

SCIENCE FOR NICARAGUA



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by Michael Harris and
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When we arrived at the UNI, the new National Engineering University, on January 3, we were not sure who would be waiting for us.

We arrived during the academic vacation, which coincides with the coffee harvest. Coffee prices are up this year, and *contra* activity in the coffee-growing regions has been virtually eliminated. So we were told that everyone involved in Nicaraguan higher education—students, faculty, and administrators—had gone off to the mountains to pick *el rojito*, as ripe coffee beans are called.

We had gone to Nicaragua—five men and two women, all scientists from Boston-area universities—to meet with our counterparts in Nicaraguan universities in order to discuss our proposal for setting up a

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Cooperation in Technology and Science Education

program of cooperation in scientific education. Our first project was to send a group of professors to teach in Nicaragua during the academic year starting March 1986. Two of our professors were engineers, so it was natural to make the UNI our first stop.

We were met by Arturo Collado, the academic vice-rector of the UNI, who launched immediately and energetically into a discussion of Nicaraguan higher education and how it had changed during the Sandinista revolution. Some statistics to start with: there are now 30,000 students and over 1,000 full-time

professors in the universities, as opposed to 17,500 and 350 under Somoza.

Before 1979, the medical faculty could accept at most 80 students per year; that number has gone up to 600. In the last years of Somoza's rule, women numbered only 4% of engineering students, but 56% of the 1986 entering class at the UNI are women.

And there are new programs. The National Autonomous Universities (UNAN) are offering college preparatory courses to 800 students annually from disadvantaged backgrounds and remote regions. The UNI is introducing degree programs in mechanical engineering and computer science, two subjects which never were taught before in Nicaragua.

The National Engineering University

As of next August, the UNI will begin offering training in Nicaragua's new graduate program, a two-year course in environmental and sanitary engineering. It almost goes without saying that this is the only program of its kind in Central America, and the UNI already plans to accept environmental engineering students from neighboring countries. Presumably, this is an instance of "exporting revolution" that the Reagan administration is so worried about.

The UNI itself is only three years

old, and is still very much in a state of flux. Housed in a former Catholic school building that still shows signs of damage from the 1972 earthquake that wiped downtown Managua off the map, the UNI looks fated to be continuously under construction for the foreseeable future.

This has a positive as well as a negative side. Somoza's neglect of his country has left the Nicaraguans with an unprecedented opportunity to rebuild it from the ground up, in accordance with their goals. Anyone—Nicaraguan or foreign visitor—with enough energy to organize a new project is almost sure to be encouraged, provided the project is seen to be in the long-term interests of Nicaragua.

Nowhere is this willingness to experiment more in evidence than in the universities. The Sandinista revolution can be described as a never-ending conversation about its own future, in which everyone is invited to take part.

Halfway through the first meeting, we were joined by Juan Sanchez, the Chancellor of the UNI, looking fit after a week of picking coffee, as well as visiting professors from Holland and the U.S. The purely ceremonial portion of the meeting ended soon after his arrival. For the rest of the morning, our delegation—individually and collectively—became a part of the never-ending conversation about the future of higher education in Nicaragua, and the role our project could play in fulfilling Nicaragua's goals for that future.

Sanchez and his colleagues had evidently devoted a lot of time to thinking of ways Science for the People could do useful work in Nicaragua. Before we broke for lunch we sat around the table and talked in groups of twos and threes about some of their ideas, which were later proposed to us officially as goals for the SftP Program in Cooperation in Scientific Education.

Excitement and Education

The energy and informality we felt at our first meeting are not unique to the UNI, and go a long way toward explaining why so many people from around the world have been drawn to work in Nicaragua and, in many cases, to relocate there more or less permanently. We felt this excitement again during the sightseeing part of our trip, when people on the street repeatedly came up to greet us—they had read about our visit in the newspapers—and ask us our opinions on science,

education, break dancing, and on every other conceivable topic.

Uppermost in their minds was U.S. policy in Central America. Everyone assured us that the *contras* had been "strategically defeated," that they

ENGINEERING LIBRARY:
UNI's library needs books and journals. Send contributions to SftP.

still caused damage in a few regions of the country but they no longer posed a serious military threat. But for this very reason Nicaraguans we spoke with were concerned more than ever about the threat of a direct intervention by U.S. troops. "How would the American people react if that happened?" We couldn't really answer that question, but our visit



photo: Bob Lange

Every Project Has a Purpose

I was in Nicaragua during the summer of 1985 to establish contacts for Science for the People's program of cooperation in scientific education with Nicaragua. At the medical university in Leon, I met Rodolfo, the assistant to the director of postgraduate research, in one of the research labs in the pharmacy building. The lab looked like a not-too-well-equipped college chemistry lab, with a moderate amount of glassware and bottles of reagents up and down the counters.

I had interrupted an informal class that Rodolfo was teaching. There were three high school students in the lab who had collected and dried some medicinal plants. Rodolfo was instructing them on the scientific method, uses and properties of the plants, and methods of preliminary analysis of the dried specimens.

I was witnessing a project stemming from a Jornada Científica de Desarrollo, an annual conference of applied research projects designed to meet the national development needs of Nicaragua. These students were working on a

project to collect, catalog, and analyze medicinal plants native to Nicaragua, with the longterm goal of decreasing Nicaragua's dependence on expensive imported medicines.

Other projects, whose research teams usually involve a couple of professors and several students, included the "Epidemiological Study of the Ten Most Important Diseases of Region II," "Feeding Systems for Beef Cattle in the Dry Season," and "Factors in the Graduation Rate of the School-age Population in the City of Leon and Surrounding Areas."

After the class, the students started work on some elementary analyses of the plants they collected by passing solvents through crushed leaves, while Rodolfo took me aside to explain more about the program. The previous year, they had about 50 projects. That year, they had expanded the program to include over 70 projects.

I left with the impression of a program and way of doing science that truly strives to be a science for and by the people.

—Robert Van Buskirk



left us no doubt as to the Nicaraguan reaction in the event of an invasion.

When we arrived late for a scheduled meeting in Esteli, a woman who happened to be waiting in the office invited us to visit a college for

Research and Higher Education in Nicaragua

There are presently four universities in Nicaragua: the two UNANs (National Autonomous University of Nicaragua) in Leon and Managua, the Jesuit-run University of Central America (UCA), and the UNI (National Engineering University), established in 1983. Along with many small technical schools, they are administered by the National Council of Higher Education (CNES), a government ministry created by the Sandinista revolution.

Graduate studies are geared to developing skills and solutions for Nicaragua's greatest developmental needs. The UNI is about to begin a master's program to train sanitary and environmental engineers. UNAN in Leon offers graduate training in integrated pest management, and a new university of agricultural sciences is being administered by the Ministry of Agricultural Development and Agrarian Reform. For advanced medical training, hospitals have been converted into schools for fifteen postgraduate medical specialties.

The ambitious expansion of higher education under the revolution has been accompanied by serious growing pains, inasmuch as the most highly qualified professors have been forced to take administrative positions in government agencies, in CNES, and in the universities themselves. During our tour of higher education programs, we met only one official with a doctorate degree—and this was the president of CNES!

In order to deal with the enormous shortage of professors, the Nicaraguans have had to find ways to stretch their resources. Curricula at the universities are divided into intermediate and professional levels. The three-year intermediate-level program leads to a technical degree. Students in this program are likely to be taught by professional-level students or, in some cases, by high school teachers. The professional-level program takes five years. If qualified Nicaraguan professors cannot be found, courses are generally in the hands of foreigners.

Every Nicaraguan with special skills is constantly being offered new opportu-

nities to employ them, and university students and professors are no exception. Miguel Angel Aviles, director of research and postgraduate studies at CNES, explained to us that, under present conditions, the task of Nicaraguan scientists is to further applied rather than basic research, in order to overcome the historical technological dependency on the West, especially on U.S.-made goods no longer available under Reagan's trade embargo.

The most ambitious initiative along these lines is the Jornada Cientifica de Desarrollo (JCD)—something akin to a country-wide science fair. The idea is to harness the combined imaginations of people at all levels of society—high school students, college students, and factory workers—to try to solve what the Ministry of Planning considers to be the 100 biggest problems facing the country.

For example, Nicaragua cannot afford to import mimeograph ink. This problem was selected as one of the 100 greatest research needs in a recent JDC, and projects were set up at both high school and university levels to try to develop substitute inks which can be produced using locally available materials. Burnt motor oil and mangrove dye were among the materials tested.

Whether or not a particular JCD project actually solves the specific problem assigned is less important, to Aviles's mind, than the experience it provides both students and their faculty advisers in creative thinking. Like most dependent third world countries, Nicaragua under Somoza suffered from a relative abundance of technicians qualified to install and maintain equipment produced in the developed world, and an almost total lack of engineers and scientists trained to design the tools needed to solve problems at hand.

The universities were full of "professors of blackboard and chalk," according to Aviles, who could teach their students nothing about research, an activity reserved for the First World. In the future, Nicaraguan professors—and foreign visitors as well—will be expected to divide their time 50-50 between teaching and applied research.

—Michael Harris

elementary school teachers. Since the universities were not in session, this would be our only opportunity to witness education in Nicaragua, and two of us eagerly accepted the invitation. The director of the school apologized when we arrived, since the only classes that afternoon were in civil defense and nutrition.

Civil defense? It seems most of the students in the school were elementary school teachers from rural areas who were taking intensive courses to improve their teaching skills—a process known as *capacitacion*, which goes on at all times in all sectors of society, and which is the main method devised by Nicaraguans to overcome their historic underdevelopment. Since these teachers—95% of them women—are usually the most educated people in their villages, the government has chosen them as the vehicle to provide basic information about civil defense to remote regions.

The class we visited was a methodical, matter-of-fact discussion, by a tiny woman with a powerful voice, of the relative advantages of different kinds of bomb shelters. The students took careful notes. There was much note-taking in the nutrition class as well.

At the end of our first meeting at the UNI, we were given a copy of the study on which the school's development was based. The tension between the desire to achieve technological self-sufficiency in the shortest possible time and the painful awareness of the shortage of resources—particularly of qualified technicians and scientists—is resolved through a detailed five-year development plan for the university, which takes as its starting point the country's need to develop small-scale industry based on the needs and products of the local agricultural economy. (See table.)

Goals and Objectives

Nicaraguans are serious about defending their revolution, but then, they take everything having to do with the revolution seriously. Every significant reform and important new project is preceded by painstaking studies of needs and resources, and by consultations with organizations representing all sectors of society which stand to be affected by the initiative. A striking example of this is the document entitled "Fines, Objetivos y Principios de la Nueva Educacion"—Goals, Objectives and Principles of the New Education. This document, which guides

Nicaragua's educational process at all academic levels, was based on the *Consulta Nacional*—National Consultation—of 1981. In this process, more than 50,000 representatives of different organizations, including women, labor unions, and religious groups, along with government agencies assessed the country's academic needs and gave their opinions about the type of educational reforms needed in Nicaragua.

The document, approved by the Sandinista National Liberation Front, will direct Nicaragua's educators in their efforts to defeat underdevelopment and dependency. They are establishing an educational system that responds to the needs and interests of the majority of Nicaraguans, and not to those of the multinationals, oligarchs, and remnants of the *somocistas*.

Some of the problems of training students to be scientists and engineers were surprisingly familiar to us. In Leon, the second largest city in the country, we met Gilma, a leader of the student union at the National University there. Gilma is a 23-year old woman who at 14 left Leon to join the Sandinistas in the mountains and returned two years later to take part in the battle to liberate the city.

The university at Leon is Nicaragua's oldest, and apart from its famous medical school also has the longest-standing programs in basic sciences. But few students choose to follow careers in science, Gilma told us. Why? It seems the students don't like mathematics much. It makes them nervous. Given this attitude, the shortage in technical experts is

ENGINEERING NEEDS

This table, based on the document "Fundamentación y Propuestas de Desarrollo" of the Universidad Nacional de Ingeniería (UNI) Simon Bolívar, describes the estimated nationwide need for engineers by sector, over the medium term.

SECTOR	NUMBER
Agriculture (excluding agroindustry)	1550
Agroindustry	500
All other industrial	1400
Electrical energy	400
Communications	470
Construction and mining	400
Transport	600
Drinking water	85

likely to persist over the short run.

Science for the People's project of cooperation in science education with Nicaragua hopes to address these math and science anxieties. We want to expand the program to

August.

Meanwhile, in Washington, another group of U.S. citizens, with a budget about 100 million times larger than ours, is debating how much of that money should be sent to help

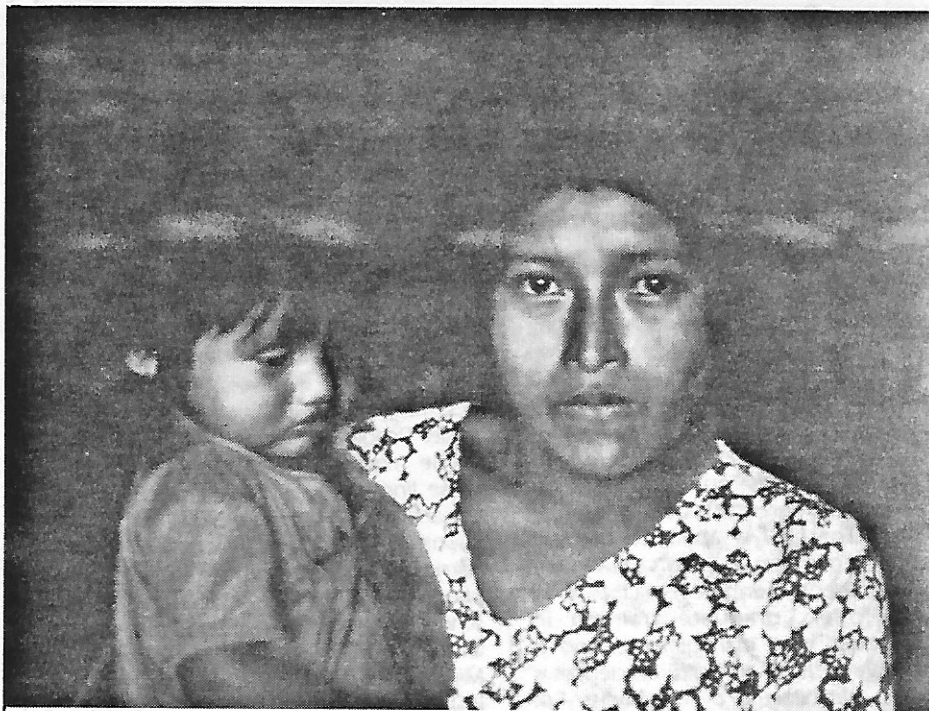


Photo: Barry Ingber

EDUCATION FOR ALL: By sending professors to Nicaragua and assisting in science teacher training, SftP supports the goals and objectives of Nicaragua's new education for development and independence.

include science teacher training and teaching science in high schools. In this component, we would be working with the School of Education at UNAN-Managua and the Ministry of Education, providing assistance in needs assessment, establishing priorities, and recruiting the needed faculty.

Nicaraguan educators expressed—correctly, in our view—that while they train scientists and technicians for industry and research, they also need to train secondary science teachers. High school science teachers are responsible for preparing Nicaraguan youth to enter science fields. They also provide the scientific knowledge needed by all citizens to assist in the building of a new Nicaragua. That will be our new task too.

Teaching vs. Terror

In March, our first group of professors began teaching Nicaraguan students courses in digital engineering, microcomputers, and statistics. The Science for Nicaragua Committee is now selecting candidates to teach next semester, starting in

torturers and rapists destroy the precious little Nicaragua has been able to build since 1979. Faced with such a powerful and determined adversary, the role of progressive North Americans in promoting peaceful cooperation with Nicaragua has never been so important.

We at Science for the People are planning to launch three new projects during the coming year which were suggested to us at the UNI: a program to improve Nicaraguan universities' access to library materials, in particular scientific journals; a program of short-term visits by U.S. scientists interested in working on research projects or teaching advanced seminars in Nicaragua; and a search for U.S. universities willing to provide fellowships to Nicaraguan graduate students.

Nicaraguans have reminded us that it is still possible to build an independent future, even in Uncle Sam's backyard. What they have asked us to do—to teach their students science, technology, agronomy, and medicine—is meager by comparison, but we are glad the Nicaraguans are willing to make the exchange.