

# **Undergraduate Degree Programs: The Key to Increasing Minority Participation in Water Resources**

**Victor I. Okereke, Director**  
International Center for Water Resources Management  
Central State University

When I was invited to write an article about minority involvement in water resources professions, the first inclination was to research the poor statistics and use it to demonstrate how poorly minorities are represented in water resources. However, I resisted that urge, preferring instead to write about our experiences at the International Center for Water Resources Management (ICWRM). I offer it as a model for increasing the participation of underrepresented minorities in this important field.

## **Traditional Education in Water Resources**

Traditional education of the water resources professional has been the exclusive province of engineering schools — civil and agricultural engineering — and to some extent, geology. It is no wonder then that the curricula emphasized the physical sciences such as hydrology, hydraulics, mathematics and physics, with little or nothing from the social sciences like economics, political science and sociology. Besides, most undergraduate engineering programs do not offer enough water resources courses to award a degree in it. There are other grounds to cover, such as structural analysis, transportation engineering, soils and materials. The result is that there has been a dearth of undergraduate degree programs that focus primarily on water resources. For the most part, the subject is treated as a specialized are, and in-depth coverage is left to graduate schools.

Unfortunately, graduate school programs are by their nature very selective. They serve as sieves that allow only a certain fraction of applicants to move on to the next level. Since minorities have generally been underrepresented in college admissions, it follows that there would be even fewer of them in graduate schools. Therefore it is not surprising that there is such a dearth of minorities — especially Blacks and Hispanics — in the water resources field. The twin factors — that water resources traditional has been treated purely as a specialized are of engineering and that its full curriculum exists only at the graduate level — combined to exacerbate the problem of minority participation in this important field.

## **A Different Approach**

The reality, though, is that neither the treatment of water resources as a purely engineering subject nor its relegation to graduate programs is really necessary. Water resources is a multi-disciplinary subject and should be

taught as such. Therefore, the social science aspects of water should get as much emphasis in the curriculum as the pure engineering aspects. This is because the nontechnical aspects of water resource problems are often the most intractable, as any municipal engineer would confirm. This may sound heretical, especially coming from an engineer with the usual traditional training in the area, but it isn't. The reality of the job market confirms the demand for people with broader backgrounds.

A cursory review of the delegates to the Universities Council on Water Resources also confirms that players come from sociology, political science, economics and, of course, engineering. Since we all came into this field from multiple doors, it is only fair that we give our students the same opportunity. Such a change not only would allow us to respond appropriately to the natural diversity in water resources problems, but also have the added effect of bringing more minorities into the field.

The other issue is the current practice of offering degrees in water resources only at the graduate level. I see no rational basis for continuing that practice, and as long as that is the case, the number of minorities entering the water resources field may not increase significantly. This is why the program I direct at Central State took a bold step to start the nation's first and still only undergraduate degree program in water resources. As the rest of this article will make clear, it has been a very successful experiment and should be replicated elsewhere.

## **International Center for Water Resources Management**

In 1995, the Ohio Legislature authorized Central State University to start an international center for water resources management. The goal was to develop a center of excellence in water resources that would approach the solution of water resources problems from several angles. These include engineering, economics, public policy, law, and the local culture. It was planned that the Center would develop and nurture the first-in-the-nation baccalaureate degree program in water resources as well as develop a research program with a broad range of projects: locally, nationally and internationally. Furthermore, it was to develop a strong educational program with the bachelor's degree program as its core, supplemented by a wide range of short term training programs such as conferences and short courses. Being in a historically black university, the Center

was expected to focus attention on minority education and access to careers in the water resources field.

### **Early Development**

An entire curriculum had to be developed, including all the courses that would lead to the new degree program. These courses, as well as the curriculum, must be tailored to undergraduate education. Since there was nothing on the market at the time, the task was formidable. Besides, most existing water resources programs in the country approached the subject from one of two sides: physical sciences (engineering, geology, etc.) or social sciences (political science, economics, etc.). ICWRM was bent on covering all facets of the subject. The program was designed to ensure that no student would graduate from it without significant exposure to both aspects of this fascinating subject.

### **Educational Program**

Students in the program may take courses in groundwater, hydrology, hydraulics and fluid mechanics, water chemistry, water treatment plant design, wastewater systems design, soil and water pollution, water policy, world water resources, economics of water resources planning, water law and so on. Naturally the student is required to take additional courses from mathematics, computer science, biology, chemistry, history, sociology, etc., to complement the core courses. Besides, an internship program of full time work in the field is required for graduation.

### **Minority Education in Water Resources**

ICWRM is committed to providing quality water resources education to all, especially minorities. The Center so far has been very successful in doing this. Many factors contributed to that success. However, two of the most important are: active participation of undergraduate students in sponsored research, and effective mentoring and advising.

1) **Undergraduate Student Research.** Virtually every research project undertaken by the Center includes active student participation. Thus, undergraduate students work on projects as research assistants. The result of this is not only better education of students but also an increased interest in graduate study and research careers on the part of students in the program. So far, 55% of all graduates of the program have gone on to graduate school. This is a higher percentage than what would be expected, even from large prestigious schools. The reason is that the exposure to research piques the student's interest and helps correct the negative myths many have about graduate school. If more schools were to try this, perhaps we may reverse the negative trend in the number of advanced degrees awarded to Americans.

2) **Mentoring and Advising.** The mission statement of Central State University requires it to have an open admission policy and to provide quality college education to the poor and underprivileged. Therefore the university admits students with less than adequate preparation for college. Such students generally need more guidance than the average student in order to make it through college successfully. Consequently, tutoring, mentoring and advising are key ingredients in the success of ICWRM. Class sizes are also kept small to ensure that the faculty have time to devote to individual students.

Nationally, the success rate of incoming freshmen with inadequate preparation for college is generally low. Many drop out by the end of their first or second year. But that has not been the case at ICWRM, despite the fact that its students come from the same population. In its first five years of operation, less than 5 percent of its students have dropped out. The reason for that level of success rests squarely on the individualized attention that each student gets from the faculty and staff. That is a model for success and it can be replicated in other parts of the country.

Minorities are grossly underrepresented in many scientific professions in the United States. In the water resources field, the problem is made worse by the fact that the field is relatively new and growing and by the fact that most formal water resources education begins at the graduate level. The program described here is one attempt to attract, retain and train minorities in this important field. It has been so successful that other universities should not hesitate to replicate it in their own communities.