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The Roles of Teachers and Institutions In Third World Technology Transfer

George B. McLeroy

Third World Overview

The third world — also variously referred to as the undeveloped, underdeveloped, less developed, and developing countries — primarily encompasses the geographical area 30 degrees N and S of the equator. However, it does include a number of countries in North Africa and across Asia outside this limit. For present purposes, countries with controlled economies are considered distinct from the third world. Entirely tropical to semi-tropical in nature, the climate of the third world varies from semi-tropical through subhumid to supra-humid.

While all third world countries have many common characteristics, they exhibit greater diversity as regards development potential than do countries at higher latitudes. Indeed, they are so diverse that it is almost meaningless to generalize about the best approach to their development. Certainly realistic plans for improvement can be made only on a country by country basis and must be premised on national resource inventories that include both macro- and micro-data assessments. Even then some third world countries, due to such attendant constraints as over population, ethno-religious conflicts, limited and/or unbalanced natural resources and general political instability, are hardly viable by any reasonable standard.

With the exception of countries possessing valuable mineral resources, the third world is strongly dependent on subsistence agriculture, which is increasingly hard pressed to keep pace with a human population that is expanding by 2-3 percent annually. It is axiomatic that to increase productivity of agriculture in general, and for subsistence agriculture in particular, something must be done differently (e.g., improved seed, fertilizer, pesticides, irrigation, and cultural practices). Unfortunately, the technology that has made American agriculture so productive has only marginal application in the third world. Many small-holder subsistence farmers are justifiably reluctant to try new methods, even in the face of

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declining yields from traditional practices. Without savings or alternate means of livelihood to fall back on, subsistence farmers who gamble on change do so at an extremely high risk. One must conclude that the labor extensive, high energy using, large scale operations technology of the industrialized world is not universally transferrable.

For constructive change ever to occur in the traditional agriculture of a given third world country — and few have a potential for industrialization — a number of qualifications must first be met. Apart from a national commitment and sweeping desire to change, the following conditions must be present or on the way to evolving:

- an economic, social, religious, and political climate conducive to technological adaptation and usage;

- applicable technology must be available that is both productive and profitable, when compared to conventional production systems and management practices already in use, which among other things may require a responsive market that will pay a premium for higher quality produce;

- widespread demonstration of the new technology must be effected, which demands a capable and operative extension service;

- there must be a process whereby a continuous flow of more advanced technology is made available, which requires technical staff and functional research institutions; and lastly,

- there remains the critical issue of the fiscal means to meet governmental costs, over an extended period of time, while the hoped for benefits of technology are accumulating.

A review of the above prerequisites for sustained technological change paints a rather dismal picture for the third world, as does the record of improvement programs over the past quarter century. Without doubt agricultural development is difficult under the best of circumstances and well-nigh impossible for the most disadvantaged third world countries. This assessment is not meant to imply hopelessness, but it does assert that the matter of development is extremely complex, requires a

comprehensive approach and can seldom be attained solely by the application of technology.

The position of third world countries, in relation to the industrialized western nations, is no different from that of disadvantaged minorities within any given country; unquestionably education has an ameliorating role to play in both cases. Differences in the level of resource consumption between the developed and third world countries were studied recently by the United Nations Fund for Population Activities. Highlights of this investigation indicate that the developed world, with only 25 percent of the human population, absorbs the following of the earth's resources:

<i>Resource</i>	<i>Percent</i>
Energy	85
Feed grains	70
Gross Domestic Product	83
Education expenditures	89
Science and Technology	95
Export earnings	82
Health expenditures	94

Third World Students

Few third world students enter institutions of higher learning with an agricultural background. It is rather more common to pursue a given course of study because of scholarship availability than from any particular interest in the field. Due to intense competition for school enrollment and grades, most are more adept at rote memory than problem solving and analysis. This circumstance is also thought to explain some of the intense aversion most such students have for impromptu examinations.

Major difficulties in training third world students, apart from a language barrier in some instances, hinge upon the uncertainty of their eventual job assignment and responsibilities. They may be required to fill bureaucratic positions of a fiscal or administrative nature totally removed from their field of specialization. Even more disquieting is to see advanced degree students with highly specialized skills for which their country has no job opportunities. In this connection, the oil rich countries are presently creating a brain drain throughout much of the rest of the third world, and this is offering some relief to many otherwise overtrained individuals. In other cases, planning for development while supervising on-going programs may be required of an individual immediately after graduation.

In general and to the extent possible, it is preferable that third world students take their undergraduate degrees at institutions in or near their own countries. In this way, they have few cultural adjustments to make and do not lose touch with reality as often happens when studying in industrialized countries. Concerning advanced degrees, especially where the needed training can be obtained only abroad, such students usually have a specific goal or career in mind and are less likely to be unduly influenced by cultural change and lack of motivation.

American Teachers and Institutions

The U.S. land grant college system, with emphasis on research, teaching and demonstration, has been instrumental in developing the world's most advanced and productive agriculture. However, this has been done under a free enterprise economy with relatively cheap energy. Since the relevancy of any new technology proposed for the third world ultimately rests with the end users who are primarily subsistence farmers, the paramount problem in technology transfer is in the initial determination of relevancy.

American agricultural teachers are normally a product of the U.S. land grant college system. Understandably their academic training has prepared them for a career in some phase or related activity of the nation's highly developed agriculture. Thus, special effort is usually required to obtain a background suitable for effective service to or in the third world. Contact with foreign students, special interest in different cultures, religions and languages, and background information about the third world can all contribute to one's education. However, it must be stressed that such efforts and any special courses taken in international agriculture and rural development must be additional to a broad-based coverage in some established discipline of agriculture.

A relatively large number of institutions of higher learning in the third world have evolved and matured in recent years, and are attracting students who cannot afford the hard currency costs of studying in the U.S.A. While this may not be an issue with third world countries having mineral reserves, the total number of foreign students coming to U.S. institutions will no doubt decline in the coming years. Thus, the opportunity for American agricultural teachers to transfer technology to third world students will likewise decrease, unless of course they seek positions at institutions with strong foreign student programs or join third world institutions.

American agricultural institutions located in a geographical area with climatic and ecological conditions akin to countries of the third world have a substantive advantage of relevant technology transfer. For example, the University of Hawaii is favorably situated to offer humid tropical countries background information and training in soils, irrigation, and the production of sugar cane and horticultural crops. For countries of the semi-arid tropics with large ruminant populations and extensive grazing lands, a number of the southwestern institutions (e.g., Arizona and New Mexico) have much to offer in terms of range management and general arid lands technology. This results from the fact that the problem of relevant technology transfer is most critical in terms of production systems and management practices, for both plants and animals. While supporting courses in an agricultural curriculum (e.g., soils, genetics, and economics) are fairly universal and little influenced by the locale taught, for the production courses it is important that student observe and work with crops and animals in an environment not totally alien to that of their native land.