
[rskanwar@iastate.edu](mailto:rskanwar@iastate.edu)

January 29, 2004

**TO WHOM IT MAY CONCERN**

I support the proposed name change of the “Water Resources Interdisciplinary major” to “Environmental Science major”. I think this name change is timely and I agree with the Water Resources Supervisory Committee analysis that the Environmental Science name much more accurately reflects programs curriculum, course offerings, faculty expertise, student interests and would have a nice base at Iowa State University to recruit graduate students from the interdepartmental undergraduate major in environmental sciences.

Ramesh Kanwar  
Professor and Department Chair



February 6, 2004

Dr. William Crumpton  
Ecology, Evolution and Organismal Biology  
129 Bessey

Dear Dr. Crumpton:

The Department of Agronomy strongly supports the proposed name change of the Water Resources Interdisciplinary Graduate Major to “Environmental Science.” We see this change as being very positive, timely and entirely complementary with our strategic goals. Thus, we envision co-listing many of our graduate courses as both Agronomy and Environmental Science. We envision recruiting graduate students through whichever program attracts the better individual for a particular project. We envision an Agronomy-Environmental Science synergism developing that makes us more competitive for visionary, integrative grants. All of these activities will result in Agronomy being better, the College of Agriculture being better, and ISU being better.

In summary, I anticipate approximately 20 Agronomy faculty, especially Soil Science faculty, to participate actively in Environmental Science. They will do so because they see the interface between agronomy and the environment as fertile ground for scientific discoveries that will positively affect society.

Sincerely Yours,

Steven L. Fales  
Professor & Chair

email from Dr. Greimann, Chair, CCEE

The Department of Civil, Construction and Environmental Engineering supports the proposed name change of the Water Resources Interdepartmental Major to "Environmental Science." Our faculty members in environmental engineering indicated that they agree to this change. We think that the name change will facilitate recruitment of superior graduate students, use program resources more efficiently, and create a better program identity.

Date: March 10, 2004

To: William Crumpton

From: Jonathan F. Wendel, professor

Re: Change of name for the Water Resources interdepartmental graduate major

I am writing in support of the proposal to change the name of the interdepartmental graduate major in *Water Resources* to *Environmental Science*. This change probably is overdue, as it reflects more accurately the broader perspectives and activities of the faculty and students who participate in the program. Changing the name also will have a salutary effect on graduate recruiting, as many students will more readily identify with the new than the old name. *Water Resources* faculty that presently are in EEOB include Crumpton, Downing, Jurik, and van der Valk. Each of these faculty is in favor of this name change. In addition, these same EEOB faculty are involved in one way or another with the undergraduate *Environmental Science* major. This congruence will facilitate curricular coordination and strengthening of both the graduate and undergraduate majors. Because the graduate and undergraduate *Environmental Science* majors will share the existing *Environmental Science* office and secretarial staff, there will be an enhanced identity to these programs as well.

email from Dr. Glatz, Associate Chair, FSHN

>Dear Ken,

> The proposal for a name change for the Water Resources  
> interdepartmental graduate major to Environmental Sciences was presented  
> to the faculty of the Food Science and Human Nutrition department at our  
> faculty retreat on January 31. We support this change. Currently we  
> have only one faculty member in this program, Dr. Anthony L. Pometto III;  
> he, too, supports this name change to better reflect this program's  
> mission. We understand that this change is supported by the  
> Environmental Science program. We agree that Environmental Science is a  
> much more common and recognized name than Water Resources, and for that  
> reason alone, the name change should help the ISU program attract more  
> graduate students.

> -Bonnie Glatz, Associate Chair, FSHN

***Interoffice Communication***

**DATE:** January 29, 2004

**TO:** To Whom it May Concern

**FROM:** Carl Jacobson, Professor and Chair  
Geological and Atmospheric Sciences  
253 Science I

**RE:** Name Change for Water Resources Interdepartmental Graduate Major

The Department of Geological and Atmospheric Sciences strongly endorses the request of the Water Resources Supervisory Committee to change the name of the Water Resources interdepartmental graduate major to Environmental Science. The Supervisory Committee makes the point that the proposed name more accurately reflects what the program actually does. This exactly matches the experience within our own department. Approximately 15 years ago, we initiated a major shift in both undergraduate and graduate curricula to reflect the fact that jobs in the traditional oil and gas industry were on the decline, whereas those in environmental science were on the upswing. When we first embarked on this path, we, too, thought that a term such as “water resources” was appropriate to describe our new endeavor. However, as we have brought in new faculty and attracted a new generation of students, we find that our course offerings and research topics have evolved to be far broader than initially guessed. In particular, whereas virtually all students who came into the geology graduate program in the past had geology undergraduate degrees, we now find that geology faculty are recruiting students with undergraduate degrees ranging from environmental science, to physics, to microbiology. These students commonly do not take a significant amount of course work in traditional geology, and should not be given a Geology degree. For some, a Water Resources degree would be fine, but for many others, even this is misleading relative to the actual training they receive. Environmental Science, is, however, a degree name that we would feel comfortable with for a large number of our students. Thus, an Environmental Science graduate degree is something we have been hoping to see for quite some time.

**Interoffice Communication**

Date: February 4, 2004

To: William Crumpton

From: J. Michael Kelly, Chair

Subject: Proposal to Create an Interdepartmental Environmental Science Program

Thank you for the invitation to comment on the proposal to develop an Interdepartmental Environmental Science program through the absorption of the existing Interdepartmental Water Sciences program. After polling the NREM faculty on this proposal we would like to express the following concerns for committee consideration.

First, we are of the opinion that Iowa State should have a strong and highly visible Water Resources program given that surface water quality is of paramount importance in this state. Subsuming the water resources program into a broader based environmental sciences program will result in the loss of this visibility and is only likely to weaken the program further as competing demands for available "seed" resources currently allocated to Water Resources are spread more widely.

Second, the creation of a broadly based environmental graduate program while advantageous to some departments would have significant overlaps with existing "environmentally based" programs in this department, possibly creating unnecessary duplication that could prove detrimental to existing programs in this or other departments. We are certainly supportive of interdepartmental programs that create opportunities to work at the interface of various disciplines. NREM faculty actively participate in the Water Resources program as well as Genetics, EEB, IPPM, and Sustainable Ag. So it is not that we are opposed to interdepartmental approaches, it is more a matter of creating an unnecessary duplication with many of these programs since at least four of the five are significantly involved in "environmental science".

Again thank you for the opportunity to provide input. Based on these and other considerations, it is our opinion that the Interdepartmental Water Resources Program should be retained and strengthened rather than being subsumed into a diffuse Environmental Science program. In today's competitive research environment it is our feeling that more is to be gained with a strong adequately funded program focused on water resources.

## **Water Resource Interdisciplinary Graduate Program**

The Water Resource Interdisciplinary Graduate Program (WR) was reviewed by Stephen Ventura (lead), Sally MacKenzie, and Christopher Haufler. We met with about 15 faculty members (out of almost 50 associated with the program) for an hour and about ten students (out of 21 major and 9 co-majors) for about 45 minutes.

### **Quality of the Program**

WR is one of the oldest interdisciplinary programs at Iowa State. In some senses, it suffers from this maturity. The tenets and activities of the program are stable; it is successfully training a small number of students in technical aspects of water resources. But, it is doing so without enthusiasm or vigor. Both students and faculty members noted that the program lacks a sense of cohesiveness and comradery. Though it is hard to tell in a brief visit, WR is probably managed by a relatively small number of faculty with a long-time dedication to the program who have found the program convenient for their own research programs, who put in just enough effort to keep the program running.

The laissez-faire management of the program is exacerbated by the lack of a common space for faculty and students to get together; students are strongly associated with their advisors' departments and don't mingle. One student noted that faculty members are more committed to their departments, citing lack of participation in seminars and meetings as evidence. It would appear that some faculty use WR as a means to mentor students who don't meet the department's academic standards (rather than accommodating students whose interests don't fit within a discipline). In summary, WR is providing an adequate graduate education to a relatively small number of students (with potential curricular shortcomings noted below); faculty members do not appear to be motivated to put in the time and effort needed to make it excel.

Several faculty members spoke of an interest in making a transition to a full-blown environmental sciences interdisciplinary graduate program, with WR as one of several options. Such a move should be undertaken only after more thorough examination of the existing program and a very extensive planning process, including the potential for coordination with the existing undergraduate major in environmental science. This major already has an office with support staff and could supply a home for the graduate program as well. Widening WR to incorporate additional environmental sciences could reinvigorate WR and would fill what appears to be a significant gap in graduate programs at Iowa State. However, it would require recruitment of new participants along with renewed effort and commitment that appears to be lacking in the majority of faculty currently involved in WR.

### **Curriculum**

Although the program descriptions of WR recognize the role of social sciences in water resources training, the program has only one required course in this whole domain, in economics. Students are seemingly not exposed to water policy, institutions, law, regulation, planning or other social science aspects unless they seek these on their own (and this likely would not be encouraged, given that advisors come primarily from physical and biological sciences). This is a significant deficiency in training professionals to deal with complex water resource related issues. Students noted that

they came to the program for a flexible “blending” of courses but found a strongly technical program. Some felt the list of courses they choose from was too restrictive and didn’t include enough social sciences. Apparently, following an earlier review in which the lack of involvement by social science departments was noted, WR made a decision to only train students through eight biophysical science departments. This decision should be re-visited, as it has the effect of reducing the importance of social sciences in the program (it is perhaps emblematic of the lack of enthusiasm noted above that WR decided to codify the status quo rather than address the problem).

In quick assessment of the course requirements, the MS programs seem light (18-23 course credits for thesis option; 30 course credits for non-thesis option), while the PhD coursework requirements are onerous compared to other (~57 course credits, 72+ total credits). Equivalent professional (non-thesis) masters elsewhere around the country are typically 35-45 course credits. Most of the interdisciplinary majors appear to require about 72 credits for PhDs, which is high compared to PhD programs around the country.

Students also noted that, because each student is also admitted by a department, there is considerable variability in expectations in courses (beyond WR requirements), in exams, in levels of support, etc.

### **Strengths and Weaknesses**

A key asset of WR is its relation with the Iowa State Water Resources Research Institute (ISWRRI). This relation is mutually beneficial – ISWRRI presumably benefits from a supply of graduate students for its own research while it provides a source of funding to support students. ISWRRI also provides some staff support for WR. The relation between WR and ISWRRI is informal, based on common interests and overlapping actors. Formalization may enhance program stability and enhance recruitment opportunities.

Some shortcomings of the program have already been described above. In broad terms, the deficiency is faculty morale, thought this may in part be attributed to paucity of resources to administer the program. In addition, perceptions of inequities between students with different backgrounds and departments should be watched. As an example, WR students indicated that they did not feel “welcome” in the civil engineering courses? In fact, they perceived hostility from engineering students toward them.

### **Critical Issues and Recommendations**

Before contemplating expanding or changing the program, faculty should figure out how to make it function as an interdisciplinary assemblage, rather than another option within their departments. Students should feel like they are engaged with a group of faculty committed to the program. This could involve enhancing the seminar experience, providing common space in which faculty members and students could mingle, new kinds of courses such as practica, workshops, or other forms of applied problem-solving, and a careful look at the curricula to better integrate social sciences. An enhanced social science component will be critical to an environmental sciences program, and should be considered a priority for new growth in water resources.



To: John Mayfield

From: Eric Hoiberg

Subject: Environmental Science Interdepartmental Graduate Major

John - The purpose of this e-mail correspondence is to summarize the discussion that was held on Monday about the proposed name change of the Water Resources Interdisciplinary major to the Environmental Science Interdisciplinary major. Representatives from several College of Agriculture departments with interests in this program were present, including NREM, Horticulture, Agronomy, Ag and Biosystems Engineering, EEOB, Environmental Science Undergraduate major, and Food Science and Human Nutrition. We discussed several issues that had been of concern to one or more of the above departments, as follows: 1) One concern related to obtaining adequate funding for a program that has been chronically under funded and, with a name change resulting in broader appeal, might face even more severe budget challenges. The consensus of the group was that this indeed is a problem, but they seemed satisfied that you will be pushing the issue of finding a more stable funding base for interdepartmental programs generally and that all reasonable attempts will be made to secure a stronger funding base as the program grows in size, including capturing future salary savings from within the current Environmental Science program for strengthening the new graduate major. 2) Another concern related to the possible loss of identity for the water resources emphasis. Again, the group seemed to be in consensus that a plan for developing a specialization or option in water resources can effectively deal with this issue. 3) There was discussion that a stronger environmental science program can benefit all of the above-named departments by attracting a strong cohort of graduate students who will have affiliation with the departments. The issue of turf protection or program overlap did not emerge as a serious concern.

The consensus of the College of Agriculture discussion is that we should move ahead with the suggested name change with the understanding that the resource and visibility issues are addressed and carefully monitored. Thanks for participating in these discussions and taking the proposal to the Graduate Council.