Technical Assistance and Foreign Policy

A different world environment has made it fashionable to throw S & T into the foreign policy breach.

George S. Hammond and W. Murray Todd

If we have learned anything from the events of 1974—the oil price increase, the Law of the Sea Conference, the World Population Conference, and the World Food Conference—it is that the people of the developing world are determined that the rich, healthy, well-fed, adequately educated, and resource-rich minority in the developed nations must listen to the poor, sick, ill-housed, undernourished, and jobless of the developing world. To ignore this determination is to court disaster. The prospect of a worldwide depression and societal upheaval holds little terror for those who think they have nothing to lose, yet virtually all of the basic problems confronting developing countries today could be eased by proper application of existing technologies if "we" and "they" have the political will and managerial competence to do so.

The World Environment

For the most part, these problems are well-known and recognized, at least at the superficial level. Population and food are closely coupled. Urbanization and its attendant social sores seem an automatic consequence of the search for some kind of efficiency in distribution of food, goods, and services. Some developing countries suffer debilitation of large segments of their populations by endemic diseases. These problems may be of even greater national importance than the paucity of conventional medical care, which is so immediately apparent to those who travel to or work in developing countries. The lack of effective educational systems suited to the needs of agricultural populations is perceived as a crippling handicap in many countries. This is probably true, although it is not apparent that solutions are achieved by attempts to introduce general educational systems based on models from the developed world, or by ignoring the role women play in LDC (less-developed country) agriculture.

We have learned that development of poor nations is far more difficult than it was perceived to be 30 years ago. Many seemingly constructive actions turn out to be less helpful than was anticipated. For example, introduction of therapeutic drugs in a nation's medical care system may simply replace death from disease with debilitation from starvation in a country with a rigidly limited food supply. The United States has also learned that massive infusions of food through aid programs may have little long-term effect, or even be counterproductive, if the result is a failure to accelerate agricultural productivity and to motivate fertility reduction.

Technology to Suit Local Circumstances

A general lesson to be learned from our recent experience is that successful international efforts in development require very careful construction of institutions within the developing country system. In the fields of agriculture and medicine, there are some reasonably encouraging successes in which they and we have learned to adapt technology to fit local circumstances, which are usually a complex mélange of cultural mores, physical resources, and the existing position of the nation in world commerce. We also learn from the developing nations that some of their greatest needs are for technology that does not exist in the developed countries. This is illustrated by schistosomiasis, a disease unknown in nontropical climates, which enfeebles the victims throughout their lives. Since the infesting parasite is waterborne, the disease has profound implications on programs for land and water management, implications which are not easy for our irrigation and agricultural experts to cope with. If we are to help deal with such problems, we need to produce new styles of interaction that will focus effective study on the existing conditions in the developing nations by involving the most powerful analytic capabilities available. This is no mean task since reliable systems analysis is only a newly emerging skill in the most advanced nations.

Perhaps the toughest problems of all are coupled with the spread of manufacturing technology. This is greatly sought in most developing countries where it is perceived as the most desirable source of export income and potential wealth. The problems inherent in trying to share our source of affluence with the developing nations are grave. The hard, technical problems of transferring manufacturing technology to a developing country are only partially understood and certainly not solved. The economic barriers, which we must admit are largely derived from our own economic system, are severe. There are also problems of world economic interdependence, which means economic competition, about which we have learned bitter lessons during the past year.

Complementarity of Input

Over and above these kinds of problems there is the shadow of a superproblem. The countries of the world simply cannot all manufacture the same things and then try to export them to each other. A stable world system requires complementarity of input from the different nations. Achievement of this goal looks incredibly difficult. An essential precursor is increased emphasis on development of new technologies tailored for new specific national industrial economies.

In principle, the goals of a country attempting to find a place in the world market should reflect an inventory of its physical and human resources and an analysis of what is in short supply in the world as a whole. Part of the reason that agricultural expansion has suddenly become a readily accepted goal nearly everywhere is the realization that food will remain in short supply and that the realistic expectation for the future is that the bulk of the world's people will continue to be employed in agricultural pursuits.

One grim implication of this analysis is that an inventory of assets in some nations may fail to reveal any real promise of a

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complementary contribution to world technology. This will form a new and realistic base for identification of "have" and "have not" countries. The social and political response to the existence of the great disparities will be painful. Perhaps, however, resource-oriented analysis can help to alleviate some uncertainty and misguided efforts.

A Buyer's Market?

We have entered a new phase of international relations in the fields of science and technology. The newly rich nations are prepared to buy large chunks of technology and we will be in jeopardy if we do not work very carefully to understand and to honestly tell them what we can and cannot deliver. The Mideast nations may be naive in their anticipation of what the developed world can deliver and how it will fit into their plans for rapid development. One kind of expertise that can be introduced into these societies is experience, good and bad, gained in 20-odd years of working with other developing countries, even though the circumstances have been different.

Former "client nations" in Latin America, Asia, and Africa are clamoring for drastic changes in the style of our interactions with them. This puts everyone in a very uncomfortable position since our ability to respond to the demand for review and evolution of cooperative programs is being attenuated by diversion of much of our attention to the oil-producing nations. The United States will certainly be accused of selling its services to the nouveau riche while neglecting its poorer former friends. The accusation will be made irrespective of its merits, and our real responsibility will be to use as much wisdom as possible in allocating our resources to the total goal of international development. Unless we are very careful we will end up promising everyone more than we can deliver.

The LDC Environment

In assessing the potential role of science and technology in development there is an implicit assumption that we are discussing the need for and acceptability of technical assistance. This assumption needs to be qualified.

As the image of the People's Republic of China and its capacity to feed, clothe, house, and make healthy a population of 800 million people becomes more widespread and as the disenchantment with conventional aid affects more and more economic planners in developing countries, serious questions arise concerning what LDC's will and will not accept in the planning of technical development projects.

It is clear that self-reliance is not simply a catch phrase of dissidents and antagonists. Perhaps it is a sign of maturity or simply an admixture of nationalistic pride and hope, but it is a significant factor to be reckoned with in the design of technical assistance programs. The concept of *joint planning and design* is central to all technical aid.

A second, but almost equally central, theme of technical aid today is that of the appropriateness of the technology to be transferred and the research to be conducted. Strong lines of conflict between Western advisors and LDC planners and technology users have been drawn in some instances where goals were not clear.

The relationship between exports, imports, technological trade, and balance of payments is extraordinarily delicate, and frequently the technical assistance donors are caught between competing forces. Thus virtually all technical assistance quickly becomes a political issue at the national policy level for both donors and recipients. Only if we mutually agree and forthrightly state that both sides are pursuing their own interests for their own reasons will technical aid be on an honest footing.

The Employment of U.S. Resources

The first and most obvious U.S. resource to be considered in coping with the problems and issues described in the foregoing sections is money. There is no escaping the fact that the judicious use of U.S. funds to assist in the training of researchers, the purchase of scientific instruments and supplies, and the sharing of contemporary technology can make substantial differences in the capacity of partially developed nations to achieve their own targets.

The less obvious, and more complicated resource to use is our plural institutional base. From technical training schools to universities, from government research laboratories to think tanks, we have probably the most versatile and confusing-to-the-uninitiated scientific and technical institutional array in the world. In years past, the Agency for International Development (AID) and its predecessor organizations utilized this base largely by contracting for institution-to-institution technical assistance. United States universities were called upon to establish or strengthen departments, faculties, or schools in universities of developing countries. The results abroad were spotty and the effects on U.S. universities mixed. Nonetheless, some experience was gained in institution-building, and some remarkably useful ties still remain despite the termination of most contract arrangements.

A critical issue remains unsolved: efforts to provide a central clearinghouse for the hiring of U.S. educators to work in LDC colleges and universities foundered and have not been revived. Major problems with respect to tenure, re-entry after overseas service, continuation of fringe benefits, and salary topping preclude an easy flow of U.S. technical personnel into and out of LDC educational and research facilities.

This means that the U.S. manpower and institutional base, while large and rich with variety, is not readily accessible to LDC's except under restrictive constraints. Most U.S. technical personnel in developing countries are there under conventional personal services contracts, fellowships, or grants, or as employees of governmental agencies, contractors, or international organizations.

New approaches are needed to the problems of making U.S. technical people available in developing countries for both short- and long-term assignments, and leadership is required to galvanize the private community into taking the needed actions.

Unfortunately, many developing countries lack the necessary research facilities, the research support, and, above all, the technical manpower capable of manipulating the technical resources available to them. Others with some of the needed facilities and personnel are too poor to utilize them effectively. From a long-range point of view, the United States could help in the following ways:

- Work jointly with selected developing nations to help establish research and development resources that have prospects of short-term economic impact;
- Work jointly with selected developing nations to establish programs of teaching and research in their universities aimed at producing skilled persons locally who can staff the research institutes;
- Assist LDC's to retain or recover their highly trained citizens who tend to prefer to seek jobs in scientifically developed countries; and
- Apply some of our domestic research capacity to the long-range scientific goals relevant to problems of developing nations.

From a short-range point of view, much useful research and development can be undertaken in existing institutions, both in the United States and abroad. It must be emphasized, however, that severe difficulties are associated with this approach:

• Problems must first be identified by people with an intimate knowledge of the local environment.

• Certain categories of problems (such as agricultural) can only be solved in the local environment.

• There must be a new and more effective system for rapid sharing of information about planned and executed research and development results.

These difficulties strongly suggest the desirability of establishing joint programs between U.S. scientists and technologists and their counterparts in developing countries as well as of stimulating LDC scientists, engineers, and their institutions to cooperate among themselves.

Possible U.S. Actions

At present there are no international organizations, U.S. agencies, or private institutions which have the full capability of handling a substantial program of R & D assistance along the lines indicated above. In view of this, the U.S. government might well take the following actions:

1) Within the foreign policy apparatus, it could develop a capacity to cooperate fully with and provide adequate U.S. technical manpower to international organizations that can strengthen scientific and technological competences in developing countries. Neither the Department of State nor AID currently has this capacity.

2) It could develop a new institutional capacity to work bilaterally and cooperatively with all developing nations which wish to do so on joint programs aimed at the following:

• The establishment of LDC research institutions designed to solve specific development programs;

• The training of LDC technical people capable of helping solve problems of development;

• The establishment of quick response links among information dissemination centers for science and technology in developing and developed nations;

• The establishment of mutually attractive arrangements between institutions in developing countries and U.S. industrial, governmental, and academic institutions, the object of which is jointly desired activity, whether it be profit-making or intellectually rewarding; and

• The establishment of joint bilateral and multilateral commissions that would have broad mandates to examine development problems in which science and technology have a significant role and that also have bilateral or multilateral funding to enable them to support the search for solutions.*

3) It could create a new institutional entity for the purpose of facilitating the access of developing countries to "overdeveloped" world scientific and technological activities in universities, research institutes, government laboratories, and the private sector—a clearinghouse of sorts whose principal resource would be a knowledge of what is going on where in the United States and elsewhere and a capacity to translate the sometimes inchoate yearnings of our and LDC academics, entrepreneurs, and government leaders into cooperative relationships for the definition of achievable goals.

* The establishment of bilateral commissions in the last year without either planning for their content or providing funds for their operation comes close to being scandalous.

Psychobiology of Reptilian Reproduction

Environment, hormones, and behavior interact to regulate different phases of the lizard reproductive cycle.

David Crews

The interaction of behavioral, endocrinological, and environmental factors regulating vertebrate reproduction has been the subject of intensive investigation in recent years. Psychobiological research, most notably on the ringdove and canary, indicates that environmentally induced endocrine-dependent male courtship behavior, acting along with climatic and physical aspects of the environment, stimulates pituitary gonadotropin secretion and, consequently, ovarian development, steroidogenesis, and reproductive behavior in the conspecific female (*1*). The adaptive significance of the integration of internal and external stimuli controlling reproduction, however, has been obscured because experimenters have traditionally used inbred laboratory species living under entirely artificial conditions. Although present-day reptiles cannot be considered to be more primitive than extant birds and mammals, their common ancestry and similarities make reptiles an important vertebrate class with which to investigate the social and environmental control of reproduction. Of the reptiles, lizards are particularly well suited for psychobiological research. Many lizards are small, readily available, and easily cared for in the laboratory. In addition, many species retain their complete behavioral repertoire and complex social systems in captivity. More important from a psychobiological point of view, however, is that there already exists good basic information regarding the behavior, physiology, and general ecology of a number of species of two lizard genera, *Anolis* and *Sceloporus*.

Here I will describe laboratory experiments, conducted under seminatural conditions, on the interaction of internal and external factors in the regulation of the reproductive cycle of the American chameleon, *Anolis carolinensis*. The natural history of this lizard has been extensively studied (*2*) and the behavior reported here is typical of free-living populations. The results provide insights into the generality and adaptive value of these interactions which may prove to be of general application to other vertebrate species.

Anolis carolinensis is a small temperate-zone lizard found throughout the south-

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