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## Looking After the Land: The Navajo Dryland Environments Laboratory Researches the Environmental Needs of the Navajo Nation

*Semken, Steven C.* Tribal College. Mancos: Jan 31, 1992. Vol. III, Iss. 3; pg. 11

### Abstract (Summary)

This facility, the Navajo Dryland Environments Laboratory, or NDEL, began operation in the autumn of 1991. The acronym NDEL derives from the Navajo word *ndéél*, which means "giving back" or "returning." The laboratory joins three facilities previously established by WERC, each focusing on specific aspects of environmental science and technology. In accordance with the mission of Navajo Community College, this laboratory will concentrate on environmental geology, hydrology and resource management of the Colorado Plateau drylands, which includes the Navajo Nation and its immediate environs. The laboratory will also serve as an environmental monitoring facility for the eastern Navajo Nation and will be used to train Navajo Community College undergraduates in quantitative environmental science.

With the support of WERC and other Department of Energy agencies, such as Lawrence Livermore National Laboratory, Navajo Community College has also begun development of a new two-year curriculum in environmental science and technology. As presently envisioned, the program will include two tracks. One will lead to an associate of applied science and certification as an environmental technician. The other is intended for students who plan to transfer to baccalaureate programs in environmental science or engineering at four-year institutions. Each track will include rigorous preparation in basic science and mathematics; specialized courses in environmental geology, analytical chemistry, soil and range sciences, and waste management; as well as a summer field laboratory internship. The Navajo Dryland Environments Laboratory will be used extensively as a training facility, and additional opportunities for students will be available with industries on and near the Navajo Nation, the member universities of WERC, and a number of Department of Energy national laboratories. The curriculum will be designed in accordance with the Diné (Navajo) philosophy of learning, which is the educational paradigm of Navajo Community College.

NDEL researchers and students will not be at a loss for work. The rugged high desert surrounding Shiprock was a center of intense and unregulated uranium mining from the 1950s to the 1970s; abandoned shafts, radioactive waste piles and the possibility of groundwater contamination remain as threats to Navajo public health. The local economy is still largely dependent on coal, oil and gas extraction, power generation, and large-scale irrigated agriculture. These present-day industries, all operating on Navajo land, are more environmentally conscious than their predecessors, and thus have a continuing need for competent scientists, engineers and technicians as environmental monitors. The growing Navajo population itself poses problems of land degradation. Groundwater depletion and solid waste management must be controlled in order to insure the continued viability of the largest aboriginal community in North America. Navajo Dryland Environments Laboratory, the first dedicated academic research facility established at a tribal college, will undoubtedly become a permanent institution.

**Full Text** (1373 words)

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Looking After the Land: The Navajo Dryland Environments Laboratory Researches the Environmental Needs of the Navajo Nation

The Navajo Nation is situated in the semi-arid to arid country (drylands) of the Colorado Plateau in the western interior of the United States. It is a region simultaneously rich in natural resources (such as coal, oil, uranium and solar energy) and burdened with environmental problems (such as air and groundwater pollution, arable land lost to overgrazing and hazardous abandoned mining areas). In spite of traditional cultural ties to the land and environment, the Navajo Nation has few native-born environmental professionals available to address these problems and manage their vast homelands. As the designated institutions of higher education of the Navajo people, Navajo Community College has been charged with helping to remedy this situation by identifying and preparing a generation of Navajo scientists,

engineers and technologists.

No matter the size or mission of a college, its educational programs in science and technology cannot be kept current or remain valid in the complete absence of an academic research program. Even at small liberal arts colleges where teaching is emphasized, most, if not all, science faculty conduct research, and most science departments are equipped with research laboratories. Academic science research, the little that can be conducted due to limited resources, should not be considered inappropriate for tribal colleges. They are the equivalent of state universities for their native American communities, and are the primary wellspring of progress.

This philosophy guides the Mathematics and Natural Sciences Division at the Shiprock, New Mexico campus of Navajo Community College which comprises five full-time faculty (approximately one per major discipline), five adjunct instructors, and ten staff members. Unlike their peers at non-tribal community colleges, including others in the surrounding Four Corners region, many science instructors at the Shiprock campus conduct small, externally-funded research programs addressing problems of specific interest to the Navajo Nation and its people.

All of these programs involve undergraduate students directly. They work alongside faculty mentors in gathering and evaluating data, writing papers and making presentations at national conferences. The research has traditionally centered on public health, biomedical science and computer-aided education. Over the past decade, Navajo Community College in Shiprock has developed a reputation for quality science programs. It also has a consistent history of funding from and collaboration with agencies such as the National Institutes of Health, the U.S. Public Health Service, the U.S. Department of Education, the March of Dimes Foundation and, more recently, the National Science Foundation.

As successful and worthwhile as these projects are, necessity has made them labor-intensive, rather than equipment-intensive. Navajo Community College, like other tribal colleges, lacks the research infrastructure common to mainstream four-year and postgraduate institutions. On-campus research equipment largely has been limited to computers, although some biomedical projects have benefited from facilities available at an adjacent Indian Health Service hospital. Research in environmental and earth science, although of great potential benefit to Navajo students and the Navajo Nation, had never been feasible at the Navajo Community College campus since it had lacked expensive analytical equipment and the infrastructure (such as adequate space and utilities) needed to support it.

An opportunity to remedy this situation came in early 1990 with the establishment of the Waste-management Education and Research Consortium (WERC) of New Mexico. This alliance of New Mexico universities, Los Alamos and Sandia National Laboratories, and the U.S. Department of Energy (DOE), was created to develop community resources and address issues associated with environmental restoration and management. WERC pursues these objectives by means of education and training, academic research, and technology transfer programs. The consortium operates its own laboratory facilities and a satellite and fiber-optic television network. It also offers university research grants and scholarships. WERC, a barely two-year old pilot program, has experienced rapid growth and has become a model for environmental alliances in other states and regions.

Shortly after WERC began operation, consortium Director Dr. Ron Bhada of New Mexico State University traveled to Shiprock to discuss the possibility of extending WERC programs to the eastern Navajo Nation through Navajo Community College. What resulted was the inclusion of Navajo Community College as the fourth academic member of the consortium and a \$180,000 start-up grant from the Department of Energy to establish a facility for environmental research and education on the Shiprock campus.

This facility, the Navajo Dryland Environments Laboratory, or NDEL, began operation in the autumn of 1991. The acronym NDEL derives from the Navajo word ndéél, which means "giving back" or "returning." The laboratory joins three facilities previously established by WERC, each focusing on specific aspects of environmental science and technology. In accordance with the mission of Navajo Community College, this laboratory will concentrate on environmental geology, hydrology and resource management of the Colorado Plateau drylands, which includes the Navajo Nation and its immediate environs. The laboratory will also serve as an environmental monitoring facility for the eastern Navajo Nation and will be used to train Navajo Community College undergraduates in quantitative environmental science.

The laboratory, once part of a traveling science exhibit, occupies two large trailers and was donated to the college by the Department of Energy. The start-up grant provided funds to outfit these trailers with utilities adequate to serve large scientific equipment and a geochemistry lab equipped with a fume hood, metal benches and sinks, an analytical balance, microcomputer, and a high-purity water delivery system. This infrastructure will serve a number of state-of-the-art analytical devices, which will be phased in over several years. The first device purchased and installed is a Perkins-Elmer atomic-absorption spectrophotometer, which will be used to measure abundances of trace elements such as metals in water, rock, and soil specimens. In 1992, NDEL will add a gross alpha-beta counter and Scintrex fluorescence analyzer, which will permit the measurement of radioactive contaminants such as uranium in

environmental samples.

With the support of WERC and other Department of Energy agencies, such as Lawrence Livermore National Laboratory, Navajo Community College has also begun development of a new two-year curriculum in environmental science and technology. As presently envisioned, the program will include two tracks. One will lead to an associate of applied science and certification as an environmental technician. The other is intended for students who plan to transfer to baccalaureate programs in environmental science or engineering at four-year institutions. Each track will include rigorous preparation in basic science and mathematics; specialized courses in environmental geology, analytical chemistry, soil and range sciences, and waste management; as well as a summer field laboratory internship. The Navajo Dryland Environments Laboratory will be used extensively as a training facility, and additional opportunities for students will be available with industries on and near the Navajo Nation, the member universities of WERC, and a number of Department of Energy national laboratories. The curriculum will be designed in accordance with the Diné (Navajo) philosophy of learning, which is the educational paradigm of Navajo Community College.

The Navajo Dryland Environments Laboratory employs five undergraduates as research assistants, and a full-time secretary. It is managed by a faculty member who is designated a technical leader in the WERC management structure. As the laboratory enters into several research projects that are now in the proposal stage, and as the new environmental curriculum matures, fifty or more students and a number of outside collaborators are expected to utilize the facility.

NDEL researchers and students will not be at a loss for work. The rugged high desert surrounding Shiprock was a center of intense and unregulated uranium mining from the 1950s to the 1970s; abandoned shafts, radioactive waste piles and the possibility of groundwater contamination remain as threats to Navajo public health. The local economy is still largely dependent on coal, oil and gas extraction, power generation, and large-scale irrigated agriculture. These present-day industries, all operating on Navajo land, are more environmentally conscious than their predecessors, and thus have a continuing need for competent scientists, engineers and technicians as environmental monitors. The growing Navajo population itself poses problems of land degradation. Groundwater depletion and solid waste management must be controlled in order to insure the continued viability of the largest aboriginal community in North America. Navajo Dryland Environments Laboratory, the first dedicated academic research facility established at a tribal college, will undoubtedly become a permanent institution.

#### Indexing (document details)

<b>Subjects:</b>	Colleges & universities, Education, Environment, Higher education, Minority & ethnic groups
<b>Author(s):</b>	Semken, Steven C.
<b>Document types:</b>	Feature
<b>Publication title:</b>	Tribal College. Mancos: Jan 31, 1992. Vol. III, Iss. 3; pg. 11
<b>Source type:</b>	Periodical
<b>ISSN:</b>	10525505
<b>ProQuest document ID:</b>	625179481
<b>Text Word Count</b>	1373
<b>Document URL:</b>	<a href="http://proquest.umi.com.ezproxy1.lib.asu.edu/pqdweb?did=625179481&amp;sid=1&amp;Fmt=3&amp;clientId=5557&amp;RQT=309&amp;VName=PQD">http://proquest.umi.com.ezproxy1.lib.asu.edu/pqdweb?did=625179481&amp;sid=1&amp;Fmt=3&amp;clientId=5557&amp;RQT=309&amp;VName=PQD</a>

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