SCIENCE, TECHNOLOGY AND INNOVATION FOR SUB-REGIONAL COOPERATION IN THE ENGLISH SPEAKING CARIBBEAN

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English

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1. INTRODUCTION AND STUDY DESIGN

1.1 Introduction

Science, Technology and Innovation (ST&I) and its implications for development has been one of the many fundamental issues in the field of development for decades. Over the years, global changes have demonstrated that Science, Technology and Innovation have become important elements in the development of many countries. Although most substantive studies on the subject matter have focused on the development dynamics of the industrialized world, there have been some Caribbean scholars as well policy oriented research projects that have identified this connection. Many in the English Speaking Caribbean (ESC) have generally come to recognize that ST&I are indeed essential tools for the sustainable socio-economic development of these countries and specifically poverty reduction strategies. An analysis of various policy documents from several government agencies throughout the English Speaking Caribbean will illustrate that despite the important linkages between science, technology and innovation to the development process traditionally, there have been limited attention to policy formulation by the governments of these countries, as well as very limited support for the implementation of recommendations from ST&I interest groups locally and especially regionally.

The reality of this oversight is that several of these countries, like many developing countries, are still lagging behind where innovations in scientific and technological development are concerned. In the last two decades, there have been several conferences, international summits, regional scientific meetings 'gatherings', and 'writings' as well as several initiatives in the Caribbean aimed at addressing this oversight and closing the gap that exists between these countries and those of the industrial world. Additionally, there have also been a number of international conferences relevant to the ESCs effort in this regard. Although, at the micro level it is possible to piece together some evidence to argue that such gatherings and writings have contributed to the advancement of ST&I in the ESC, at the macro level socio-economic indicators tell us that the countries of the ESC have not yet seen the promised 'leapfrogging', 'modernization' and 'take-off' through the use of ST&I. The reasons for this are eclectic and will be discussed in this document.

The successful integrated approach of the European Union and the Asia Pacific region clearly illustrates that approaching ST&I will

demand a coordinated regional effort. Today more than ever before, advances in information and communication, globalization, and the death of distance can make this collaboration possible. However such an approach should acknowledge the differences and similarities that these countries share in an attempt to draw on their resources and individual strengths It is within this context that this document serves as a guide for the identification of ST&I priority areas for Sub Regional Co-operation in the English Speaking Caribbean.

1.2 Background

Many countries in the ESC sub region share common concerns in the fields of ST&I. These concerns extend across a vast network of aware actors cross cutting intellectual research and policy spaces. A number of countries in the sub region have developed infrastructure that enables them to meet the challenges of ST&I and might be on the path towards sustainable development. On the other hand, many other countries face great difficulty in dealing with crucial issues in ST&I. Most of those countries have distinct physical environments, socio-political systems, productive sectors and scientific and technological infrastructure, they, nevertheless share a common aim to share their experiences and co-operate around priority issues. Moreover, there is a great need to identify, formulate and implement sub regional co-operation in ST&I programmes and projects in key areas of development.

This paper thus aims at building on the recommendations of international summits, previous regional scientific meetings and major sub regional S&T programmes and projects to promote the elaboration and adoption of a Caribbean ST&I programmes and projects. Particularly taking into account that science, technology and innovation are realized in modern societies by integrating the scientific and technological learning process of different social actors. This implies reducing isolated scientific and technological efforts and focusing resources on those activities and projects, likely to generate a critical mass and that have a greater potential for solving priority problems in the ESC, specifically those concerning poverty other social and economic as well as environmental conditions and the comparativeness of productive enterprises. Therefore the regional discussions should be action oriented, specifically they should be about analysis and agreement on co-operative ST&I projects that address major science, technology and innovation issues, problems, and opportunities for the sub region in areas broadly related to ST&I.

To these ends, the objectives of the discussions should be:

- Identify ST&I priority areas and recommendations for sub regional co-operation

- Identify current achievements and obstacles for ST&I sub regional planning
- Review the status and prospectus of R&D, engineering, ST&I policies and develop a framework for the way ahead in the ESC.

1.3 Study Design

The research approach was qualitative and the methods which were used for data collection primarily consisted of Desk Research, Documentation Analysis and the Review of Archival Records. The sample consisted of books and material about the countries of the English Speaking Caribbean. The Internet was one of the main data collection tools used to gather conference papers and policy documents from various Caribbean counties over a two month period. Data was also gathered from several libraries and research institutions in Jamaica. Due to resource constraints it was impossible to travel to the various countries which make up the ESC to obtain primary or secondary data.

This research is thus limited by the fact that information collected was obtained from libraries and research centres in Jamaica only.

Additionally, the data gathered from the Internet is limited to what information is hosted on various servers. Thus it may be that this document does not entirely capture all the discourses on ST&I in the ESC.

2. THEMES AND ISSUES IN SCIENCE TECHNOLOGY AND INNOVATION FOR DEVELOPMENT – 1990- 2004

In the last five decades or so, there have been several 'gatherings' and 'writings' - within the ESC with regard to ST&I for sub-regional co-operation with the aim of advancing the development of these countries. Much of these gatherings and writings have attempted to develop methodologies, priority areas, strategies and policies regarding ST&I to meet the development need of these countries. An analysis of the main issues and themes, which have emerged from these gatherings and writings, is presented in this section. Also Integrated in this analysis are the main recommendations that have come out of these gatherings and writings. The current paper is thus a compilation of these main issues and themes, in particularly it presents the lessons learnt (past achievements and mistakes regarding as well as post-gathering activities) from these gatherings and writings. This approach is a form of "Learning-by-Doing" that is based on the fundamental principle that the lessons learnt from past successes and failures where ST&I planning and implementation are concerned will provide the knowledge needed to successfully map the way forward.

2.1 Sustainable Tourism

The need for an integrated approach to sustainable tourism has been one of the many issues that have emerged out of gatherings and writings over the last decade or so. The impact of tourism on the development process of the English Speaking Caribbean has been one of the many emerging topics of several gatherings and writings. One of the main issues which has emerged over the years and has been the focus of several conferences is the potential threats which tourism related activities have on environments of these countries and how this affects their sustainability, particularly where coastal areas, plants and wildlife are concerned. There has been a general agreement that there is a lack of awareness throughout the English Speaking Caribbean regarding these issues especially among micro and small enterprise entrepreneurs.

Various gatherings and writings over the years have recommended Information dissemination and regional awareness strategies to be encouraged among the peoples of the English Speaking Caribbean. Such activities it has been suggested should be implemented by local agencies and organizations associated with either tourism and/or environment management. Particularly there have been several suggestions for the utilization of models employed by countries such as New Zealand which have maintained a 'clean' track record in the execution of tourism management.

There has also been a concern by several environment agencies about the role that government institutions have played in the past, and their response time to recommendations and suggestions made by Non-Governmental Organizations NGOs. NGOs all over the Caribbean have faced a number of obstacles because of policy block and institutional culture of information control which is widely practiced by many governments. Although there is evidence that much has changed in the last decade as more and more government organizations are accepting the important roles of non-government organizations because of their associations with various international organizations, much more is needed to effect the kinds of action plans necessary for more acceptable practices of sustainable tourism.

Non-governmental Organizations have attempted to play a more involved role through lobbying or pressing international organizations. Many have attempted to negotiate new ways of doing things with tourism governmental organizations. Furthermore, many of these non-governmental organizations have gained strength over the years due to their cross Caribbean affiliations and associations with international organizations which have made them formidable forces in the ESC.

A more recent approach has attempted to focus attention on the development of grass root strategies, empowering communities to undertake projects in eco-tourism. It has been noted that community tourism has provided an excellent means of sustainable tourism. Conferences and working documents have over the years been influenced by the findings of academics in parts of Asia and Africa. Thus there has been a call for a broad-scale initiative throughout the English Speaking Caribbean that sees governmental organizations working together with Non-Governmental organizations towards such a goal.

There has also been a drive to encourage the preservation of heritage sites, protected areas and the participation of civil society to ensure sustainable tourism strategies. Out of several key gatherings and writings have emerged the design and implementation of sustainable tourism policies and programs using a regional networking strategy to share information about success stories and failures where sustainable tourism development planning is concerned. Some of the key areas identified thus far are: protection of tourism resources; mineral resources; natural and cultural heritage and the sustainable use of Renewable Energy by the tourism sector. Many social issues have also been identified which encompass overcrowding in tourist areas as well as tourist harassment.

Out of several conferences over the years, there has been a move towards promoting more solid partnerships among governments, the private sector and communities to achieve more sustainable activates relating to tourism and tourism management.

2.2 Music and Entertainment

Music and Entertainment has today been conceptualised within the framework of development by many countries in the English Speaking Caribbean and information and communications technologies are central to this linkage. An analysis of the policy documents of several countries across the English Speaking Caribbean reveals that there is indeed several initiatives aimed at capitalizing on the popularity of Caribbean music and entertainment. Such initiatives and activities have included:

- providing information on copyright procedures and practise;
- promoting music and entertainment in various educational institutions;
- updating legal and regulatory frameworks;
- the provision of loans and funds for entrepreneurs in the music and entertainment industry as well as
- facilitating/supporting conferences and exhibitions around the Caribbean on ICT and music for development.

These activities have been in response to the growing demand for Caribbean music globally, the income generating and job creation potentials of these industries locally and regionally, advances in information and communication technologies as well as the need for alternative development strategies given the inability of traditional development activities such as agriculture and mining to engender growth and development in the last five years.

There have however been several concerns about the actual future prospects of many of these initiatives given:

- the current state of the music industry in these counties – poor legislation, poor channels of communication, not much information sharing among stakeholders, limited financial support from governments and the private sector in these countries, entrepreneurs poor management practices and corruption to name a few
- the control of the global music (sales and distribution) industry by businesses in the industrialized world
- fluctuations in consumer demands
- lack of centralized support to entrepreneurs in this industry

Coordinated regional attempts to address many of these problems have come in the form of research projects undertaken by the United Nations Conference on Trade and Development. The International; Institute for Communication and Development a recently formed international organization has also illustrated their interest in ICT and Music for development in the Caribbean. Since 2001 they have funded a number of initiatives aimed at sensitising the Caribbean public about the many issues and solutions surrounding this area of development. One such initiative is the Caribbean Music Expo. The Caribbean Music Expo (CME) attempts to provide entrepreneurs in the Caribbean music industry with the capacity to reap the benefits of globalization through the use of ICTs. CME provides services for many persons in the music and entertainment industry. These range from artists, music producers and publishers to festival organizers, entertainment attorneys and Internet and web-based service providers.

Part of the program is a standardization of the actives of the industry to adjust to global industry standards through awareness and sensitization strategies. Central to this process is the use of innovative technologies such as the Internet. According to the IICD, one of the principal project goals will be to obtain support from Caribbean governments and corporate bodies by highlighting the potential cultural and economic value of the initiative to the region. CME has several components which include:

- assisting with negotiations between local artists and the international market;
- assisting with the marketing and distribution of Caribbean music with the use of advanced technologies;
- assist with the maintenance of content and quality in the delivery of music;
- facilitating strategies linking music to tourism related activities and
- develop strategies and mechanisms to undertake awareness campaigns among entertainers and musicians regarding the use if ICTs in the music industry as well as copyright administration.

All these activities are executed through a management system which is based in Jamaica but has linkages in many different Caribbean counties. In the last 3 years, CME has made some strides in accomplishing many of these objectives through the use of innovative strategies, In addition to this, the IICD has funded an online electronic commerce web portal to facilitate the marketing of Caribbean music globally. The main recommendations coming out of the CME as well as other gatherings and writings surrounding music and entertainment in the Caribbean has recommended the expansion of the activities and services of the Caribbean Music Expo.

2.3 Clean Technology and Renewable Energy

The issue of Renewable Energy has been a reoccurring of several gatherings and writings over the years. The countries of the English Speaking Caribbean face a number of challenges brought on by the forces of globalisation. Many of these challenges directly affect the already limited natural resources of these countries. The uses of improper energetic models have over the yeas contributed to the deterioration of the environments of these countries.

For years many institutions and agencies operating in the countries of the English Speaking Caribbean have attempted to undo these environmental catastrophes through research, sensitisation and awareness campaigns. Their drive is fuelled by forecasting models predicting environmental disasters leading a major health concerns in these countries, in the near future unless they capitulate to more environmentally sound practices. Attempts to promoting Clean Technologies and Renewable Energies have seen several activities and project being undertaken in the last few years. These largely fall under two umbrellas. The first is the need to encourage active preservation and energy competence. This has come in the form of research projects in alternative sustainable energy source and the better maximization of conventional power sources. The second is the promotion of public awareness campaigns through coordinated strategies which include:

- the promotion of education projects in schools throughout the English Speaking Caribbean,
- encouraging the development of education and public interest groups,
- facilitating regulatory process intervention,
- environmental coalition building and
- supporting policy research.

There has been a drive towards combining the expertise and resources of agencies and organizations throughout the English Speaking Caribbean - education and coalition building - with the hope of creating a compelling force for policy formulation. Additionally, there has been a call for the establishment of a system of co-operation and technology transfer on Renewable Energy Sources. It has also been recommended that there be a Rational Use of Energy approach by countries of the Greater Caribbean. Additionally a permanent information and co-ordination node for the promotion of Renewable Energy Sources and Rational Use of Energy has also been promoted.

There has also been a concern however that many governments in these countries are not doing enough to push these issues and thus in the last five years we have seen several recommendations regarding

the need for government to push the implementation of various renewable energy initiatives. For instance it has been recommended that a network of renewable energy associations should be established throughout the Caribbean. It has also been proposed that information sharing activities be undertaken between and among countries of the ESC and Renewable Energy institutions globally to help with the identification of present and future needs of the Caribbean islands. Additionally there has been a call for trade in renewable energy devices and systems - the transfer of "state-of-the-art" technologies for Renewable Energies - to facilitate the creation of an enabling environment for environmentally sound rapid market growth and sustainable development. Other recommendation have been the need to

- share information and results derived from viable projects and proposals including replication of successful island experiences.
- help in the identification of present and future needs of the Caribbean islands and the contribution that international organizations can provide in addressing such needs.
- To promote trade in renewable energy devices and systems and facilitate the creation of an enabling environment for rapid market growth.[1]

2.4 Water Supply and Sanitation

Water supply and sanitation have also become an important area of concern where ST&I are concerned. Globally, the issue of water supply, quality and the impact of water usage on the environment has preoccupied international conferences on health, science, environment and water. Not everyone in the Caribbean for example has access to efficient, responsive and sustainable water and sanitation services. Water and sanitation access impacts on all the major themes of the development agenda such as poverty alleviation, environmental sustainability, and good governance to name a few. These issues are intricately linked to Caribbean tourism as tourism industry in these countries depends on sustainable and safe water supply and sanitation services.

Gatherings and writings on this issue have also focused on irrigation, recreation, energy generation, wastewater collection, treatment, and disposal. Environment management is also intertwined in the debates on water and sanitation. The need to develop more effective water treatment facilities, develop awareness packages for governments around the Caribbean and obtain funding to maintain these projects have been some of the themes discussed within these spaces. One of the most common themes however has been the threat which current

[1] Source: http://www.eurocaribbean.org/pdf/ecresprogramme.pdf

water consumption has on the environment of these countries. Various research influenced presentations have indicated that many rivers throughout the Caribbean have been depleted by the peoples of these countries. This has been referred to as an ecological disaster by many based on forecasting models.

It has been proposed that this ecological crisis demands attention and that it is critical that strategies be developed and implemented to manage the use of water while monitoring its impact on the environment. International organizations such as the Inter-American Development Bank have been playing an active role in such water-related projects. Additionally, since the declaration of the Millennium Development Goals many other international organizations and governments have taken notice of water supply, quality and environmental impact. Un`tely however, many countries in the region operate in an isolated way in their implementation of water and sanitation policies. Many lack the financial resources to execute some of these projects because of resources constraints and thus the need arises for regional collaboration – sharing the resources of countries - with regard to research and development to ensure that everyone has access to safe water and sanitation facilities without threats to the environment.

2.5 Agricultural Development and Agribusiness

Agriculture has been the mainstay of the Caribbean economies for centuries. Primary commodities, such as sugar, banana, spices and fruits, have in colonial and early post-colonial times provided a reasonable income for those involved Agro-processing activities which arose later as forms of import substitution, were limited to simple extraction of juices and pulp for export and for local consumption.

With the advent of new technologies and surpluses and the consequence entrance of many more players, commodity trade lost its luster and price's began to fall. In the last 100 years commodity price's have fallen some 80%. This has placed great pressure on high cost producers of the small Caribbean islands, which do not have the benefit of economies of scale. Calls have therefore been made to diversify agricultural production, but this has proven difficult because the vital information necessary for this to happen is often nor readily available and the relevant technologies not easily identified.

Many islands therefore still try to hold on to the preferential agreements with first world countries to maintain some hope in commodity trade. There are however clear signs that for commodities such as sugar and bananas, the Caribbean either have to substantially improve production efficiencies, or move to new economic activities. Efforts are now being

made to find alternate uses for sugarcane, such as the production of alcohol for fuel and for the processing of bananas to create needed by-products.

The results of many conferences, and studies indicate that more R&D is necessary to gain relevant local knowledge, which can lead to the improvement of productivity by way of employing new varieties, better irrigation technologies, and safer and more effective use of chemical inputs and more informed marketing, along with the rehabilitation of worn soils and the reduction of pollution.

Except for a few large firms, processing methods have remained almost unchanged for decades and hinder competition in open markets which have rising standards, lower costs provided more variety from imports. Post harvest technologies to reduce the high losses now being incurred also need improvement but these are often site specific and therefore require local R&D and expertise

2.6 Medical Research & Development

Except for Haiti, the Caribbean islands on the whole have excellent public health histories and consequently longevities, equal to that of the first world countries. Longer life however have brought a new set of disease patterns and public health pressures, which are largely the result of lifestyles changes. Medical R&D emphasis has therefore largely shifted from communicable diseases to more chronic illnesses, such as high blood pressure, diabetes and cancers. Much of the R&D done in Ministries of Health and the Universities of the region is now geared to the new environment and cultural conditions. Nevertheless, the pandemic of HIV/AIDS has cause a refocusing of Caribbean health service on new infectious diseases, which have been appearing world wide and rapidly spreading because of globalization and the world wide tourist trade.

The chronic Caribbean poverty problem has gotten larger in recent times because of the backlash of the inequities in globalization and trade. This has put great pressures on health services, especially as they concerns nutrition, and child and maternal health, and the results of the carnage caused by disillusionment, crime, violence and the lack of proper health education.

The raising costs of health services and have forced a more collaborative approach to health and disease in the Caribbean. Likewise partnerships with centers of excellence outside the Caribbean have been seen as necessary to augment the efforts of the relatively small numbers of research personnel and institutions in the Caribbean, and the rapid rise of specialities and medical technologies. Although the profile of chronic diseases are quite similar to what obtains in the

industrial countries, local information must be garnered to make proper use of global information and alliances.

The use of alternative medicine and the reliance on topical herbs have witnessed a resurgence in the region. This has raised the issues of safety, standards and efficiency. The University of the West Indies has launched a National Product Research facility, while institutions such as Jamaica's Scientific Research Council and the National Commission on Science and Technology (NCST) have promoted the creation of nutraceutical and functional foods industries. This will require improved science facilities and a closer working relationship between the R&D establishment and the private sector.

2.7 BioTechnology

Modern Caribbean biotechnology had its origins in the 1960's, when both Cuba and Jamaica began paying close attention to these global developments. Since then phenomenal medical biotechnology growth and achievements in Cuba have become legendary, while Jamaica and the rest of the Caribbean still have not made full use of these tools. However, recently, with the decline in agriculture, there is growing notion that these technologies are pivotal to the resuscitation of this sector and the expansion of agribusinesses as well as food security and safety in the region.

This idea has been consolidated with each conference and workshop held over the last decade. The latest work-shop was held in Jamaica, in November 2004, with a wide cross section of both Spanish and English speaking Caribbean participants, from a number of biotechnology institutions and policy bodies. This meeting developed a regional road map for commercialization of biotechnology. The workshop agreed that biotechnology offers the small states of the region tremendous opportunities for economic and social advancements. The participants noted the fact that countries were at varying stages of readiness to utilize biotechnology, but that all, with exception of Cuba, will need to build human capacity and institutions, to make use of the possibilities in agricultural production and productivity, diagnostics, bioremediation, food, health and mining. What was also agreed as crucial, is a Caribbean wide acknowledgement of the usefulness of these tools and their inevitable impact on regional economies, whether they embrace these technologies or not.

Nevertheless there were some concerns expressed about the fragility of regional biodiversity. Consequently, it was felt that the harnessing of these technologies must be coupled with bio-safety regulations and enforcement mechanisms, and this will largely depend on the willingness to collaborate by forming partnerships and creating

networks of centers of biotechnological excellence, to share information and experiences.

The workshop further confirmed and extend previous recommendations regarding the areas where biotechnology can be usefully applied. These include improvement of commercial plant species/crops, production of biofuels to replace fossil fuels, the creation of biopesticides and biofertilizers and the development of diagnostic/therapeutic kits and delivery of medical services.

How to move from these agreed recommendations to implementation, and where to find resources and how to apportion the work, are yet to be decided. Implementation strategies and plans are clearly needed, not only to effectively use existing institutions, but also how to build new ones that are needed, produce a better critical mass of experts and how to use them effectively.

Another major challenge is how to engage the private sector, especially those which are already involved in successful biotechnology operations, as well as those which can make immediate use of these methods to improve performance, create additional jobs and protect and rehabitate the environment. Additionally, there is a prevailing negative perception of the wholesomeness of Genetically Modified (GM) foods caused by media reports emerging from the developed countries. Specific national approaches to this problem have to be devised. But it was recognised that at the heart of these misconceptions is the lack of a scientific culture and the understanding of the workings of the scientific method across the region.

The importance of social sciences therefore come to the fore to ensure that the public receives a balanced view of the pros and cons of biotechnologies. Also of great importance is how biotechnology can be used to benefit the poor, especially the rural poor.

2.8 Fostering a Culture of Innovation

One of the most widely discusses themes in the last 15 years from Caribbean gatherings and writings on ST&I is that of innovation and its impact on the development process of these countries. According to Dr. the Hon. Keith C. Mitchell, Prime Minister of Grenada, at the opening of the Conference on Science, Technology and Innovation, Sixth Annual Research Day, at the University of the West Indies Mona Campus:

> *Global changes demonstrate that Science, Technology and Innovation have become central to improving the economic performance of our Countries and the social*

> *well being of our peoples. It appears evident to me that if we, the people of the Caribbean, wish to take full advantage of this transformation, we need to ensure that the appropriate polices and infrastructures are in place.*[2]

This aptly exemplifies the philosophy and approaches taken in many gatherings and writings thus far. It is based on the ideology which has preoccupied the discourses on ST&I for years, that innovation is a critical element in the development process of a country. Innovation is the creation of a new products, process, system or device through the applications of scientific knowledge. The developmental contribution of this lies in the stimulation of productivity, international trade, and economic growth. Several studies conducted both within the developing and industrialized world have indicated that innovation or lack there of, is highly correlated with a country's ability to increase productivity for enterprises, expand its market share in domestic as well as in international markets and hence increase revenues and overall stimulate growth and development. (See McKinsey Global Institute, 2002; Christensen, Thomke, and Overdorf, 200; Porter and Stern, 2002; OECD, 2002).

The recommendations and conclusions of several gatherings and writings over the years have called for the development of local innovative capacities within each country, the promotion of regional initiatives in innovation and the encouragement of inter-island collaboration in this regard to overcome resource and size issues which many Caribbean countries experience while undertaking national ventures.

Out of these gatherings and writings has also been the call for developing the innovative capacities of a regional approach focusing on agriculture, biotechnology, entrepreneurship, science education, chemical engineering and food processing. History has however illustrated that promoting a regional approach to innovation is a major challenge for the Caribbean largely due to resource constraints and lack of political and business will. These have been major barriers to the implementation of several proposed recommendations.

2.9 Information and Communication Technology

In the last decade or so information and communication technologies (ICTs) - the internet computer hardware peripherals, electronic gadgets and equipments and associated software - have become important components of the modernization of the developing world (ICT for Development). The importance of ICT to the development process is

[2] See at http://www.caricom.org/newsflash-researchdayconf-uwi-mitchell.htm

based on the premises that ICTs provide developing countries with the tools necessary to address many socio-economic problems and needs such as poverty reduction, livelihood development, crime prevention, gender empowerment, and enterprise development to name a few. Several International organizations have over the years provided evidence of this in countries such as Africa, Asia and also Latin America.

It is the documented success stories of countries such as these that several agencies and organizations have launched a number of strategies and initiatives aimed at enhancing the capabilities of various countries in the English Speaking Caribbean organizations. Some of these agencies include the United Nations Development Programme, the Canadian Development Agency, the United States Agency for International Development, and International Institute for Communications and Development. Government and Non-Governmental Organizations, taking their lead from the growing global trends have also undertaken several initiatives with the hope of addressing the socio-economic and political problems which their countries today face.

There has been a focus on various aspects of ICT for development which includes health, the environment, governance, entrepreneurship, and education to name a few. Most recently however there has been a noticeable trend in terms of livelihood development and e-business. Several initiatives have also emerged out of various conferences and working papers emphasizing the improvement of export competitiveness within the region through ICTs. To this end, there have been a number of meetings and seminars throughout the English Speaking Caribbean with a view to consider policies and strategies to enhance the contribution of ICT and e-business to economic development and regional integration. An analyses of various policy documents however indicate that the achievements in ICT for development are marginal due to various policy, financial and human resource obstacles which many of the countries in the English Speaking Caribbean today face. Thus we have seen a number of calls for a more regional approach to ICT for development. Such an approach it is believed will draw on the capacities and strengths of individual countries in the region.

CARICOM and other regional institutions and agencies have lead this charge. In the last ten years for example, these agencies and institutions have facilitated a number of meetings focusing on addressing the weakness which the ESC today face in terms of the efficient application of ICT in the region. The key recommendations in innovative strategies for a regional approach for mobilizing ICT for development have included:

- Providing access to basic ICT to the peoples of the ESC

- Undertaking various co-coordinated research projects with the aim of promoting niche ICT production segments.
- The development of Caribbean wide content and the promotion/implementation of various intellectual property and protection schemes throughout the English Speaking Caribbean
- Support for innovative ICT applications throughout the Caribbean
- Providing information on new ICT related carrier opportunities to Caribbean youths especially girls
- The development of adequate research frameworks to guide decision-making in Caribbean ICT for development strategies.
- Encouraging e-literacy and awareness campaigns throughout the Caribbean
- Promoting collaboration between and among government, private sector and universities throughout the ESC
- Encouraging the effective use of ICT in various sectors through a widespread information campaign funded by the Caribbean governments
- The development of a regional body to assist governments with ICT related capacity building, infrastructure development, and facilitate regional consultations and dialogue.
- Encouraging regional strategies in electronic commerce
- To focus on disenfranchised and underserved people currently not benefiting from ICT

2.10 Science Education

Like innovation and ICTs, science education has also been an important focus of many ST&I engagement over the years. The importance of Science Education is as a result of the fact that it forms the basis for innovation and a foundation for advances in ICTs. There have been several critical recommendations from these gatherings and writings relevant to the future evolution of the Greater Caribbean in this regard. Some of these recommendations include:

- a commitment to science education by Caribbean government and civil society;
- coordinated efforts on a governmental scale by Caribbean countries;
- an approach to science education through formal and non-formal channels and the promotion of public awareness of S&T issues;
- a more integrated approach to science education which sees the curriculum reflecting the needs of the Caribbean society in general and
- inter-country collaborations, as well as information and knowledge sharing and a more concentration must be made on

outfitting teachers with knowledge of contemporary and regionally related ST&I issues.

The outcome of several more recent gatherings and writings has also seen recommendations for:

- increasing the academic quality of science education at the postgraduate level;
- encouraging postgraduate research relevant to the demands of Caribbean ST&I needs and
- strategies to popularize science education at all levels of the academic, technical and vocational space.

It has also been observed that there is a need for a more interdisciplinary integrated approach to research and development in ST&I. In addition to this there have been suggestions for a more modern Science Education programme development facilitated through horizontal cooperation in keeping with global trends and comparative success stories in other regions. Some conference documents reviewed thus far have recommended the need to take advantage of new advances in communication technologies for coordination of science education activities on a sub-regional level that integrated educational institutions, government agencies and organizations which focus either directly or indirectly on areas of Science Education. In this regard there have also been discussions on the development of more proactive methodological approaches and dynamic strategies to engender cooperation between scientific centres located within Caribbean and Latin America countries.

Other common themes found in the reports surrounding this aspect of ST&I is the need to focus attention on the environmental component in ST&I and the promotion of activities to establish joint research agendas oriented toward building up stable scientific capacities in these counties. Undertaking such a project will require a continuous process of assessment, monitoring and dissemination of information through the use of new communication technologies which can easily facilitate dialogue.

Finally, many have called for more international student and faculty exchange programmes with major international scientific, technological and innovative centres, the use of local consultants in ST&I projects (this often facilitates learning by doing) and more language training (Spanish, English, French, Dutch, Portuguese) to facilitate partnership across the region.

2.11 A Gendered Approach to ST&I

Located within the philosophical discussions concerning the importance of science education is the issue of gender differential access to science and technology training and ST&I planning in the Caribbean. The access of girls/women to ST&I information has also been a major theme in Caribbean gatherings and writings on ST&I. Emerging from these gatherings and writings is the idea that the full and equitable participation of women in ST&I activities will contribute to the enrichment and reorientation of ST&I projects, programmes, approaches, practices and applications. It has also been argued that girls and women in the countries of the ESC have been excluded from the ST&I process over the years as they have experienced barriers in gaining access to the education system particularly to courses related to ST&I. Thus those pushing policies of inclusion concerning the girls and women access to ST&I training have recommended the need for the development of strategies and policies that increase the participation, knowledge and access of women to ST&I. In this regard it is recommended that gender equality strategies should be integrated in ST&I education through curricular and methodological reforms, teacher training programs, research projects and assessment measures.

There have also been recommendations for the implementation of teacher-training programs to assist in raising the awareness of ST&I among teachers themselves. This would of course include the sensitising and training of vocational counsellors regarding the importance of motivating girls and young women to study ST&I. In addition to this, it has also been suggested that there should be provision for grants (regional and national) to young women to undertake graduate and postgraduate studies in areas of ST&I. Already in countries such as Jamaica there is a growing trend with regard to more female university entrants to pursue education in ST&I.

All this should be facilitated through regional bodies. National/Local agencies should assist with the monitoring of these activates and develop best practices solutions for others in the ESC to follow.

2.12 An indigenous Approach to ST&I Planning

Another large part of the focus on science education has been the importance on developing an indigenous approach to ST&I both locally and regionally. The importance in indigenous scientific and technological knowledge to developing countries has been a critical element of development planning among many developing countries. On a global scale there have been several conferences dedicated towards this matter with the aim of establishing indigenous scientific and technological capabilities for sustainable development. International organizations such as the United Nations Development

Programme, the World Health Organization/Pan-American Health Organization and the World Bank are only a few who have also recognized the importance of this issue and have developed strategies to enhance the scientific and technological capabilities of indigenous peoples in their development efforts. In the last decade, they have funded several research projects and programmes to facilitate this. Some areas include health, agricultural production, wastewater management, and environmental management.

Caribbean countries have also recognized the need for an indigenous approach to ST&I given that 'their' problems need to be solved by 'their' people and 'their' knowledge. It has been argued that for years, these countries have relied on external technical assistance and advice. Not much however, has occurred in terms of the development of these countries. Recommendations to advance the indigenous approach sees the need for the popularize ST&I issues. This it is argued helps in developing a culture of science and technology throughout the ESC. It has been agreed that a country's capacity to adopt, integrate and successfully utilize ST&I is inherently related to developing a local culture of ST&I. This requires the integration, demystification and normalization ST&I issues into societal activities through the media, seminars and official curriculums. Several strategies have been put forward over the years seeking to achieve these goals at the regional level. Some of these strategies include:

- curriculum change;
- training of educational instructors;
- amending education policies;
- establishing regional committees and boards;
- facilitating information sharing;
- encouraging research projects;
- implementing sensitization programmes and
- providing monitoring and evaluation support.

Those pushing this agenda see the need to expand on these activities and have recommended that further dialogue and research studies be undertaken in this regard.

2.13 The Private Sector in ST&I Planning

Several ST&I type gatherings and writings have recognized the role that the private sector plays in ST&I planning in the countries of the ESC. Some of the issues and themes in this aspect of ST&I for sub-regional co-operation has been:

- The need for collaboration between the research community and the private sector at a regional level.

- The need to focus on specific areas which foster backward linkages.
- The need for the private sector to be integrated within the planning nexus of ST&I activities.

It has been recommended that strategic alliances be developed on multiple levels to help with the positioning and consolidating of innovation networks. Several ways in which this can be done include:

- regional public and private research networks;
- regional joint publications research contracts;
- regional internship and mentoring program
- public forums targeting business in the region

It has generally been recommended that the Cuban model, which encourages the commercial exploitation of academic knowledge especially with regard to the biotechnology industry, should be the one which is followed. The positive impact this has had on the health and agriculture sectors as well as the generation of foreign exchange is proof of the possibilities such of linkages, if properly organized.

2.14 Universities and Research Institutions in ST&I Planning

Like the private sector, Universities and Research Institutions also play an important role in ST&I planning throughout the Greater Caribbean. From a review of various ST&I documents regarding policy directions and projects in the Asia Pacific Region, it has been observed that alliances and networking with universities and other kind of research centres can be beneficial to the advancement of ST&I on a regional level.[3] It has been acknowledged that universities and research institutions have become critical factor behind the success and competitiveness of these and other countries of the industrialized world. They provide easy access to university graduates and faculty members with dynamic knowledge of new trends in ST&I research results on matters concerning scientific and technological advancements and help to foster the innovative process

This has also been recognized in the ESC by many and this topic has appeared on various conference menu's over the years. One of the major recommendations in this regard is to get the universities and research institutions to better contribute to innovation process through collaboration on a regional scale. This is to be done through the establishment of network channels and greater information sharing

[3] See
http://www.apecsec.org.sg/apec/news___media/media_releases/120304_apecsctechminscallitscresearch.html
http://www.unesco.or.id/prog/science/est/es-index.htm

nationally and regionally. There have also been recommendations that resources mobilization strategies be established with the aim of financing integrated research projects in the area of ST&I. Additionally another preoccupation of successive gatherings and writings has been the identification of appropriate ways of transferring the results of university research to industry. It has generally been recognized that the transfer of ST&I academic knowledge into commercial sector requires several factors, such as an excellent research results, managerial and industrial competence and financial support and there is a great need to foster these activities within Caribbean countries. Over the years several strategies have been promoted to undertake such activities in areas such as biodiversity bio-safety and also biotechnology..

2.15 Capacity Building Strategies for ST&I

Capacity Building is a central issue that has emerged throughout the many ST&I gatherings and writings over the years. Capacity building in ST&I is the sum of efforts needed to foster, augment and utilize the skills and capabilities of people and institutions at all levels -- nationally, regionally and internationally -- so that they can better progress towards development. This includes among other things outfitting people with the understanding, skills and access to information, knowledge and training related to ST&I for development. It also includes, making legal and regulatory changes to enable organizations, institutions and agencies at all levels and in all sectors to enhance their capacities. Most of the recommendations reviewed thus far on Capacity Building in ST&I have indicated the need for a strengthening of the institutions that focus on and support ST&I. Capacity building is today recognized as a critical component of any long-term strategy for sustainable development.

It has been recommended that this 'strengthening' would help to improve the internal management structures, working processes and procedures, as well as partnerships among various actors involved in ST&I regionally. To varying degrees, it includes the investment in property and equipment, training, information and communication strategies, personnel, and private and public sector relationships. Over the years there have been several strategies and initiatives proposed with the aim of developing the capacities ST&I institutions critical for joint ventures undertaken by countries of the ESC. However there are many areas which still need strengthening. For instance there is an urgent need for lawyers with comprehensive knowledge of ST&I issues as well as customs and hazard officials. These areas such be included in any upcoming regional gathering on ST&I.

2.16 Caribbean Governments and ST&I Planning

One of the most common themes found in the recommendations of ST&I related gatherings and writings is the call for Governments of the ESC to play an active role in supporting local and Regional ST&I ventures. The final decision making bodies for ST&I planning and project implementation as well as execution rests in the hands of the governments of the ESC.

Historically the Region's economic stability relied heavily on agricultural production and the advantages from preferential trading arrangements linked to a colonial past. There is a general understanding of a lack of knowledge among Caribbean policy makers themselves where ST&I issues are concerned, and this has significantly affected policy formulation or lack thereof over the years where ST&I is concerned. The recommended strategy emerging out of successive gatherings and writings is to sensitise these officials about the multidimensional dimensions of ST&I and its impact on development and the need to collaborate and share information as well as resources in this regard.

- Additionally, the following recommendations have been suggested:

- the funding of joint research activities;

- dissemination of information region wide;

- assisting with R&D collaborative strategic planning;

- establishing regionally networked ST&I centres promoting regional programmes and project assessment;

- helping to facilitate collaboration networks (links) between government agencies corporations and universities within and between countries throughout the region and

- helping with the monitoring and assessment of these initiatives.

3. MAJOR ACCOMPLISHMENTS AND CRITICAL BARRIERS

3.1 Accomplishments

These are just a few of the main themes and issues concerning ST&I for sub-regional co-operation and development which have preoccupied Caribbean gatherings and writings (academia and policy frameworks) over the last decade and a half. From a micro perspective, at the national level, there have been some accomplishments over these years in terms of policy changes regarding advancing gender issues, promoting ICT, innovations in music and entertainment, science education as well as clean technologies and renewable energies. Additionally, over the years there have also been the successful implementation of several recommendations which have emerged from ST&I gatherings and writings. For instance environmental laws have been updated in several countries. Several institutions and agencies have been created and others have been strengthened.

Although at the regional level many recommendations for sub-regional co-operation among the ESC countries have rarely been adopted in full there have been some strides particularly with regard to the increasing awareness of ST&I issues, innovation and the popularization of ST&I in some respect. Government Institutions such as the National Commission on Science and Technology (Jamaica) and Ministry's like for instance the Ministry of Science, Technology and Tertiary Education (Trinidad), to name a few, have played an important part in the development of awareness campaigns as well as undertaking useful and applicable research projects in ST&I. In addition to this several international organizations such as UNESCO and UNDP as well as regional organizations such as CARICOM have managed to pull together interest groups from these countries and have formed regional working groups to address ST&I concerns in the ESC. Although many could possibly argue that this is not much, it is a start, at least enough to encourage Dr. the hon. Keith C. Mitchell to proclaim:

> *The framework for encouraging innovations is being developed within the Region with the establishment of Innovation Centers and programmes in several countries.*

3.2. Critical Barriers

When one compares the activities of the countries of the English Speaking Caribbean where a regional approach to ST&I for development is concerned with those of the European and the Asia Pacific Region, it is clear that much more still needs to be done. In addition to the identification of the main themes emerging form

successive gatherings and writings over the years this working document also looks at the factors that have inhibited the successful implementation of recommendations. Much of these issues have been mentioned in Section 2. This section will however provide some more information on them. It is hoped that these issues and ways to address them will be incorporated in forthcoming research and/or study projects on Science, Technology And Innovation for Sub-Regional Cooperation in the ESC.

3.2.1 Inconsistency in ST&I Planning and Limited Sustainability for Projects: Many Caribbean ST&I projects and recommended strategies often have short lifespan. Every year, gatherings and writings tend to focus on new and emerging areas in synch with global trends in ST&I. Unfortunately, with each new trend often comes limited attention to previous priority areas both financially and ideologically. This has threatened the longevity of ST&I policies and associated projects both regionally and nationally and it inhibits the ability of projects to actually achieve their desired goals of development, modernization of change.

3.2.2 Lack of Political and Business Will: Despite promotion and recommendation for the implementation of various programmes and projects emerging from gatherings and writings over the years, many regional and national business leaders as well as high level decision and policy makers are slow to act if at all. The reasons for this are eclectic and include among many other things business and political culture, ideological differences, knowledge poverty, resource constraints and conflicting interest. This lack of adequate government support has significantly affected the implementation of ST&I projects over the years.

3.2.3 Deficiencies in ST&I Plans and their Implementation: From a review of the recommendations of many ST&I gatherings and writings as well as follow-up documents, it seem that some of the recommendations regarding the implementation of ST&I projects and programmes and proposed strategies for the way ahead, are sometimes too overambitious. They often attempt to accomplish too many goals and objectives simultaneously and often do not attempt to assess the current landscape to ascertain projects and initiatives with similar goals. The identification of such projects can possibly lead to co-operation and the maximization/efficient utilization of resources.

3.2.4 Insufficient and Unreliable Data: Very often, successful ST&I planning is dependent on the reliability and validity of the data. ST&T planning in the Caribbean have suffered from unreliable and insufficient data which have in the past inhibited the success of ST&I projects. Activities undertaken prior to the implementation of an initiative such as a landscape assessment or a feasibility study are rarely undertaken. Additionally, in many countries, there has been limited: access to; availability of; and use of; data in policy making and planning.

3.2.5 Lack of Financial Support: For many ST&I projects and recommendations, Caribbean countries are often unable to provide the much needed financial support to ST&I initiatives. These countries are burdened with heavy debt, and sometimes are preoccupied with internal crisis which requires immediate financial attention. Consequently ST&I projects are sometimes unable to start off the ground and very often when they are implemented, they are unable to be financially sustained and are terminated.

3.2.6 Institutional Weakness: Institutional weakness is perhaps one of the most significant factors affecting ST&I project implementation in the ESC. This includes among many other things, the failure of planners, administrators and policy makers to engage in continuous interaction and dialogue regarding the goals of an initiative and the appropriate methodologies to achieve these goals. This is sometimes caused by ideological and philosophical disagreements as well as personal rivalries, and conflicting personal interests among and between those involved in the ST&I development planning process. Also, sometimes regional plans do not fit within the schema of national strategies leading to a lack of support and consequently project failure. Thus a landscape assessment of national policies and approaches is needed prior to undertaking regional projects in ST&I.

3.2.7 Unanticipated Disturbances: The Caribbean has seen its fair share of local, regional and international: unanticipated disturbances. These have included: international wars; local and regional regime change: local riots and protests; shift in the policy focus of funding agencies; acts of god and international terrorism. Such activities have had a significant impact of the implementation of ST&I planning especially in regard to political will and financial support. Too often forecasting techniques are not conducted in ST&I planning taking these disturbances and ways to minimize their effects into consideration.

3.2.8 Corruption and Nepotism: Corruption and nepotism are sometimes the source of the inability of ST&I initiatives in the ESC to engender the kind of development they are envisioned to do. Corruption and nepotism come in many forms. Over the years, this has included bribery, purposefully concealing vital information, extortion, misappropriation of funds and favoritism in the distribution of ST&I contracts.

3.2.9 Geographical Barriers to an Integrated and Coordinated Approach: A regional ST&I approach which seeks to achieve the development of the Caribbean is dependent on a coordinated effort. Traditionally an integrated and coordinated approach to ST&I for development has been inhibited by many factors related to the geographic dispersion of the countries of the Greater Caribbean. Even with the use of ICTs which promises the death of distance, incompatibilities associated with the ICTs themselves (software, protocols) are deterrents to efficient information processing and communication activities. Additionally, language, self interest, and cultural barriers have also been identified as barriers for the establishment of ST&I networks throughout the Caribbean.

3.2.10 The Lack of a Tailored Approach: Regional ST&I gatherings and writings have over the years recommended policies and strategies with a one size fits all approach. History has illustrated that this is inadequate and, it is of course, dangerous to make generalizations about the countries of the Greater Caribbean since they vary enormously in size, endowments, language, ideology, challenges, and structural capacity as well as deficiencies. These differences have lead to disastrous regional project outcomes. Thus the need arises for a 'Tailor-Made' approach to Regional ST&I planning which recognized the similarities and differences and strength and weaknesses of each country and develops appropriate ST&I strategies which, though existing under the thematic umbrella 'fits' the needs of specific societies. Such an approach has proven to be successful in New Zealand in terms of the New Zealand Agency for International Development's NZAID ST&I projects in the Asia-Pacific Region.

4. THE WAY AHEAD

Based on an analysis of past and current trends as well as potentially upcoming global trends which forecasting modelling has predicted, the way ahead calls for a Regional Integrated Systems Approach to Science, Technology and Innovation planning for sub-regional co-operation in the English Speaking Caribbean. This approach is a knowledge-based one which utilizes the network of structures, ideologies, resources, shared experiences (lesson learnt) and strategies among NGOs, international organization, the public and private institutions, infrastructures and industries throughout the English-Speaking Caribbean. This strategy is participatory and calls for these agencies and organizations to work together to contribute towards the utilization of ST&I for the development of the entire English Speaking Caribbean, the identification of ST&I projects and the implementation and monitoring of these projects. This kind of approach is an indigenous one which utilizes cross national interdisciplinary knowledge located throughout the English-Speaking Caribbean but is aware of the trends, issues and events of the industrialized world where ST&I planning is concerned. .

Such a model is founded on lessens learnt from studying the history of science, technology, innovation, integration and development theories and planning practices within these countries. It seeks to learn from the successes as well as the failures of past attempts to engender sustainable development though the use of S&T both at the national and regional level. Such an approach is fundamental to the future evolution and survival of these countries.

From the documents reviewed on ST&I planning in the English Speaking Caribbean, it can be argued that traditional approach to ST&I planning frequently neglects the inherent importance of Caribbean history within and outside of the context of the world system. This has had tremendous impact on the future of the ESC in terms of ST&I planning. By disregarding the historical contexts of development, and the attempts to use ST&I in this regard, successive gatherings and writings have run the risk of not adequately capturing and appropriately explaining the implications of science and technology on the sustainable development of the Caribbean. The historical present is connected with the historical past and must be explored to understand and possibly explain the realities ST&I development planning in the region.

This is an approach to ST&I development planning goes beyond the ‘best practice’ thinking which has preoccupied Caribbean scholars and policy makers in the past. This approach seeks to understand what worked in a given context and explores more deeply why it worked or why it did not work. It attempts to absorb lessons from earlier, and

sometimes unsuccessful efforts which includes the use of ST&I for development based on the notion that the success or failure of successive efforts are inherently intertwined with current approaches.

The way ahead is a democratic approach to regional ST&I development planning which promotes participation, transparency, and representativeness. It is an approach which is census oriented and fosters inclusiveness and accountability. But is also encourages radical and divergent views and continuous dialogue between and among planners, decision makers, academics, stakeholders and beneficiaries and where available, online discussion boards and emails should be used to facilitate these activities. The approach will seek to develop viable and practical resource mobilization strategies by working closely with international donors and foundations, the private sector and NGOs.

In order to achieve these goals, a new commitment to cooperation among actors is necessary. The approach seeks to work with governments to assist with the development of a legal basis for cooperation between industry and Government agencies to facilitate project implementation and engender a culture of innovation. This should be done by popularizing ST&I themes and expanding access to ST&I issues. It encourages long term strategies and aims to foster coordinated monitoring techniques. It also seeks to encourage innovation in private firms, in particular micro and small enterprise enterprises through the promotion of linkages among national R&D institutions, private firms and governments across the Greater Caribbean.

The approach is one which seeks to minimize possible deficiencies in plans and their implementation caused by insufficient and unreliable data. Thus this approach to ST&I for development planning will promote continuous and more rigorous data collection methods utilizing both qualitative and quantitative methodologies to provide valid and reliable data in real time regarding project activities and outcomes. It strives to use these methodological approaches and foster coordination with tertiary institutions in the Caribbean. An attempt should be made to encourage more publications annually and the rapid dissimilation of information throughout the Caribbean. Thus future ST&I meetings and gatherings should promote ways and means of commissioning such activities, as well as the development of standards for enhancing the quality of evaluation and impact assessment of projects.

The way ahead should incorporate these activities. There must be a new commitment to ST&I issues which must cover these and other explicit goals emerging from the Task Force. This can only be achieved through a Regional Integrated Systems Approach to Science and Technology Planning for the Sustainable Development of the ESC and must involve governments, corporations, academic and scientific

communities, and other public actors and international cooperation institutions, as a group. Provision should be made for a solid basis for long-term ST&I strategies and policies aimed at sustainable development .

5. POTENTIAL TARGET AREAS FOR SUB REGIONAL COOPERATION IN ST&I

This historical analysis of ST&I gatherings/writings and discourses nationally, regionally and internationally has identified several core themes relevant to current and future Sub-Regional Co-operation research projects in the English Speaking Caribbean. The suggested target areas for Sub Regional Corporation in ST&I for development should focus on the following areas:

- The culture of Innovation throughout the Caribbean
- The commitment to Science Education by Caribbean government.
- Differential gender access to ST&I training.
- An indigenous approach to ST&I and the development of a Culture of ST&I
- The use of ICT to improve Caribbean collaboration in ST&I for development.
- Issues in licensing and patenting of indigenous innovations throughout the ESC.
- Marketing of environmentally safe indigenous S&T products and services regionally and internationally
- The integration of Private Sector in ST&I Planning
- Regional strategies for including Universities, the Private Sector and Research Institutions in ST&I Planning
- Capacity Building for institutions, organizations and agencies involved in ST&I for development activities.
- Developing mechanisms for critical project evaluation and impact assessment activities to monitor these themes and their embedded initiatives.
- Regional approach to Renewable Energy and Sustainable Tourism
- The impact of water demand on the environment.

- The development of realistic resource mobilization strategies for a regional approach to ST&I planning in the ESC.

- Exploring non traditional sources of development such as music and entertainment.

- Explore the pros and cons of ICTs and its potential for the development of the ESC.

6. CONCLUSION

This document has outlined the main issues, themes and trends surrounding Science, Technology and Innovation for sub-regional cooperation in the English Speaking Caribbean. It has also provided a sketch of the main recommendations of various gatherings and writings in this regard. It must however be noted that this document is limited in that it is not specific to any one country, but rather represents a generalization of science, technology and innovation planning in the last fifteen years. It is also limited by the fact that the information collected was based on the use of secondary data found in one of the islands - Jamaica - and also on the Internet. Thus it may not contain all the main themes and issues on ST&I which have emerged over the years from all the countries of the English Speaking Caribbean. Many of these Islands suffer from serious resource constraints which may inhibit an efficient use of the Internet to store and publish local gatherings and writings on ST&I. To accomplish a more representative and comprehensive pool of information, will necessitate the assistance of the main R&D/ST&I bodies of each Caribbean territory as well as those of the industrial world whose history with ST&I has provided some practical examples regarding the way ahead. To do this will require a more in-depth country specific analysis and research activities which facilitates primary data collection.

The use of the qualitative approach here is based on the need to unearth historical information from existing secondary data. The inherent flexibility of this research tool to iron out concepts, themes and issues necessary for exploratory research project(s)/study(s) and to pursue more analytical constructs of a phenomenon(s) is a useful first step for planning more in-depth research projects. It is therefore hoped that this draft document will be the springboard for this proposed comprehensive research project in science, technology and innovation for sub-regional cooperation in the greater Caribbean

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