

ENVIRONMENT | Protecting our natural resources

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Public-Private Partners Bolster Geosciences Training in Africa

AfricaArray uses seismic stations, research to build scientific work force



The 15th largest rough diamond in the world was found at the Letseng Diamond Mine in Lesotho, a kingdom surrounded by South Africa.

By Cheryl Pellerin
Staff Writer

Washington — Beneath the surface of Earth's second-largest continent is a wealth of minerals, petroleum, water and geothermal energy. African scientists are working to develop and manage this vast resource, but more scientists are needed to strengthen the work force in Africa's natural-resource sector and drive economic growth.

Four years into an ambitious 10-year public-private effort to boost the capacity of African universities to train world-class geoscientists, the AfricaArray program has completed its goals for phase one and is pushing into phase two.

"We started with in-kind support from the three founding partners,"

Andrew Nyblade, a professor of geosciences at Pennsylvania State University (Penn State) and AfricaArray co-director, told *America.gov*. These are the University of Witwatersrand in Johannesburg, South Africa, Penn State, and the Council for Geoscience in Pretoria, South Africa — formerly the South African Geological Survey.

WORKING WITH PARTNERS

The fledgling Africa-to-Africa educational support system is aligned with the New Partnership for Africa's Development, a strategic framework for Africa's renewal adopted by the African Union in 2001 to eradicate poverty, promote sustainable growth and development, enhance Africa's integration into the global economy and accelerate the empowerment of women.

Phase one, 2004–2007, Nyblade said, focused on revitalizing the geophysics program at the University of Witwatersrand.

That effort included raising money to support a world-class seismology researcher at the university; acquiring computers, geophysical equipment and technical support; and setting up a network of 30 seismic stations in 13 countries, mainly in eastern and southern Africa but with two stations in Cameroon in western Africa.

An international geophysics course was established and a multiproject research program was initiated.

To store and manage the data generated by AfricaArray, the Incorporated Research Institutions for Seismology, a consortium of universities established in 1984 with support from the U.S. National Science Foundation, made available its data management and distribution facilities. (See "[U.S. Seismology Consortium Makes Equipment Loans Worldwide.](#)")

Today, AfricaArray has hundreds of partners across industry, academia and government. Some underwrite grants and contracts; others contribute equipment, offer technical assistance or offer access to data sets or research sites; some supervise students, provide student scholarships or work with student interns.

STARTING WITH SEISMOLOGY

The AfricaArray founders settled on seismology — the science of earthquakes and mechanical properties of the Earth — as a way to launch the continentwide program for reasons local and global.

Seismology students learn about the geosciences — including geology, mineralogy, hydrology (the scientific study of water on the planet's surface) and the environment — along with physics, chemistry, mathematics and information technology.

Because seismology education and research requires access to data from seismic stations across continents and oceans, its study is a natural mechanism for promoting scientific collaboration. Seismic data collection can also be integrated into an educational program.

"I argued that if you are going to train Africans in Africa at the master of science and Ph.D level — train them so they can compete in the global work force — then you need the research infrastructure to support it," Nyblade said. "That brought in the idea of a seismic network."



A gold miner works underground at the East Rand Proprietary Gold Mine in Boksburg, South Africa.

Seismic activity in Africa is associated mainly with the northern part of the continent bordering the Mediterranean, the Gulf of Aden and the East Africa Rift System. Southern Africa has some tectonic activity but its history is incomplete, according to the Council for Geoscience.

A growing seismic network will allow African students to do original research and will lead to significant interest and participation in African science by researchers around the world.

Scientists in a research setting "have to generate new data sets," Nyblade said. "One good way to do that is to have a network and use it to catalyze research and education programs that pull together researchers and university professors from across the continent."

ACROSS THE CONTINENT

Since 2004, the AfricaArray program has raised about \$3.5 million from the U.S. National Science Foundation and \$1.5 million or more from the South African National Research Foundation.

Funding also comes from projects like one for the U.S. Department of Energy's National Nuclear Security Administration, for which students help identify natural seismic events within a mining environment. Mining also can generate seismic signals.

Phase two began in January 2008 (and will run to 2010) to begin building centers of excellence in geophysics at other universities in Africa and to expand the seismic network in two ways.

"One is to expand its geographical scope," Nyblade said. "So far, we're focused on eastern and southern Africa, but in this phase we're trying to push into western Africa with the seismic stations. We're also trying to add to the seismic stations other sensor technology to transform the seismic network into a multidisciplinary network."

For example, adding Global Positioning System — a U.S.-built satellite navigation system — equipment to the network would allow the stations to be used for atmospheric science, including space weather applications. The GPS sensors would also allow the stations to study tectonic plate motions and for regional mapping of roads and boundaries.

Meteorological sensors would allow African researchers to do weather observations, so Nyblade is seeking funding for this application.

AND BEYOND

In phase two, the AfricaArray program will try to expand the number of seismic stations to 50, including 10 in West Africa, and will seek to expand the areas of geoscience to support research and training in groundwater hydrology, geochemistry and geology, as well as meteorology.

"We want to make this a pan-African network," Nyblade added, "so in phase three [2011–2013] we would push into north Africa with the network, so we'd cover the entire continent."

More information about [AfricaArray](#) is available at the organization's Web site.

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