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CARIBBEAN COUNCIL FOR SCIENCE AND TECHNOLOGY

Seminar/Workshop to Develop a Regional Plan of Action
for Science and Technology for the Caribbean
Castries, Saint Lucia
8-12 September 1992

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**MAIN DOCUMENT FOR
SEMINAR/WORKSHOP ON THE DEVELOPMENT OF A
REGIONAL PLAN OF ACTION FOR SCIENCE AND TECHNOLOGY**

21 JUL 1992



UNITED NATIONS

ECONOMIC COMMISSION FOR LATIN AMERICA AND THE CARIBBEAN

Subregional Headquarters for the Caribbean

CARIBBEAN DEVELOPMENT AND COOPERATION COMMITTEE

**MAIN DOCUMENT FOR
SEMINAR/WORKSHOP ON THE DEVELOPMENT OF A
REGIONAL PLAN OF ACTION FOR SCIENCE AND TECHNOLOGY**

RATIONALE FOR A PLAN OF ACTION

Recognizing that regional efforts at developing a capability in science and technology could not succeed unless individual national capabilities were encouraged and developed, the Caribbean Council for Science and Technology (CCST) undertook, within its work programme, to facilitate activities in science and technology management of its member countries and encouraged exchanges of information and experiences in science and technology at the regional level.

Consequently, over the past five years CCST has assisted individual member countries in holding national consultations so that within those countries the role of science and technology in the country's development could be examined and recommendations on organization, policy and programmes for science and technology for national development could be made. In general, the objectives of the consultations could be summarized as follows:

- (a) To identify structures and personnel within the State to serve as focal points for science and technology activities;
- (b) To assist in science and technology popularization;
- (c) To assist in the development of science and technology in the country; and
- (d) To develop a mechanism by which science and technology policies could be integrated within the national planning process.

Consultations were held in Antigua and Barbuda, Belize, Dominica, Grenada, Saint Lucia, Saint Kitts and Nevis and Saint Vincent and the Grenadines with CCST's assistance while the Council participated in consultations held in Jamaica and Trinidad and Tobago. The consultations brought together representation from all the sectors or subsectors involved in science and technology and socio-economic planning. These included ministries of agriculture, communications and works, education, community development, finance and planning, health, trade and industry, professional associations, business associations and regional development institutions and organizations. Within each country the consultations produced a number of ideas, recommendations and decisions on the organization and management of science and technology. Some of the proposals were similar in most countries while others were country-specific. One of the shortcomings recognized by all participants of the national consultations was

the lack of co-ordination of and absence of a concrete plan of action for scientific and technological development at the national level;

At the international level, the Vienna Programme of Action on Science and Technology for Development, adopted in 1979, identified mechanisms whereby developing countries could strengthen their scientific and technological capacities at national, subregional, regional and international levels. The Programme of Action stated that the formulation of a comprehensive and coherent national science and technology policy, designed as part of the national plans to contribute to the achievement of a country's development objectives, is necessary for the effective application of science and technology for development and reiterated that primary responsibility for their development rested upon the countries themselves.

In order to implement the recommendations of the Programme, some countries of Latin America and the Caribbean established scientific and technological structures such as Consejo Nacional para Investigaciones Cientificas y Tecnologicas (CONICYT), COLCIENCIAS of Colombia, etc, to serve as coordinating centres for the direction and development of science and technology in the state. The successes of these undertakings could inform other Caribbean countries in terms of the organization of science and technology in their individual countries. Additionally, the initiative taken by the Government of Venezuela in the context of the Simon Bolivar Programme can also play a vital role in regional cooperation in science and technology.

Within the recent past, various other regional initiatives seeking to contribute to the development of a regional capacity in science and technology have included:

(a) A seminar in 1987, organized by the Economic Commission for Latin America and the Caribbean (ECLAC), Latin American and Caribbean Institute for Social and Economic Planning (ILPES), United Nations Educational, Scientific and Cultural Organization (UNESCO) and the Organization of American States (OAS), where regional planners and specialists identified methods and options for incorporating science and technology into developing planning. The need to continue the process of the organization of science and technology was recognized by all participants;

(b) A science and technology policy for the Caribbean approved by the Caribbean Community (CARICOM) Standing Committee of Ministers responsible for Science and Technology in 1988, which in its introduction noted that

"A regional policy can provide a framework to guide the choice and judicious application of science and technology at the national level. It cannot however substitute for policies

and actions that have to be made at the national level".

The organization of science and technology at national levels remains very haphazard and un-coordinated. A number of different ministries have responsibility for science and technology, with emphasis placed on different aspects of science and technology depending of the area of concentration of the ministry.

(c) The Regional Economic Conference which produced guidelines for economic development for CARICOM countries into the twenty-first century with technology and technology policy being a major issue, which stressed that "technological progress is a fundamental determinant of economic progress" and recognized that "technological capability is essentially embodied in human resources". Consequently, the Conference placed great emphasis on scientific and technological training within the context of human resource development at all levels of the society.

However, for all these initiatives to be successful there was need for a systematic approach to scientific and technological planning in the Caribbean region particularly with the special emphasis now being placed on environment and development and the need for the development and utilization of technologies that reduce damage to the environment, while improving the economic development of the region.

Having concluded the national consultations that it facilitated, the CCST proposes to analyse the outcomes of the consultations and to pool these results within the framework of the above-mentioned activities in order to develop a Plan of Action, including programmes and projects, dealing with science and technology aspects of development in the region.

The Plan is intended to strengthen those areas of need in member countries, assist in their individual development efforts while promoting regional collaboration and development.

CONCLUSIONS OF PREVIOUS MEETINGS

Efforts at addressing science and technology issues in the Caribbean have included:

1. Seminar/Workshop on Science and Technology Planning in the Caribbean

The focus of this meeting, held in Barbados 13-17 July 1987, was to incorporate science and technology into the planning process, in particular to:

(a) Discuss procedures to improve the formulation, execution and evaluation of science and technology development plans, programmes and projects;

(b) Undertake a critical assessment of the application of science and technology planning in the Caribbean, its present situation and perspectives, risks, challenges and opportunities; and

(c) Propose means to improve the multisectoral linkages of technological development, its orientation and promotion.

Some of the recommendations made, included:

"The need to focus on proactive technology, technology policy and technology incorporation for the furtherance of socio-economic development of the Caribbean;

The importance of promoting a better dialogue between science and technology planning at the central level as well as at the sectoral level."

2. Meetings of ministries and institutions responsible for science and technology in member States of CARICOM and Latin America

Two meetings of ministries and institutions responsible for science and technology in member States of CARICOM and Latin America have been held, the first in Venezuela on 22 and 23 June 1990 and the second in Trinidad and Tobago on 4 and 5 April 1991. At the first meeting, efforts were made to identify mechanisms for enhancing collaboration and identifying areas of cooperation. Specific proposals put forward by the CARICOM member countries covered exchange of data on scientific and technological institutions of CARICOM and Latin American countries; development of human resources to include exchange of professors, exchange of researchers, courses at the undergraduate and postgraduate levels, courses at the technical and vocational levels, intensive Spanish and English courses for science and technology personnel and short courses, seminars, workshops and on the job training; agriculture; biotechnology; and natural resource development.

By way of further defining the areas of cooperative activities under the areas of human resource development and research, at the second meeting both groups made a number of general and specific proposals. There was agreement, in principle, on the proposals/activities and coordinating agencies were established for some activities. Notwithstanding the facilitating role of the coordinating agencies to facilitate the long-term objective of having institutions in the region develop links with each other, the following three activities were agreed upon:

(a) Copies of the report of the meeting would be sent to all science and technology institutions in the region;

(b) Questionnaires would be sent to all science and technology institutions with a view to identifying research capabilities, their interest in activities proposed and other possible areas for collaboration; and

(c) Reciprocal fact-finding missions would be undertaken by senior research personnel from key science and technology institutions within the region.

Unfortunately, the mechanisms for implementing all the recommendations of the meetings as well as for financing were not put in place. The Plan of Action should, therefore, decide on mechanisms for implementing these recommendations.

3. Vienna Programme of Action on Science and Technology for Development

On the international scene, the Vienna Programme of Action Science and Technology for Development, adopted in 1979, has as its principal focus the following broad areas:

(a) Strengthening the scientific and technological capacities of developing countries;

(b) Restructuring the existing pattern of international scientific and technological relations;

(c) Strengthening the role of the United Nations in the field of science and technology and the provision of increased financial resources.

The Programme of Action also set out requirements for specific action to be taken at the national, subregional, regional, interregional and international levels on the following:

(a) Creation and/or strengthening of the policy-making capacity of developing countries in scientific and technological matters;

(b) Promotion of the self-reliant efforts of the developing countries to strengthen their scientific and technological capacity;

(c) Strengthening of the scientific and technological capacity of developing countries, inter alia through external support and assistance, to generate scientific and technological knowledge in those countries and to enable them to apply science and technology to their own development;

(d) Restructuring of existing international cooperation so as to promote a better distribution of world production and resources in the fields of science and technology;

(e) Allocation of adequate financial resources for the development of science and technology in and for the developing countries;

(f) Strengthening of scientific and technological cooperation among developing countries;

(g) Adoption of special measures in the field of science and technology in favour of least developed, land-locked, island and seriously affected developing countries;

(h) Strengthening of cooperation between developing and developed countries in the application of science and technology to development.

The document further stated that:

"The primary responsibility for the development of developing countries rests upon those countries themselves. The developing countries are committed to continue assuming their responsibility, individually and collectively, through economic, scientific and collective self-reliance. However, effective action at the international level, especially by developed countries, is required to create an environment that is fully supportive of the national effort of the developing countries to realize their development efforts.

The full recognition of the necessity for all countries to rely on their own endogenous scientific and technological capacities has characterized the preparatory activities for the Conference. Such self-reliance does not mean autarky but the ability, in essence, to take and implement autonomous decisions for the solution of national problems, and the strengthening of national independence.

The formulation of a comprehensive and coherent national science and technology policy, designed as part of the national plans, to contribute to the achievement of a

country's development objectives is necessary for the effective application of science and technology for development."

With regard to the scope and dimensions of science and technology policy for action at the national level it was recommended that:

"The government of each developing country should formulate a national policy for science and technology, which involves carrying out certain essential responsibilities such as the planning, budgeting, management, co-ordination, stimulation, promotion and execution of scientific and technological activities relevant to define development objectives. It implies also the bringing about of careful interaction between factors responsible for growth and transformation.

Technology policies of developing countries should provide for a technological spectrum ranging from the most simple to the most advanced technologies. Their efforts should be to arrive at an optimum combination of capital and non-capital-intensive technologies in a country-specific, resource-specific and product-specific pattern".

In some respects, there has been implementation of some of the recommendations of the Vienna Programme of Action, but further action is needed for more successful implementation.

4. Regional Meeting on the Progress of Science and Technology for Development in Latin America and the Caribbean

Ten years after the adoption of the Vienna Programme of Action on Science and Technology for Development, a Regional Meeting on the Progress of Science and Technology in Latin America and the Caribbean was convened in Costa Rica from 10-12 April 1989. The meeting was part of the preparation for the end-of decade review of the implementation of the Vienna Programme of Action on Science and Technology for Development later carried out by the United Nations General Assembly from 21 August-1 September 1989.

The meeting carried out an in-depth review of the region's approach to the issues of:

- Science and technology development strategies;
- The impact of technology assessment on the new scientific and technological development;
- Financing for science and technology for development;
and

- Cooperation and integration in Latin America in the Caribbean.

Discussions highlighted some unique aspects of the experiences of Latin American and Caribbean countries during the 1980s in socio-economic development, regional and subregional economic integration and international cooperation, despite the poor economic performance of the region's economies.

The meeting found that despite such constraints, the region was able to achieve several science and technology breakthroughs during the 1980s and, in some cases, to export new locally generated technologies. Each Working Group formulated a number of recommendations which were adopted by the meeting. The meeting however noted:

"In addition to quantitative shortfalls, the S&T systems of the region are greatly deficient in their organizational quality. As is generally known, and as it appears also from some of the basic documents submitted to the Meeting, our S&T systems suffer from a lack of coherent connexion among their constituent units, to the point that several authors dealing with the subject have asked whether it makes sense to call "system" a set of units whose functional articulation is weak or inexistent.

While the above refers to the lack of internal connexion of S&T systems, equally serious is the lack of external connexion. This is to say, the inconsistency between S&T plans and activities and socio-economic development plans elaborated by the countries of the region. Such plans, for the most part, are formulated separately and S&T factors fail to appear as explicit variables in socio-economic planning. It was repeatedly stated in the meeting that S&T bodies tend to play only a marginal role in the region's socio-economic decisions."

5. Meetings of the Standing Committee of Ministers responsible for Science and Technology

The science and technology policy adopted by CARICOM Ministers expressed a broad-based approach to science and technology and outlined the general areas of concern as being:

- (a) The education and training of scientists and technologists;
- (b) Experimental research and development;
- (c) Techno-economic services;

(d) Initial production (or "plant start-up") and marketing;
and

(e) Scientific and technological services.

On the general policy areas - planning and infrastructure, research and development, human resources, international cooperation, and science, technology and society were identified. Within these broad fields specific policy areas were identified as: human resources development leadership and management, electronic repair and maintenance capability, scientific and technological information systems and services, telecommunications technology, technology acquisition and development, new technologies; and agro-industry and marine science, which were all designed to:

(a) optimise the benefits to be derived from the exploitation of available resources while protecting the environment;

(b) develop and make use of skilled human resources as the critical engine for transformation and growth;

(c) create dynamism in existing and future Caribbean agriculture and industry to enable rapid adjustment to technological, market and other changes which affect competitiveness;

(d) promote and foster a climate conducive to the development, exchange and effective use of technology within the region;

(e) ensure the most cost-effective methods of acquiring and using technology developed and available within and outside the Region; and

(f) preserve and enrich the cultural heritage of the peoples of the region.

6. National consultations on science and technology

In 1986 the CCST decided that as a principal function it should assist its member countries in conducting national consultations on science and technology. The series of consultations was planned to examine the role of science and technology in the development of the smaller CCST member States and to make recommendations for the organization, policy and programmes for science and technology at the national level.

Although CCST helped to identify and provided financial support for resource persons drawn from regional and national institutions, the organization and implementation of the

consultations were the responsibility of the countries' focal points. Consultations were held in Saint Lucia (1987), Grenada (1987), Antigua and Barbuda (1988), Dominica (1988), Saint Vincent and the Grenadines (1989), Saint Kitts and Nevis (1991) and Belize (1992).

Examination of the recommendations revealed a number of similarities:

Areas of consensus among the different consultations:

(a) Institutional aspects of science and technology

- Establishment by Cabinet of an inter-ministerial committee, chaired by the Minister of Planning. To include other ministers.
- Establishment of an office of Science and Technology Adviser.
- Establishment of a National Science and Technology Council.
- Development of a Science and Technology Policy.
- Liaison between public and private sectors in Science and Technology planning.

(b) Science and technology culture

- Popularization of science and technology using existing community groups, mass media, lectures, demonstrations, fairs, competitions, museums for public awareness.
- Revision of education system from earliest levels.
- Restructuring of CXC science syllabus.

(c) Human resource development

- Identification and aid, monitoring use and development of skilled manpower resources e.g. by means of a National Training Board.
- Inventory of skills.
- Development of computer literacy skills in schools and in public.
- Retraining and upgrading of skills in conjunction with public and private sectors and trade unions.

- Upgrading of teacher training programmes.

(d) Technical support systems including research and innovation

- Development of information services for tourism, agriculture, alternative technology.
- Testing, standards and standardization development, using regional expertise where necessary.
- Multidisciplinary analysis of impact, relevance and quality of Research and Development prior to implementation.
- Development of industrial incubators.

7. Agenda 21 from UNCED

More recently, within the framework of environment and development, the Rio Conference, or the Earth Summit, as it came to be known, adopted a wide range of decisions. Section II of Agenda 21 of UNCED, Conservation and Management of Resources for Development identified 14 areas in which immediate action is needed urgently:

- Protection of the environment.
- Integrated approach to the planning and management of land resources.
- Combating deforestation.
- Managing fragile ecosystems: combating desertification and drought.
- Managing sustainable mountain development.
- Promoting sustainable agriculture and rural development.
- Conservation of biological diversity.
- Environmentally sound management of biodiversity.
- Protection of the oceans, all kinds of seas, including enclosed and semi-enclosed seas, and coastal areas and the protection, rational use and development of their living resources.
- Protection of the quality and supply of freshwater resources: application of integrated approaches to the development, management and use of water resources.

- Environmentally sound management of toxic chemicals, including prevention of illegal international traffic in hazardous wastes.
- Environmentally sound management of solid wastes and sewerage-related issues.
- Safe and environmentally sound management of radioactive wastes.

While they may be of varying degrees of importance to the Caribbean, certainly the following items from the agenda are of primary importance to the region from a scientific and technological standpoint: integrated approach to the planning and management of land resources; combating deforestation; promoting sustainable agriculture and rural development; environmentally sound management of biodiversity; protection of the oceans, all kinds of seas, including enclosed and semi-enclosed seas, and coastal areas and the protection, rational use and development of their living resources; and protection of the quality and supply of freshwater resources: application of integrated approaches to the development, management and use of water resources. Some of the other areas are of a more legal or administrative rather than a scientific undertaking.

The document identifies some of the priority activities that will have to be undertaken, including

"(a) Identify priority areas of scientific, technical and socio-economic research related to the critical linkages between the environmental and developmental issues arising in all sectors, as they relate to the atmosphere, with the support of relevant United Nations bodies, regional and subregional organizations, industry, research institutions and other non-governmental organizations;

(b) Promote the transfer, development and use of improved energy-efficient technologies, including indigenous technologies, in all relevant sectors, (giving special attention to renewable sources of energy and the modernization of power systems) through capacity-building and management, particularly in developing countries;

(c) Encourage industry to increase and strengthen its capacity to develop products and processes that are more energy-efficient, safe and environmentally sound; and

(d) Develop policies that encourage sustainable land use and management of land resources and take the land resource base, demographic issues and the interests of the local population into account."

The agreements provide a comprehensive set of activities to be undertaken for sustainable development to be possible. A critical factor in all of this, however, is the organizational strength of the scientific and technological community to provide the endogenous capacity for technology assessment, research and development, information exchange and regional and international collaboration in order to achieve the desired goals, not to mention the financial undertaking and commitments necessary to carry out such projects.

What we see from all these documents are common areas of concern to be addressed, be they food production, health, transportation, etc., and the need to have appropriate structures and policies to deal with the challenges.

EFFORTS AT COORDINATION AND IMPLEMENTATION

Past work of CCST

At the first plenary session in 1981, six projects were identified and approved as the basis for the CCST work programme and two were added at the second plenary session. These eight projects were:

- (a) Assessment of national science and technology capabilities.
- (b) Establishment of a science and technology journal.
- (c) Preparation and exchange of audio-visual materials for education in science and technology.
- (d) A study of the consequences of the development of energy crops on food supplies in the region.
- (e) Conservation and exchange of germplasm of crop plants.
- (g) Development of agro-industries and employment opportunities particularly at the rural level.
- (h) The potential and limitations of newly-emerging technologies for developing countries.
- (i) A science and technology policy for the Caribbean.

Assessment of national science and technology capabilities

This was designated a priority project with the objective of obtaining information on the quality and quantity of personnel involved in science and technology activities at the national level and their deployment within the national framework for development.

Although some difficulties were experienced in the implementation of this project, some useful information was obtained and UNESCO later built upon the idea into a much larger project.

Establishment of a science and technology journal for the Caribbean

The establishment of a science and technology journal was among the first projects identified by CCST for implementation. Its objectives were to bring CCST activities to the attention of scientists, technologists, policy-makers and planners in the region and to share knowledge of new and significant information in the areas of:

- (a) Technical processes appropriate to the countries in the region;
- (b) Projects in progress; and
- (c) Research results relevant to the development of the science and technology capability of the region.

The Council decided subsequently to produce a newsletter instead because of the high production cost. The first issue of the CCST newsletter was published in late 1985. The newsletter continues to be published bimonthly.

Preparation and exchange of audio-visual materials for education in science and technology.

The objective of this project was to sensitize students, teachers, decision makers and the general public about the pivotal role of science and technology in present-day society.

Three 20-minute video films were produced:

- (a) "Science and Technology: the Trinidad and Tobago Experience" (1983);
- (b) "Regional Development in Energy" (1983); and
- (c) "Food Technology : Our Business Now" (1985).

The project demonstrated the cooperation that can exist within the Caribbean. Filming for these productions took place in

Barbados, Guyana, Jamaica and Trinidad and Tobago. Support was extended not only by all governments from which it was requested, but by regional institutions, scientists, technologists and the business community. Included in these are the Caribbean Development Bank (CDB), Jamaica National Investment Promotion Limited (JNIP), Institute of Applied Science and Technology (IAST) and Hi-Lo Food Stores, among others. The films were produced on a low budget and served to bring together regional educators and television production facilities and improve their production skills.

Other productions were planned but lack of finance prevented implementation of those activities.

A study of the consequences of the development of energy crops on food supplies in the region

This project was proposed at a time when some CARICOM countries were assessing the feasibility of converting part of their sugar-cane and cassava production into fuel. The objective was to collect and analyse information which would assist regional planners and decision makers in the critical evaluation of the production of crops for food or for fuel and in identifying options.

In 1983, a report by two consultants contracted by the secretariat, reference CDCC/CCST/83/10, presented a precise plan of action, together with provisional estimates.

The report was submitted to funding agencies with requests for financial support. By this time, however, the lowered cost of petroleum fuel had led to a waning of interest in this project.

Development of agro-industries and employment opportunities particularly at rural level

This project had two objectives:

(a) To reduce post-harvest losses by optimizing the small-scale processing of agricultural produce, particularly in rural areas; and

(b) To increase individual income by the sale of processed and semi-processed products.

A consultant was contracted to assess the available skills and natural resources in food processing in Grenada and Dominica. His report was submitted to the Council and subsequently to funding agencies, while the project was transferred to the Agriculture Unit at the ECLAC Subregional Headquarters. Arising out of this was a survey and consultant's evaluation of cottage type agro-processing industries in the LDCs of the Caribbean. This was part of a project funded by the Government of the Netherlands to identify and

evaluate the potential for development of rural agro-based industries in the LDCs. A meeting was held in March 1985 in Antigua and Barbuda to consider the consultant's evaluation.

CCST resumed activity in this area in 1985. In conjunction with the Caribbean Association of Industry and Commerce (CAIC), it held two workshops for small-scale agro-processors for the OECS countries with particular emphasis on quality control, marketing and preliminary aspects of business management techniques. One workshop was held in Saint Kitts and Nevis and the other in Saint Lucia.

Conservation and exchange of germplasm of crop plants

This project's objectives were to assist regional centres with the identification, exchange, conservation and storage of genetic material from indigenous as well as introduced crop species.

In 1983, funds were obtained from the Commonwealth Foundation and a consultant was recruited to initiate work on this project. His report is contained in document CDCC/CCST/84/4. Arising out of its recommendations, a plant-breeder recruited to complete the first stage of the project commenced work in September 1984.

Following a visit to Jamaica, Grenada and Guyana, the consultant reported on the status of germplasm diversity and conservation in these three countries. His findings and observations are contained in a report entitled "Report on Conservation and Exchange of Germplasm" which was circulated to member countries for their consideration.

CCST itself did not pursue any further action since other organizations had by this time taken action in this area.

A science and technology policy and plan for the region

In 1982, the Council included this in its work programme in order to formulate a cohesive regional policy on science and technology to harmonize the priorities and capabilities of individual member countries.

At the request of the CARICOM Ministerial Sub-committee on Science and Technology the interim secretariat coordinated the preparation of a science and technology policy and plan for the region.

The plan was presented to the CARICOM Ministers responsible for science and technology for their consideration.

The potential and limitations of newly emerging technologies for developing countries.

CCST was among the first regional organizations to initiate action in this area when it identified this project in 1982. Its objectives were:

(a) To create an awareness of the implications of newly-emerging technologies among senior officials and decision-makers in regional governments and institutions; and

(b) To identify and implement the type of practical action which would be most effective for the beneficial utilization of these technologies.

With the assistance of UNESCO, a preparatory meeting was convened in Jamaica in May 1983 to plan a workshop on new technologies and their implications for Caribbean development. A regional report on the Implications of New Technologies for Caribbean Development was completed and distributed to Council members for discussion and comment. It was originally intended that CCST, in conjunction with UNESCO and the United Nations Centre for Science and Technology for Development (UNCSTD), would organize a workshop in 1985.

During this period the Standing Committee of Ministers responsible for Science and Technology requested CARICOM to undertake consultations with appropriate agencies and organizations with a view to holding a regional seminar/workshop on new technologies and their implications for Caribbean development. This subsequently resulted in the convening of a seminar/workshop in Trinidad and Tobago in May 1986. The workshop was hosted by the Government of Trinidad and Tobago through its National Institute for Higher Education Research, Science and Technology. Financial assistance was provided by the Commonwealth Secretariat.

Other activities

The following activities were all initiated after 1984:

CCST Newsletter

The first issue of the CCST newsletter was published in September 1985. Since then, it has appeared bi-monthly, distributed using ECLAC's facilities and resources. The newsletter serves the same purpose as the journal was intended to, but is a more informal publication.

In general, each issue focuses on a particular topic, in addition to informing on past and future events and available publications. Among topics highlighted in the past were the pharmaceutical sector in the Caribbean; science, technology and the

small State; science and technology popularization; and sustainable development and technology.

Other CCST science and technology popularization activities

During the period when the CCST films were made, a capability in film production was developed whereby local media and education personnel worked together in the production of material for science education purposes. This led to two training workshops on television production materials for education and popularization of science and technology. These were held in Saint Lucia in 1986 for the Windward Islands and in Antigua and Barbuda in 1986 for the Leeward Islands. The countries participating in the workshops were Antigua and Barbuda, Dominica, British Virgin Islands, Grenada, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, the Netherlands Antilles and Montserrat. This enabled the local production of science and technology films for use in schools and on national television. In Saint Lucia for example, the Primary Health-Care Unit benefitted greatly and continues to produce public information material which is regularly aired. CCST's role in upgrading the skills of personnel in Saint Lucia's Helen Television pre-dates that station's participation in CBU's Programme, "Caribvision" and undoubtedly contributed to it.

A register of films dealing with science and technology in the region was also started, using material from companies in Trinidad and Tobago, with the aim of circulating these films throughout the region.

CCST developed the main ideas behind the Workshop on Science Writing and Communications which was eventually held in 1986 in conjunction with Committee on Science and Technology for Education in Developing Countries (COSTED) and the Caribbean Industrial Research Institute (CARIRI).

Through its activities in this area, CCST also supported the first regional consultation on science education research in Latin America and the Caribbean held in Trinidad from 12 to 15 February 1986, under the auspices of the Faculty of Education, University of the West Indies.

National consultations on science and technology

These activities were already mentioned.

Animal feed production

A project shared by the University of the Virgin Islands (UVI) and Saint Lucia was developed to investigate the growth of tilapia as a protein source for feed, using coconut meal and banana for pigs and possibly other animals. Following successful trials, the project was expanded by the Government of Saint Lucia.

CCST collaborative work with other organizations

CASTALAC II

On behalf of UNESCO, CCST convened a consultation of regional officials involved in science and technology matters in preparation for the Second Conference of Ministers for Science and Technology in Latin America and the Caribbean (CASTALAC II). This was held in Trinidad and Tobago in November 1984.

Workshop on problems of science popularization

A regional seminar/workshop on the problems of science popularization was organized in Trinidad and Tobago in October 1985 by the Caribbean Industrial Research Institute (CARIRI) and sponsored by COSTED, UNESCO and CCST which also participated in the workshop.

TCDC function

CCST has served a TCDC function on a number of occasions. Within its work programme, CCST has advocated and continues to employ the modality of TCDC. In all of its workshops and training programmes it has drawn on the resources available within its larger members and, in cases where these were not available, within the larger ECLAC framework, as evidenced by a training seminar on agro-processing sponsored by the Government of Brazil.

CCST also provides technical assistance whenever possible. This began in 1985 when, through ECLAC, it made available the services of an engineer from the University of the West Indies (UWI), St Augustine for one week to assist the Food Technologist of Montserrat in the installation of some agro-industrial equipment.

In 1988, the secretariat negotiated a two-week training workshop on banana by-products for four participants from the Windward Islands with the Brazilian Institute of Food Technology (ITAL) of Brazil. Financial assistance was provided by the TCDC Unit of United Nations Headquarters and the Brazilian Government.

Negotiations with the University of the Virgin Islands (UVI) enabled two participants from Saint Kitts and Nevis and Dominica to attend a workshop on Science Teaching at the Primary School Level. The workshop was organized by the Lawrence Livemore Institute of California and the University of the Virgin Islands.

Funding by CCST enabled the participation of member countries in a seminar on Biotechnology, held in February 1988 in Trinidad.

Additionally, CCST has assisted in identifying sources of funds for regional projects, the development of an updated skills bank; collating and disseminating information already available in

the region; undertaking a short inventory of research in progress in the region among others.

TCDC modalities will continue to be employed in the implementation of the CCST work programme as they not only serve as means of information exchange, but also considerably reduce the cost of project implementation.

A science and technology extension service

This is intended to be an effective community tool with the long-term objective of facilitating small business development in the OECS. Its immediate objective is the establishment of technology extension services in the six OECS countries.

History of the scientific and technological development of the Caribbean

The main output of the project will be a monograph which highlights the achievements of all member countries in science and technology. Through this project, it is hoped that the factors that have shaped the perception of science and technology in the region will be identified and means of change devised so that science and technology can have a more meaningful role in the development process of the region.

A programme to improve the teaching of science and mathematics at the primary level

The project aims at developing national plans in five Caribbean countries for improving the teaching capabilities of teachers in science and mathematics and to serve as a pilot for other countries of the region. Its objectives are:

- (a) To develop greater regional capability in science and mathematics; and
- (b) To develop national plans for improving the abilities of teachers of science and mathematics.

The immediate objective of the project is to train teachers, administrators and teacher trainers from throughout the Eastern Caribbean to develop national plans through an in service training model developed in the United States Virgin Islands (VITEMS) and through experience with some of the best materials developed by reform efforts in the United States, the United Kingdom and the University of the West Indies.

Reports of Agencies

(To be filled in after presentations
at seminar/workshop)

Reports of Governments

(To be filled in after presentations
at seminar/workshop)

ACTION PLAN

Implementation of a science and technology policy

A regional plan cannot spell out in detail the activities to be undertaken by individual countries, as these priorities have to be established by the political directorates of each country. However the plan can suggest some areas needing attention, and the possible action that can be taken. In that respect four areas are being suggested for immediate action:

- (a) Structures and coordinating mechanisms for science and technology development,
- (b) Information, data collection and analysis,
- (c) Technological capability building,
- (d) Popularization of science and technology.

However the areas identified in the CARICOM regional science and technology policy document and the various sections outlined below will form the basis of actions to be undertaken at the workshop based on discussions there. These areas are:

- (a) Science and technology policy and organization;
- (b) Science education (Human resources development);
- (c) Technology transfer and information exchange;
- (d) Agriculture (to include biotechnology);
- (e) Marine science and technology;
- (f) Natural resources utilization;
- (g) Environmental issues;

- (h) Tourism;
- (i) Energy;
- (j) Science management;
- (k) Information;
- (l) Financing science and technology.

1. Programme to be undertaken at the national level

Structures and coordinating mechanisms for S&T development

At the fifth Plenary Session of the CCST held in Dominica, in 1985 discussions on the Establishment of a National Science Council led to the adoption of a set of guidelines that could be followed. Those guidelines suggested an interministerial committee; draw terms and reference for a National Science Council; suggested the composition of the council; and the functions, structures, accountability and financing of a National Science Council.

Needless to say, no Councils were established in the States that did not have such structures in place and in fact, in later years, there have been some doubts as to whether Councils are the best approach. At the seminar on science and technology planning in the Caribbean there was also much discussion on the need to for a mechanism that would be able to make inputs into the national planning process with respect to science and technology programmes but no definite structure was agreed to.

There are different arrangements within the region regarding science and technology planning. A few States have science councils and some have science advisors to ministers. However both arrangements lament their ability to influence the planning process; their advice to be sought or implemented; and their being seen as an integral part of the development process of the state. There is therefore need for further discussion and elaboration on this critical structural point. The experiences of the Latin American countries may be helpful in that respect.

A coordinating mechanism or unit for science and technology would have as its work programme: (a) infrastructure and data collection and analysis; (b) technological capability building; (c) science and technology popularization programme; (d) the development of a science and technology policy for the state through the widest possible consultations with all sectors, labour, private and public sectors and NGO's.

Information and data collection and analysis

A precondition to the planning and management of science and technology and the development of a science and technology policy is the collection of data on personnel, institutions and other factors that will provide a good inventory of resources available to the state. Such an inventory will provide information on human resource development, financing needs, technical assistance projects etc. In fact needs and capabilities will be clearly identified and any indigenous capability existing in the state can be harvested. Such a survey could also provide information on the available natural resource base on which a technological capability or any other industrialization programme can be based.

The technologies coming into the State, arrangement on technological acquisition, fees, licenses can be inventoried and form the basis for informed judgement on what action is to be taken on science and technology programmes. The promotion of technical cooperation among developing countries (TCDC), as well as the analysis of imported technologies and their impacts on the environment can be undertaken by the unit or Council.

Technological capability building: research, administration, and science and technology management

The unit should serve as the liaison between research institutions, the private sector and institutions of higher learning bringing in problems from the field for solutions, as well as assisting in identifying new trends in both products and processes for trials in the State. As such the unit should be responsible for the establishment of a technology extension service to carry out the above. Inputs into the scientific training needs of the state as well as optimal use of scientist, technologists and scientific institutions can be made to the planning authorities.

Quality control; the upgrading of cottage industry skills; and the development of product ideas into scientifically bankable projects should also fall within the mandate of the unit.

Programme for science and technology popularization

It has been said that the lack of a scientific and technological culture in developing countries may be partially responsible for the lack of an endogenous technological capability and by extension, industrialization.

The science and technology plan should:

(a) Encourage the hosting of seminars, science fairs, lectures and discussions on a regular basis in a State. These should be at various levels to reach as wide a cross section of the

population as possible on a wide range of topics.

(b) The promotion, encouragement and establishment of scientific societies and associations and publication of materials either in the regular media or in scientific journals.

(c) The development of visual aids and materials for distribution in teaching both at formal and non-formal levels.

(d) The creation of a system of rewards or recognition for accomplishment in the society in science and technology. These accomplishments need not be in sophisticated technological projects but should also encourage village or rural-type initiative and innovation.

2. Regional action

(a) Programme of work for the Council

(To be elaborated at seminar/workshop)

(b) TCDC promotion

(To be elaborated at seminar/workshop)

(c) Interregional cooperation

(To be elaborated at seminar/workshop)

3. International dimension

(a) Responsibility of the Council

(To be elaborated at seminar/workshop)

(b) Collaboration with international organizations and other extra-regional bodies

(To be elaborated at seminar/workshop)

