The Greening of the Green Revolution

A generation ago, a cadre of able scientists, working through a network of international agricultural research centers, changed the face of much of southern Asia. The Green Revolution they fostered turned chronic agricultural shortages into surpluses. Now, confronted by famines in parts of Africa, environmental degradation in agricultural regions of the developing world, and worsening poverty among many of the poorest farmers, the network of research centers is discovering that the Green Revolution is a hard act to sustain.

Consequently, after a decade of debate, the centers are embarking on their most significant change in 20 years. In a move approved by the network's financial backers late last year, the centers will broaden their focus, placing major emphasis on the management of natural resources and adding a half-dozen new institutions to the network to help carry out the expanded mandate. In effect, the centers are giving the Green Revolution a new shade of environmental green.

The 13 existing centers, which operate with a budget of $250 million under an umbrella organization headquartered in the World Bank—the Consultative Group on International Agricultural Research (CGIAR)—have until now concentrated mainly on raising the yields of staple food crops such as maize, rice, and wheat, or on particular regions. The expansion will take the group into research in forestry and agroforestry, irrigation management, and fisheries, and add bananas, plantains, and vegetables to the commodities now on the network's agenda. Current plans call for five centers already operating outside the network to be inducted and one new center created.*

CGIAR

Sustainable system? *International research centers are looking beyond crop yields.*

When World Bank vice president Wilfried P. Thalwitz, current chairman of the group, announced the expansion of the network at the CGIAR annual meeting last fall, he put the new stress on natural resource management this way: "The basic mandate of the CGIAR is to contribute to the productivity of poor people, but this cannot be done by mortgaging the future."

The decision to expand the network's operations stems in part from the growing awareness that, despite remarkable success in raising rice and wheat yields in the 1970s, progress in the 1980s was less than spectacular. Hubert Zandstra, deputy director for research at the International Rice Research Institute in the Philippines, told *Science* in an interview in 1989 that irrigated rice production had already had its "big kick" from the technology and resources available. "Yield increases have tapered off and the system is stuck," he said. "It's a serious problem." Other centers have seen a similar flattening of increases in production.

At the same time that yields seemed to be bumping up against technological limits, it was becoming clear that the agricultural practices behind the Green Revolution were causing social and ecological problems in some areas. Liberal applications of water, fertilizer, and pesticides are required to get the most out of the improved crop varieties developed by CGIAR, and critics argued that the group's concentration on intensive agriculture, large farms, and the best growing areas damaged the environment and offered little to the poor farmers whom the research network was established to help.

In fact, the centers have already made a series of piecemeal shifts in policy and organization designed to benefit poor farmers. For example, when it became obvious that the centers' attempts to introduce improved crop varieties developed elsewhere had failed in African conditions, the CGIAR came to accept the limitations of agricultural research alone and started to pay more attention to environmental and economic factors. The centers put more emphasis on farming systems research, taking into account farmers' needs and knowledge. Equally important, they have been giving higher priority to reaching poor farmers by working with national agricultural research and extension services. As for ecological concerns, the CGIAR has been investing more heavily in such activities as soil research and biological control of pests. And several centers are trying to increase production on land where soil and water conditions are less favorable.

Although these new moves have been approved by the organizations that fund CGIAR, they have prompted some misgivings. Traditionalists argue that the organization should not move too far from its original specialty of plant breeding. By tackling broad environmental problems and taking on responsibilities for upgrading national research and extension services—many of which are inadequately funded and highly politicized—they say that the group risks being overcommitted and losing effectiveness.

There has also been some resistance from within CGIAR because of fears that expansion would sharpen competition for scarce funds. CGIAR gets major funding from the World Bank, the United States, and other industrial countries, and many of the centers that are about to be admitted are now supported by the same donors. The expectation, according to Thalwitz, is that the new centers would come "with a certain amount of funds," but he warned that additional support would be required.

Even if that support is forthcoming, however, agricultural experts caution that there are no brilliant breakthroughs in prospect like those that brought the Green Revolution a generation ago. The daunting question now is whether CGIAR's expanded mandate, better management, and new techniques in biotechnology, such as building better pest resistance into plants, will be enough to enable the world's farmers to stay ahead of the population curve in the 21st century. ■ JOHN WALSH

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*Headed for induction are the International Irrigation Management Institute (IIMI) in Colombo, Sri Lanka; the International Network for the Improvement of Banana and Plantain (INIBAP) with headquarters in Montpelier, France; the International Center for Living Aquatic Resources Management (ICLARM) in the Philippines; the Asian Vegetable Research and Development Center (AVRDC) in Taiwan; and the International Council for Research in Agroforestry (ICRAF) in Kenya. An institute for forestry research is to be established.