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USE OF PARAPROFESSIONAL ENGINEERING GEOLOGISTS IN LDC's

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Introduction

Shortages of trained scientists and engineers are a major problem in less developed countries. Part of the problem is simply that there have not been adequate numbers of professionals trained, either locally or in the more developed countries. Further, as recently emphasized by Katz (1980), available scientists and engineers may be "overtrained" and alienated from the pressing problems of their own country or, alternatively, may view their role as that of administrator rather than as leader in solving local or national problems. Others have left their countries, contributing to the brain drain.

The need for scientific and engineering expertise is widely recognized, even at the village level. Moravcsik and Exell (1978) cited examples from "real life" situations in which application of fundamental scientific principles could be used to solve village level problems. They stressed the need for developing an educational format in which "science as a way of thinking and as a method of inquiry and problem solving" plays a pivotal role. Although I concur, there are also advantages in providing village-level personnel with the guidelines and knowledge for solving specific problems, as emphasized by Katz (1980).

Engineering Geologists in Disaster and Development Work

Engineering geologists may play important roles both in normal development work as evidenced by AGID's recent offering of a short course in water management, and in disaster relief work, e.g. following a major earthquake

or volcanic eruption. Urban and rural flooding problems, groundwater hydrologic problems, and seismic risk/structure siting and design problems are typical needs experienced in LDC's as well as in the more developed countries. Solutions, which are sometimes inexpensive, may be unknown at the local level.

Disasters, such as major earthquakes, volcanic eruptions, or floods, serve to intensify the need for immediate engineering geologic evaluations. Following the 1976 Guatemalan earthquake, which destroyed the homes of more than a million inhabitants of the central highlands (Espinosa, 1976), local officials sought the advice of engineering geologists before relocating civic structures to seismically safe sites. In addition, hundreds of private individuals also wanted to know where it was safe to rebuild. The few geologists available were severely limited by time and were unable to visit all of the communities that needed and wanted professional services. We partially solved the problem by training extensionists as paraprofessionals.

Paraprofessional Engineering Geologists

In post-disaster situations, as well as during normal periods of development, paraprofessionals may be trained to make engineering geological decisions. Fixed criteria and easily recognized features can be taught with graphics, even to non-readers. Where local communities face the choice of limited advice from a paraprofessional vs. no advice, because professionals are not available, it is generally better to accept the advice of the paraprofessional trained by the professional. Further, trained locals know and understand local problems and are trusted by their communities. Numerous problems are amenable to solution by such paraprofessional ('barefoot') geologists.

As an example, paraprofessionals can be trained to make either pre- or post-earthquake site selections using a list of criteria presented either graphically or in writing. Such a list was developed by me for the farsighted

Republica Peruana Ministerio de Vivienda Y Construccion's pre-seismic, structure stabilization program (Raymond, 1978). Whereas the professional engineering geologist ranks the relative dangers of various site factors (on the basis of his/her education and experience), the paraprofessional must rely on listed, memorized criteria (because of his/her limited experience and training). Nevertheless, the most dangerous building sites can be eliminated from use by the paraprofessional, resulting in a reduction in both life and property loss in subsequent earthquakes. Such training programs relating to flood problems, landslide problems, and sewage and other engineering/environmental hazards are similarly possible.

Conclusion

The shortage of trained professional engineering geologists in LDC's is a serious problem in both development and post-disaster reconstruction. However, the negative impact of that shortage can be minimized through the training and use of paraprofessionals recruited from local areas within the country. Such paraprofessionals can be taught, with graphics, to deal with specific problems and they bring to their task a zeal and knowledge of the local conditions often superior to that of the foreign professional.

Extensionists trained as paraprofessional engineering geologists were used by Proyecto Kuchub'al in Guatemala following the 1976 earthquake. Although the results of that project have not yet been fully realized, it is clear that scientific knowledge can be transmitted and used effectively at a local level by personnel who lack even a grade school education.

REFERENCES

Espinosa, A.F. (ed.), (1976) -- The Guatemalan earthquake of February 4, 1976, A preliminary report: U.S. Geol. Surv., Prof. Paper 1002.

Katz, M.B., (1980) -- Alternative directions in geoscience development: The training of 'barefoot' geologists or prospectors in developing countries: AGID News, No. 24, 12-14.

Moravcsik, M., & Exell, H.B., (1978) -- Third World needs 'barefoot' science: Nature, 276, 315-316.

Raymond, L.A., 1978, Seleccion de un Lugar Sequr para Construir en Zonas Sismicamente Activas de Paises en Desarollo: unpublished report for Republica Peruana Ministerio de Vivienda y Construccion.