Towards a regional co-ordinated programme in Latin America

by C.R. O'Neal*

The development of nuclear science and technology in the Latin American region has been substantial over the past quarter-century. There are isotope applications of one form or another in virtually every country, more than 15 research reactors and a similar number of accelerators of various energies either in operation or under construction; and four countries are either preparing for or actually now generating nuclear power. Total annual technical assistance-related expenditure by the Agency within the region has averaged some US$ 5 million over recent years, the major share of which has been expended in relation to the support of projects in radioisotope applications in medicine and agriculture, nuclear engineering and technology including safety, radiological protection and dosimetry, and prospecting, mining and processing of nuclear materials. This of course reflects an annual expenditure on the part of the Member States concerned many times that amount.

For the most part, the Agency's expenditures to date have been in relation to programmes within individual countries, and only recently have activities been conceived of in relation to a group of countries, i.e. on a sub-regional or regional basis. The number of such activities to date is not large, but it is already evident that their potential or actual impact has been considerably enhanced over that of a series of national programmes. They are shown in Table 1.

Because of this, and the results obtained to date in the framework of the Regional Co-operative Agreement for Research, Development and Training related to Nuclear Science and Technology for the Asian and Pacific regions (RCA programme), interest is being shown by a number of countries in Latin America in organizing a similar programme in that region. The Agency is therefore prepared to assist in any way possible in the development and implementation of a regional co-ordinated programme in Latin America. The major purpose of such a programme would be to carry out projects designed to employ nuclear science and technology for the social or economic well-being of the peoples of the Member States concerned. As is the case in the RCA programme for Asia and the Pacific, a further major goal would be the development of increased self-reliance within each of the participating States.

Table 1. Activities currently being implemented on a regional basis in Latin America

Co-ordinated Research Programmes

Formulation and implementation of maintenance plans for nuclear laboratories in Latin America: Bolivia, Chile, Costa Rica, Ecuador, El Salvador, Uruguay

Improvement of leguminous and oil seed crops in Latin America through induced mutations: Brazil, Chile, Guatemala, Peru (and 3 other countries)

Research programme on the application of isotope techniques in hydrology and geothermics in the Latin American region: Argentina, Bolivia, Brazil, Chile, Colombia, Cuba, Dominican Republic, Ecuador, Guatemala, Mexico (planned participants)

Technical Co-operation projects

Science and technology development: Bolivia, Colombia, Ecuador, Peru, Venezuela

Quality control of nuclear medicine procedures *in vivo* in Latin America: Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, Mexico, Peru, Uruguay, Venezuela

Non-destructive testing: Argentina, Bolivia, Chile, Colombia, Ecuador, Guatemala, Jamaica, Peru, Uruguay, Venezuela

Nuclear Science Development: Belize, Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Nicaragua, Panama

Ecological Studies of the Amazon Basin: Brazil, Colombia, Peru

Latin America represents in some ways an ideal region for arrangements directed towards co-operation between states in relation to common goals. The favourable factors include:

- a common language (save for Brazil, in which a related language is spoken, and several islands in the Caribbean in which French or English is predominant);
- a similar cultural heritage;
- similar problems of development in most countries and similar political institutions; and
- the presence of countries in the area which have reached a somewhat higher level of technological development and would be in a position to co-operate effectively with those countries which have not yet reached that level.

Largely for the first three reasons a strong regional awareness has already developed. This is characterized in those areas of relevance to the IAEA by such organizations as the Inter-American Nuclear Energy Commission (IANEC), Latin American Energy Organization (OLADE), Asociación Latino-Americana de Sociedades de Biología y Medicina Nuclear (ALASBIM), and the Organization

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for the Prohibition of Nuclear Weapons in Latin America (OPANAL). A number of other organizations of a regional or sub-regional character exist in other fields as well.

Increased collaboration in relation to the application of nuclear science and technology is thus a realistic option. The advantages to be gained from increased collaboration could include:

- greater sharing of scarce resources, including possibly facilities, equipment or manpower;
- greater pooling of knowledge and an improved information base;
- increased awareness and support by governmental funding bodies;
- increased potential for obtaining larger-scale outside funding; and
- improved co-ordination of outside assistance received in relation to activities in nuclear science and technology.

The rôle of the Agency in relation to regional co-operation is that of a catalyst. This, however, can prove to be effective, as has already been demonstrated in the Asian region. While the Agency's own financial resources are modest, it has the possibility to employ several possible modes of action and, by virtue of its international position, is able to initiate, organize, or co-ordinate activities which might involve Member States within or outside a region as well as various funding bodies at the national, regional or international level. The various modes open to the Agency for supporting a regional programme would include technical co-operation activities (including the award of fellowships, the sending of experts, or supply of equipment), research support, organization of meetings and, as noted, contacting or co-ordinating with Member States and other organizations.

Interest in the concept of a co-ordinated regional programme is most recently exemplified by the activities of the group of five countries of the Andean sub-region (Bolivia, Colombia, Ecuador, Peru, and Venezuela), which have been holding joint meetings for nearly three years in relation to the use of nuclear science and technology. The group asked the IAEA Secretariat at the end of 1981 to assist them in co-ordinating their efforts relating to the adoption of nuclear techniques in a number of fields. The Secretariat has responded to this request, viewing it as an important step.

At a meeting held in Bogotá in September 1983, several projects were identified for joint implementation. Two of these, relating to improvements in the fields of radiological protection and nuclear instrumentation, were designed to provide a firm basis for the continued introduction of all other aspects of nuclear technology. The remaining three, in the fields of applications of radioimmunoassay techniques in animal production and health, the use of research reactors, and irradiation technology, were designed to build further on the base already developed within the individual countries in these subject areas. It is expected that a more complete programme will be designed for future years. The activities envisaged for the present are shown in Table 2 (see page 30).

The enlargement of the group to include other countries in the region, on a step by step basis, could permit direct and continuing co-ordination between the countries concerned, and between these countries and the Agency, in specific fields considered of high priority. This, in turn, could permit a far better definition of regional interests, would enable those countries able to do so to assist others in the region, and should gradually develop a more effective infrastructure capable of dealing with more extensive forms of aid from outside the region. Existing projects which are clearly regional in character, if desirable, could easily be assimilated into the programme as well and thus brought more closely into a network of integrated programming. More intensive attention could also be given to an important requirement for the region – that of manpower development, particularly at the technician level.

Appropriate ground-rules for the development of an effective regional programme can be stated as follows:

- Any regional group formed must of course respect the national sovereignty of each of its members, and the participation of any State must be on a purely voluntary basis;
- a regional co-ordinated programme should not supplant current forms of assistance, but must rather be complementary, and so designed that it makes the most effective use of all existing forms through proper project development, co-ordination, and implementation;
- the members of the regional group must themselves define their aims, policies, priorities, and procedures. In this process, the Agency should serve as counsellor or advisor, but not as the driving force;
- projects proposed for implementation should clearly be of potential social or economic benefit to the population of the countries concerned;
- any projects or activities agreed upon should be open-ended in the sense that any or all members may take part, or, alternatively, only those few to whom the subject is of greatest interest;
- use must be made of existing institutions, rather than efforts bent towards the creation of new ones;
- wherever feasible, such as in relation to short-term activities, training should be carried out within the region and in the language of the region; and
- any organizational arrangements made must be as simple as feasible, and must take account of existing infrastructures within the region. Primary emphasis in this respect should be directed towards increasing communication between existing organizational structures.

For the time being, efforts will be concentrated on implementing the activities noted above within the five Andean countries concerned. In so doing, however, sight will not be lost of the larger goal of associating a larger

Table 2. Co-ordinated projects envisaged in relation to the Andean Group*

Each project represents an area considered by the Group to be of high priority. Planning effort has been concentrated on the initial three years. Project implementation in most cases will involve both the Agency's technical co-operation and research contract programmes.

Subject	Activities envisaged	Objectives
Radiological protection and Secondary dosimetry	Harmonization of radiological protection legislation, and of inspection and quality control procedures. Practical implementation of standards, strengthening of radiation protection services, and of Secondary Standard Dosimetry Laboratory (SSDL) facilities	To improve the radiological protection of users of ionizing radiation and the public at large by creating the necessary infrastructure To improve the accuracy and reliability of radiation measurements
Nuclear instrumentation	Development of applicable recommendations for preventive maintenance, training of personnel, development of data bank, construction of selected modular items, and acquisition of practical experience	To set up in each of the five Andean countries and the sub-region a system comprising, on the one hand, the necessary physical infrastructure and on the other, personnel capable of: • installing and operating nuclear instruments (detectors, instruments, and computer) and maintaining them at an optimum level of performance throughout their useful life; and of • designing and assembling nuclear instruments
Use of radioimmunoassay techniques in relation to animal production and health**	Organization of appropriate laboratory facilities, training of staff, establishment of radioimmunoassay quality control procedures, and participation in the FAO/IAEA co-ordinated research programme	Generally, to improve the production and protection of agricultural products through the appropriate use of nuclear technology, in conjunction with the conventional methods employed in the various research programmes To promote and co-ordinate information exchange, the acquisition of experience, the training of personnel, and the attainment of maximum efficiency in the use of equipment and facilities Specifically, to improve animal production and health through research into reproduction, nutrition, health, and environmental physiology
Use of research reactors	Development of necessary infrastructure leading to appropriate studies relating to reactor physics, fuel element analysis, neutron activation analysis, and the actual production of radioisotopes and labelled compounds	To stimulate activities relating to reactor physics, study of nuclear materials, research into shielding and instrumentation associated with reactors, and safety To elaborate methods of neutron tests on research reactor-core using a critical assembly To introduce reliable computerized methods of instrumental neutron activation analysis To investigate the region's radioisotope needs and prepare a plan for producing the required radioisotopes and radiopharmaceuticals locally
Irradiation technology	Undertaking feasibility surveys, development of limited infrastructure, and development of appropriate multi-purpose demonstration facilities	To conduct research programmes aimed at technological development To carry out training programmes with a view to creating a reserve of personnel capable of developing the applications of radiations To develop multi-purpose radiation facilities in the region

* Bolivia, Colombia, Ecuador, Peru, and Venezuela.
** Initial portion of a more comprehensive programme in agricultural applications of isotopes and radiation.

number of Latin American States with the programme. Of considerable importance in this respect is the fact that the arrangements being entered into with the Andean countries are themselves open-ended, and make provision for the addition of other countries to the programme. Furthermore, the arrangements are being established through a simple exchange of letters between the executive heads of the atomic energy organizations of each country and the IAEA.

It is likely that other countries will become associated with the programme during the coming year or two, among them one or more of the larger countries of the region. Such a development could give considerable

impetus to further integration and could give much greater meaning to the United Nations TCDC concept – that of technical co-operation among developing countries – under which those countries somewhat more able to do so share their technical skill and know-how with others. Of equal importance would be the possible emergence of one or more donor countries, probably from outside the region, from which funding or contributions in kind might be obtained in relation to larger projects which would be defined by the Member States themselves in relation to activities perceived as priority areas, which would have a high social value content, and would carefully be reviewed for technical soundness by the staff of the Agency.

It remains to be seen how the current interest in greater co-operation might lead to more effective projects having a clearer impact in the field concerned. While there is strong reason to believe that effective collaboration in relation to various activities can indeed be achieved, various infrastructural difficulties, combined with a general economic outlook which is unfavourable in varying degrees, might prove to be obstacles which could substantially retard such an innovative approach. The approach as such is valid, however, and this has largely been recognized.

Whatever course the programme arrangements may take, they are now becoming known by the Spanish acronym ARCAL (from Arreglos Regionales Cooperativos para la Promoción de la Ciencia y la Tecnología Nucleares en América Latina). Depending upon the actions taken within the region, and the assistance the Agency may be able to arrange for or provide, ARCAL may in time become a main focal point for actions related to nuclear technology transfer to Latin America, in a manner similar to that of RCA.