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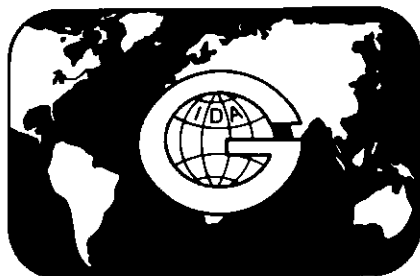
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## Earth Science Aid to Developing Countries: A Collective Critique

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### Introduction

On May 17, 18, and 19, 1974, an International Workshop on Earth Science Aid to Developing Countries was held at Memorial University, under the sponsorship of the Canadian Geoscience Council, and with financial assistance from the Canadian International Development Agency, Canada Department of Energy, Mines and Resources, the Commonwealth Foundation, and UNESCO. This meeting was a follow-up to a larger symposium on the same topic held during the 1972 International Geological Congress in Montreal.

The two days of discussions on the role of the earth sciences in international development and on earth science aid programmes in particular attracted some 70 earth scientists from 26 countries and from a wide variety of backgrounds, with outlooks ranging from relatively traditional to relatively radical. Nearly a third of these were geoscientists from the less developed nations, including senior government officials, mining and petroleum company personnel, university staff, and even post-graduate students. A further 15 participants were from multilateral or bilateral aid groups, largely Canadian, and the balance consisted of those who had had some experience with

aid programmes as mineral exploration advisers, lecturers, hydrogeologists, soil scientists, etc., and those who had had little or no direct experience but were keen to learn.

The aims of the Workshop were: (1) to provide a forum for continuing the discussions begun at Montreal, (2) to identify and record views on earth science aid programmes in order to suggest guidelines for improving their scope and efficiency, and (3) to discuss ways of ensuring a continuation of this dialogue and even of carrying some of the recommendations into action.

In order to help attain these objectives, a series of "background documents" was circulated prior to the Workshop. These consisted of relevant material from the Montreal symposium together with contributions (formal and informal) from participants or other interested people expressing their concerns, criticisms and suggestions. Summaries of these documents together with the reports from the workshop and plenary sessions will form the basis for a report on the meeting to be published later this year by the Geological Survey of Canada.

The main part of this present paper is a brief summary of some of the main points raised in the discussions. The fact that many of these are not new and could apply equally well to technical assistance in other disciplines does not lessen their relevance to the quality of geoscience aid programmes. A final section of this paper describes a new association set up in St. John's in response to the third objective of the meeting. A short list of readings on earth science aid is also appended.

### Summary of Discussions

**1. Preamble.** There was general agreement that the earth sciences should be used to improve the well-being of the peoples of the Third World both in immediate economic benefit and in terms of quality of life. Donor countries must assess the social implications of aid programmes and ensure that they do not lead to conflict or to disruption of the way of life of the recipient peoples.

As one participant pointed out, the development of a mine or of a functioning groundwater system is bound to have a major effect on the way of life of local people, and there are too few examples of sufficient planning for the consequences of these kinds of resource development.

### 2. Technology Transfer.

Technology transfer must obviously be adapted to the needs and priorities of the developing countries, and we must not continue to think that technology which has worked well for us is necessarily desirable in very different environments. Much of the past Canadian aid in mineral resource development seems to have been based upon the experience in our own country. This has involved "a little bit of government help" (i.e., the provincial and federal mines branches and geological surveys) with the rest left to private enterprise. We need to reexamine the general applicability of this approach to Third World situations.

Two recent developments in the Third World in particular need to be taken into account: the growing tendency for recipient government participation in mineral development and exploitation, and the increasing numbers of well-trained indigenous earth scientists who are as competent as foreign 'experts'. Furthermore, as one participant said, many of the aid programmes are being handled by agencies "locked into the format of their own paperwork". The earth scientists who work with them should be constantly trying to get these organizations to adapt to new changes in Third World conditions "otherwise we are trying to solve what are really tomorrow's problems with yesterday's tools, and worse yet with yesterday's paperwork!"

### 3. Scope of Earth Science Aid.

There was much agreement that aid programmes in mineral development should continue well past the reconnaissance stage and should involve even assessment and exploitation of resources. The resulting benefits should be used to make the recipient country self-sufficient. Further, governments of developing countries must ensure

that resource exploitation is controlled in a framework of overall development so that the benefits are used to attain self-sufficiency, for example to build up permanent infrastructures. There appears to be a consensus that no large resource should remain indefinitely in the hands of the private sector, and that management by private capital should last only as long as is necessary to develop local technology and management expertise.

*4. The Role of the Earth Sciences in Resource Development.* Our greatest task as earth scientists is to educate government and the public on the role of the earth sciences in orderly development of natural resources. As several participants pointed out, local planners often do not understand the results from aid programmes aimed at basic geoscientific work, such as mapping. They naturally want some immediate economic benefits. There is clearly a need to educate or sensitize planners and politicians in terms understandable to them even if this means learning the language of the economist and policy maker. We must take the responsibility for our own actions as earth scientists and concern ourselves with advice on resource management.

*5. The Difficulties of Generalizing.* A vigorous discussion of aid projects underlined, as always, the difficulties of generalizing. The diverse nature, scope and objectives of geoscience programmes and the greatly varying needs of the developing countries makes it difficult to draw widely applicable conclusions. Not only is the gap between the West and the richer of the Third World nations (e.g., Nigeria, Mexico, Iran) often smaller than that between these countries and those designated "least developed" by the UN (e.g., Chad, Botswana, Afghanistan), but there are also the vast differences in geological setting between countries like Saudi Arabia, Burma and Fiji that must be taken into account.

Some developing countries have completed basic mapping and reconnaissance prospecting and can now focus on advanced mapping or

on detailed mineral assessment, while other countries still lack basic reconnaissance coverage. This situation was highlighted by a debate on the relative merits of short-term versus long-term (and/or large scale) projects. As many developing countries now have basic earth science institutions and at least some well-trained personnel, both the U.K. and the U.S. are going more and more to short-term requests for specific projects such as age determinations, chemical analyses, mineral assessment and groundwater projects. One advantage of these is that requests can be handled without going through the normal bureaucratic channels involved for larger projects. In contrast, other participants stressed the need still for long-term assistance in building-up permanent local organizations which can advise governments and act as training institutes, as for example in the case of Botswana and certain other "least developed" nations.

*6. Criteria For Judging the Success of Aid Projects.* The successful aid programme, of course, is one which produces beneficial permanent results, and some general factors necessary to achieve this end were outlined.

At the outset it was stressed that response to aid requests is generally not as rapid as it should be, due to red tape in both recipient and donor organizations. Delays of several years between initial request and inception of programmes are far too common, and, of course, can be very harmful. Much more cooperation in the planning stages of aid projects between donor and recipient country personnel is needed, and the local counterpart personnel who will be working in the project should be involved in these preliminary stages.

The data collected during aid programmes should be promptly published, or at least notice of its existence widely circulated. That this is not generally the case illustrates one of the major flaws in the whole aid system, one that leads to much waste and duplication of effort.

The follow-up stage of an aid programme is in many ways the most essential. There is little use in

preparing a geological map or doing an aeromagnetic or soil survey if there is no practical use of the results after the work is completed, and examples of such a lack of follow-up are numerous.

There is also an obvious need for better coordination of aid projects, past, present, and future, within individual nations, and this applies especially to the relationships between bilateral and multilateral programmes being carried out at the same time in any one area. Better integration and cooperation with existing institutions in the recipient countries is another serious need.

*7. Problems of Aid Personnel.* The selection of foreign personnel is a critical factor and one too often neglected. Time and again the importance of the personality of the "expert" was raised, even to the extent of stressing that personal qualities are far more important than technical training. Many criticisms were directed at the work ethics and quality of "experts", and in some cases "inexperienced experts" were clearly less capable than their local counterparts. Others were too young or too old to be effective.

Improvements are also needed in the choice and in defining the roles of the local counterparts. Criticisms directed at recipient countries included the claims that (1) counterparts are unavailable when needed, despite official approval for their participation, (2) counterparts are available and willing to work but are so untrained that they are of little use to the project, and (3) some counterparts are trained but unwilling to work. On the other hand, counterparts complain that (1) they are often used as mere data collectors, (2) they are not given status or responsibility in the execution of the project, and (3) they are often unnecessarily diverted from their long-term or current programmes to work with aid projects.

Some of these problems might be overcome by the early selection and participation of the counterparts in the planning stages of the project, by specialized training in similar projects in similar regions or in special field institutions, or by higher field

allowances.

The problems faced by "experts" also attracted much attention especially since many of the participants in the Workshop had been in that position at one time or another. Several of the background documents stressed the difficulties of careers in international development, chiefly stemming from the lack of job security and career continuity. Earth scientists who wish to devote time to work in developing countries run more than the normal risk that their active working life will be shorter than those of their less mobile colleagues, because they are so often subject to health and physical hazards. At the same time they are liable to have considerable periods between jobs, with no compensation. Keeping up with the literature and with modern advances is particularly difficult for such people.

The need was repeatedly stressed for a pool of earth scientists for work in aid programmes, and the absence of any such pool in Canada was contrasted with apparently well-functioning rosters in the U.S. and the U.K. Methods of recruitment of aid personnel in Canada also came in for criticism, there being few ways in which geoscientists outside the international consulting firms or the federal government could participate in aid programmes.

The possibility of using suitable geoscientists from developing countries as "experts" was mentioned time and again. There is now a significant number of well-trained earth scientists from the Third World who could be more suitable than "experts" from the West, by virtue of cultural and linguistic qualities and relevant earth science experience. Clearly one of the aims of aid programmes is to build up local expertise, and as one participant pointed out, use as aid "experts" of local personnel available in many developing countries instead of foreigners should be encouraged. Indeed it was argued that the frustration and lack of success in some aid projects is simply due to the complete neglect of such local earth scientists. Despite this fact, the example was quoted of aid

programmes in one African country where the level of education was so poor that local counterpart staff simply did not exist. The aid agencies involved apparently preferred to advertise for foreign counterparts in Canada rather than to look in other African countries such as Nigeria where aid programmes are also functioning and where there is a surplus of trained earth scientists!

**8. Training.** The training of earth scientists from the Third World received much attention. It was pointed out that although most developing countries do not have sufficient geoscience personnel, a few like Nigeria and India now produce more graduates than they can employ in the earth sciences. A more general problem is the low quality of geology graduates, due among other factors to: (1) the fact that geology departments attract large numbers of drop-outs from the more favoured physical sciences, (2) poor instruction and academic stagnation, (3) the common reluctance of graduates to do field work and their preference for administrative posts. Some of these problems could be partly resolved by encouraging closer links between universities and industry in the developing countries so that students could gain practical experience during their course. Examples of such schemes were given from Zambia. Twinning schemes between established university departments in the West and counterpart institutions in the Third World could also be helpful, though examples where such schemes had not worked well and were even harmful were also quoted. Clearly there is no universal panacea for these problems.

The perennial problem of training abroad versus training at home also received much attention. As usual the consensus was that training in the earth sciences, at least to the B.Sc. level, was better done at home. Indeed, the current emphasis in several aid agencies was on the building-up of local training establishments. In the case of nations where this was not practicable, regional training institutes in neighbouring countries offer a

possible solution and examples in the Middle East were quoted. To others, however, such regional institutes were often impractical and unsatisfactory due to local political situations.

Points in favour of training at home include: (1) the students are exposed to local problems and do not require the post-training adjustments that foreign-trained personnel often need, (2) there is no culture shock to overcome, (3) the research and field work is a contribution to the local earth sciences, (4) there is no "brain-drain". In favour of training abroad are: (1) better facilities, (2) more experienced staff not hampered by unstable conditions, (3) an academic milieu more conducive to productive academic attainment, and (4) the broadening of personal outlook.

In the case of training abroad, there is an obvious need to ensure that the studies and research are relevant to conditions at home. This can be done on a graduate level by basing research projects in the home country and making provisions for the supervisor to travel to the home field area. Successful examples of such schemes were given.

Consideration was also given to the appropriateness of the classical earth science education for the Third World where many graduates are rapidly promoted to positions of responsibility in which they become decision and policy makers. Such people could act as effective "agents of change" given a wider background and training (for example in economics and developmental models) than normally provided by western-style scientific education. The danger that such studies would lead to "underdeveloped degrees" might perhaps be overcome by appropriate in-service training involving, for example, close field work with foreign "experts". This approach has proved quite successful in South America.

**9. Communication and Liaison.** Finally, emphasis was laid upon the urgent need for improved communication among agencies and individuals involved in earth science aid work, and particularly for easier access to information on the nature

and results of past and present projects. Examples were given of unnecessary duplication of effort due to poor coordination between aid groups, even those belonging to one country. In Canada, for example, aid programmes in the earth sciences are undertaken by CIDA, the GSC, the Mineral Resources Branch and by a variety of private consultant firms, and communications between them appear to need improvement.

As a further example of poor communication, the case was mentioned of a recent scheme for short-term volunteer advisory services initiated by the UN Natural Resources Committee. In the two years since its adoption Canada, one of the prime movers behind the scheme, has had only two requests, both of which were answered. The apparent reason for this lack of interest was that the UN meetings were attended primarily by diplomats who did not get the information out to their own technical personnel!

The need for a "field guide through the jungle of international aid" was stressed, and other proposals were made for an annual international catalogue of current and proposed aid programmes, for an inventory of present and past projects on a country-by-country basis, and for data banks on aid programmes in the whole field of resource development and management.

Examples were given of earth science aid projects which failed, and many people expressed puzzlement at the lack of efforts on the part of the aid agencies to learn from these mistakes and to improve their own programmes accordingly. The establishment of a comprehensive inventory or data bank on aid programmes could be a first step in this direction.

### **A New Association of Geoscientists for International Development**

The 1972 Montreal symposium in its closing moments adopted a resolution to establish an international committee which would provide further opportunities for the exchange of views on earth science aid. A proposal to this effect was drawn up by the organizing committee of the

symposium and submitted in early 1973 to the International Union of Geological Sciences for its consideration. However, no action was taken and the proposal was thoroughly reexamined at the St. John's meeting.

There was complete agreement at the Workshop on the need for a forum for concerned earth scientists to foster the effective application of geosciences to international development, and an *ad hoc* committee was elected at St. John's to draw up detailed plans for an association of earth scientists for international development.

Among the objectives agreed upon by the Workshop participants were: (1) to emphasize to both donor and recipient countries the fundamental role of the earth sciences in international development, (2) to encourage communication among all individuals, societies, and agencies interested in international development in the earth sciences, and (3) to encourage and promote coordination of the activities of the various agencies relating to earth science aid. Other objectives are concerned with problems relating to regional cooperation, guidelines for earth science training, selection of personnel, the "brain-drain", evaluation of aid projects, and the dissemination of information from aid programmes.

The organizing committee for the new association is chaired by Dr. Deborah Ajakaiye of the Department of Physics at Ahmadu Bello University in Zaria, Nigeria, with the help of Professor R. A. Blais, Associate Dean of Research at École Polytechnique in Montreal (Vice-Chairman) and the writer (Secretary-Treasurer). Other committee members are Dr. A. M. Al-Shanti (Saudi Arabia), Dr. S. Bonis (Guatemala), Dr. G. Constantinou (Cyprus), Professor W. von Engelhardt (Germany), Dr. L. A. Heindl (U.S.A.), Dr. J. A. Hepworth (Botswana), Mr. C. Hudson (Peru), Dr. S. Singh (Guyana), and Dr. B. K. Tan (Malaysia).

The committee is already drawing up plans for the next meeting of the association to be held in Sydney, Australia, in conjunction with the 1976 International Geological Congress.

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