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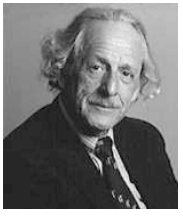

World Bank Boosts Brazilian Science

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Improving science and science education in Third World nations has long been a part of development programs initiated by multilateral agencies, such as the United Nations. But in recent years a new strategy—science for development—has emerged.

Instead of being merely one among many areas targeted for the overall educational, social, and cultural improvement of a developing country, science is beginning to be emphasized as a sector in which development aid can produce outsized returns, especially economic returns.

In this issue of *The Scientist*, Abdus Salam points out that the Third World Academy of Science has adopted as one of its major themes "the direct application of science for economic development" (p. 20-21). He goes on to say that Brazil is only one of five developing countries that has charted a clear course of direct investment in science.

A Nation of Promise, Problems

With abundant natural and human resources, Brazil resembles the proverbial sleeping giant. Generations of commentators have predicted that when finally awakened, it will play a dominate global role. During the "economic miracle" of the late 1960s and early 1970s, Brazil attained an annual growth rate of some 10 percent. That performance certainly fueled speculation about the nation's potential. But growth has slackened considerably and now the country is saddled with enormous social and economic problems, most notably the largest foreign debt of any Latin American nation and an inflation rate of over 300 percent.

Support for science was sacrificed during the years immediately following the industrial boom. Money continued to flow to oil refining, nuclear power, telecommunications and computers, but basic research, especially at universities, sputtered from a lack of funds and inadequate facilities and equipment.

In 1982 the military government, prompted by the complaints from the science community and worried about diminishing prospects for long-term growth, sought out advice from the World Bank on how to improve the nation's scientific infrastructure. Since 1985 there has been new money for science, especially for research at universities and government laboratories, largely because of a cooperative program worked out by the Bank and the Brazilian government.

Together, Brazilian and World Bank officials fashioned the Program for Support in the Development of Science and Technology (PADCT), which was designed to overhaul and modernize scientific research planning, funding, and administration. Under the terms of the program, the Bank extended to the Brazilian government a loan of $72 million which the government agreed to match with $140 million of additional or new money for science.

These funds are now supporting about 1,000 projects in areas vital to economic development: biotechnology, chemistry and chemical engineering, and geosciences. Funding for instrumentation, as well as for the repair and maintenance of existing equipment, is also part of the package. Moreover, PADCT funds, especially from the Brazilian side, are being spent for upgrading science education at the primary and secondary levels, for improving science information networks, and for strengthening science policy-making and management. Although not all the loan funds area yet disbursed, an assessment of the program's effectiveness was recently undertaken be a team of development and science experts, both Brazilians and foreigners.

Among the successes so far is a better coordination of Brazil's five science agencies (FINEP, the Agency for Financing Studies and Projects; CNPq, the National Council for Scientific and Technological Development; CAPES, the Coordinating Agency for Advanced Training of High-level Personnel; the Secretariat for Industrial Technology; and the Ministry of Science and Technology). Also improved is the system for importing scientific equipment and supplies, such as chemicals, a process that was formerly a nightmare of bureaucratic and foreign exchange difficulties. Finally, PADCT has helped establish a system of peer review for the awarding of research grants; previously seniority and sometimes political considerations took precedence over considerations of merit in funding projects.

More recently, Bank officers have helped the Brazilians formulate a funding system that protects the buying power of grants from the depleting effect of run-away inflation. Instead of issuing the funds in the *cruzado*, Brazil's unit of currency, they are denominated in a standard unit, transferable into *cruzados* but continually adjusted to compensate for inflation.

An Important Experiment

Nobel Laureate Henry Taube of Stanford University, who served on the international team reviewing PADCT, gives the program high marks, especially in its effort to establish a peer review system of research funding. "It is an important experiment and it ought to be continued," he says. The Bank is, in fact, now considering the the possibility of a follow-on loan, which may have a greater focus than the first on building up centers of excellence in research.

The World Bank's program for improving science in Brazil is praiseworthy. It also deserves wider attention in the scientific community, which in the past has heard a lot about the Bank's failures in that nation, specifically the failure of a massive regional development program in the state of Rondonia that had a damaging impact on the environment and on indigenous populations. Last spring Bank president Barber Conable introduced reforms, including an expansion of the Bank's environmental staff, which should ensure that past mistakes will not be repeated.

Multilateral agencies, such as the United Nations and the World Bank, receive lots of media attention when their efforts go awry. It is only fair that when they succeed we give them commensurate notice. ■