

**CARICOM REGIONAL BIOTECHNOLOGY
BIOSAFETY POLICY & STRATEGY**

For:

CARICOM SECRETARIAT

Prepared by:

POLICY NETWORKS INTERNATIONAL INC.

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EXECUTIVE SUMMARY

The CARICOM regional biotechnology and biosafety policy must be developed in such a way that it seeks harmonisation with existing sector policies developed to sustain the regional agenda of sustainable socio-economic development, regional integration and overall competitiveness of key economic sectors. The national development agenda of Member States will also form the context for which the policy will be developed as ultimately regional policy initiatives must be implemented at the national level.

Developing a regional policy for biotechnology and biosafety which address specific sustainable development objectives of using the human, cultural and biological assets of the region to enhance the quality of life of the peoples of CARICOM including their health, well-being and safety, reinforces the developmental objectives of CARICOM regional governments.

Global research and development efforts related to modern biotechnology have focussed primarily on agriculture and food; medicine and healthcare; industrial production processes, energy and the environment. The global biotechnology industry in 2007 had an estimated value of US\$29.9 billion with a 60% projected growth by 2012.

Within the CARICOM region, biotechnology research and applications are still in the early stages of development and is mostly limited to cell biology and diagnostic techniques and as a consequence the requisite framework to enable both research and development and utilisation of products of biotechnology are not in place. There is a growing awareness that the development and use of biotechnology must occur within a policy framework which supports trade, innovation, effective technology exploitation, overall public awareness and an appropriate legal and regulatory framework for biosafety, protection of biodiversity, and protection of intellectual property rights and overall increased competitiveness of the public and private sectors in all economic sectors.

There are several initiatives within the region which are synergistic with the development of a policy to develop biotechnology industry in the region and the requisite biosafety regulatory framework. The Revised Treaty of Chaguaramas sets the context for which a CARICOM Regional Biotechnology and Biosafety Policy and Strategy will operate. While the Revised Treaty in its entirety is generally applicable to the implementation of the provisions within the Regional biotechnology and biosafety policy there are specific articles which should be highlighted as biotechnology application can be directly utilised to assist in the achievement of their objectives. Of particular importance are the articles of Chapter 4 of the Revised Treaty dealing with Policies for Sectoral Development.

The provisions of the regional biotechnology and biosafety policy and strategy are complementary to, and supportive of, those provided within other relevant regional and national policies and initiatives as articulated for key productive sectors. Further, the policy takes a look at current regional development and projected growth in these sectors and develops a set of objectives to guide such growth by employing appropriate biotechnologies, and establishing relevant biosafety systems and best practices. Notwithstanding the regional context for which the biotechnology and biosafety policy must be framed, focus is also placed on relevant multilateral trade and economic partnership agreements for which Member States are a party to.

The CARICOM region has the potential to develop and expand biotechnology research capabilities in agricultural, industrial processes, environmental and medical biotechnologies. There is need at the regional level to clearly articulate biotechnology research and development priorities, guided by national R&D priorities, and to coordinate research and development efforts to achieve real growth in key sectors relevant to regional economic development.

Since 2001 CARICOM Member States, with the aid of funding from the Global Environment Facility (GEF), have been developing national frameworks to deal with issues related to biosafety. However, very few CARICOM Member States have developed policies or strategies to address biotechnology. Member States and regional organisations have been involved in several stakeholder consultations and public awareness campaigns geared toward building expertise in biosafety management and educating the public to the nature and scope of biotechnology and the biosafety issues relevant to trade; plant, animal and human health; and the environment. What is now required is a up the level of these programmes and to engage the public and decision makers in effective discussions on how the region can sustainably use the techniques of biotechnology to further regional economic development, integration and global competitiveness.

There are a number of opportunities in several areas of biotechnology which can be commercially exploited by CARICOM Member States to enhance economic growth and social development. Analysis of national documents related to biosafety, biotechnology, science and technology and agriculture, and of data collected during consultations conducted at the national level has revealed that the region can have a comparative advantage in several areas including:

- *Agriculture and food*: development of diagnostic kits for plant diseases; development of specific biosensors; use of microbial technologies to develop biopesticides and biofertilisers; production of natural products from medicinal plants; production of transgenic crops with improved agronomic traits; and development of new ornamental plant varieties.

- *Medicine and healthcare:* tropical diseases transmitted by insect vectors (dengue and malaria); health and wellness tourism.
- *Industrial applications:* development of food and industrial enzymes; development of specific biosensors for agriculture, mining, bioremediation and waste management; use of biomass in the agricultural sector for the development of biopolymers.
- *Environment and energy:* identification of microorganisms which can be used for waste management; development of biosensors for identification of water and mining pollutants; Development of bioenergy sources
- *Biodiversity management for new products:* identification process while other techniques can be used to produce new products; development of micropropagation protocols; identify and conserve fish stock and for development of aquaculture;

The vision as articulated in the policy sees CARICOM Member States as leaders in innovative biotechnology research and development which produces products, services and processes to enhance competitiveness in key sectors while safeguarding and improving the quality of life of peoples within the CARICOM region. The policy sets a 2020 goal to have a vibrant and integrated CARICOM regional biotechnology and biosafety programme comprising sound infrastructure, trained personnel, educated public and an effective regulatory framework to enhance the social, cultural and economic well being of the Region while safeguarding human health and the natural environment.

The CARICOM regional biotechnology and biosafety policy is framed within five main thematic areas:

1. Expanding applications of biotechnology in CARICOM Member States

The primary focus of the this strategy will be to provide a roadmap to expand the biotechnology industry in CARICOM Member States to enhance socio-economic and environmental benefits and sector competitiveness at the national and regional levels. Specific focus will include:

- a. Facilitating development of key biotechnology research and development clusters
- b. Exploitation and Commercialisation of biotechnology products and services for competitiveness
- c. Providing support for Innovation Systems
- d. Providing a framework to facilitate investment in biotechnology and biosafety initiatives

2. Development of biosafety regulatory systems

The activities undertaken to achieve this objective will facilitate the development of appropriate legislative, regulatory and institutional framework for the effective execution of biotechnology and biosafety initiatives in the region. Specific focus will include:

- a. Supporting the implementation of environmentally sustainable initiatives in the Region
- b. Facilitating the development of regional and national innovation systems
- c. Ethically and socially responsible creation and use of biotechnology

3. Development of appropriate legal, regulatory and institutional frameworks

The activities undertaken to achieve this objective will facilitate the development of appropriate legislative, regulatory and institutional framework for the effective execution of biotechnology and biosafety initiatives in the region. Specific focus will include:

- a. Supporting the implementation of environmentally sustainable initiatives in the Region
- b. Facilitating the development of regional and national innovation systems
- c. Ethically and socially responsible creation and use of biotechnology

4. Human capital development

To facilitate human capital development in key areas to position the region to obtain maximum benefits from the development and exploitation of biotechnology products and services. Specific focus will include:

- a. Identifying Human Capital Needs to meet priorities with respect to Biotechnology and biosafety management within CARICOM Member States.
- b. Developing mechanisms to enhance human capital in key areas necessary for biotechnology R&D.

5. Education, training and public awareness

To promote Education, Training and public awareness for greater understanding of issues related to biotechnology and biosafety and their impact at the community level. Specific focus will include:

- c. Facilitating the design and implementation of appropriate public awareness campaigns
- d. Engaging civil society in decision making process
- e. Promoting Information sharing

To achieve the objectives articulated in the policy, it will be necessary to establish a dedicated unit operating under the CARICOM framework. Such a unit can function as an overall 'Science Technology Innovation Unit' having oversight for science and technology issues. Specifically in relation to biotechnology and biosafety there will be a 'Regional Biotechnology and Biosafety Commission/ Secretariat' established and approved by Member States.

The 'Regional Biotechnology and Biosafety Commission/ Secretariat' will function:

- a. To provide guidance to Regional governments in all areas of biotechnology and biosafety through a regional mechanism.
- b. To facilitate the establishment of mechanisms to enhance the capacity of regional institutions to undertake cutting edge R&D in areas of biotechnology clusters and to provide for the testing of products of biotechnology to ensure safety for consumption, trade and environmental safety.
- c. Facilitate the development of appropriate biotechnology research centres of excellence and biotechnology parks to encourage the development of clusters around key core technologies of relevance to the region. E.g. alternative/renewable energy, agriculture and food; medicine and the environment.
- d. Facilitate development of biosafety frameworks at the country level.

The implementation of the objectives articulated in the policy will take place in several phases. The first phase focuses on the establishment of an efficient operational framework to have oversight for the implementation of the strategic plan. Within this context, setting up of the CARICOM Science, Technology, Innovation Unit and resulting Secretariat will be priority and will be the focus of activities for the first year. It is expected that this Unit will be established, with the requisite, budget, staff and administrative support within the first year. The Regional Biotechnology and Biosafety Commission/Secretariat will be pivotal to executing the five year work plan.

Phase 2 activities over years 2-5 are expected to result in laying the basic foundation framework for efficient and effective management of biotechnology

and biosafety and related business development within the region. This second phase essentially will focus on capacity building.

Years 4-5 will focus primarily on review of the policy and strategy to evaluate success of implementation and to develop a 10 year strategic plan which will focus on the next phase of the policy, that is, the development of Biotechnology and Biosafety centres of excellence within the region, and the regional innovation system with its requisite financial, administrative and human capital support systems.

The total estimated budget for execution of the 5 year implementation plan is US\$ 6 million.

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Acronyms and Abbreviations

AMF	Agricultural Modernisation Fund
AUTM	Association of University Technology Managers
BCH	Biosafety Clearing House
CAPE	Caribbean Advanced Proficiency Examination
CARDI	Caribbean Agriculture Research and Development Institute
CARICOM	Caribbean Community
CARIFORUM	Caribbean Forum
CARTFund	Caribbean Aid for Trade and Regional Integration Trust Fund
CBD	Convention on Biological Diversity
CCST	Caribbean Council for Science and Technology
CDB	Caribbean Development Bank
COFAP	Council for Finance and Planning
COFCOR	Council for Trade and Economic Development
COHSOD	Council for Foreign and Community Relations
COTED	Council for Human and Social Development
CPDC	Caribbean Policy Development Centre
CRNM	Caribbean Regional Negotiating Machinery
CTCS	Caribbean Technological Consultancy Services
CXC	Caribbean Examinations Council
DIFID	UK Department for International Development
DNA	Deoxyribonucleic Acid
ECLAC	Economic Commission for Latin America and the Caribbean
EDF	European Development Fund
EPA	Economic Partnership Agreement
EU	European Union
FAO	Food and Agriculture Organisation
GDP	Gross Domestic Product
GEF	Global Environment Fund
GMO	Genetically Modified Organism
IFAD	International Fund for Agricultural Development
IICA	Inter-American Institute for Cooperation on Agriculture
IP	Intellectual Property
IPOs	Intellectual Property Office
IPRs	Intellectual Property Rights
JI	Jagdeo Initiative
LMOs	Living Modified Organism
MDGs	Millennium Development Goals
NBF	National Biosafety Framework
NGOs	Non-Governmental Organisation
NIHERST	National Institute for Higher Education, Research, Science and Technology (Trinidad and Tobago)
OECS	Organisation of Eastern Caribbean States
PROCICARIBE	Program for Cooperation of Institutes of Agricultural Science and Technology in the Caribbean
R&D	Research and Development
rDNA	Recombinant Deoxyribonucleic Acid
RNA	Ribonucleic Acid

SIDs	Small Island Developing States
SRC	Scientific Research Centre (Jamaica)
TRIPS	Trade-Related Aspects of Intellectual Property Rights
UNEP	United Nations Environmental Programme
UWI	University of the West Indies
WIPO	World Intellectual Property Organisation
WTO	World Trade Organisation

CARICOM Regional Biotechnology and Biosafety Policy and Strategy: Enhancing Regional Socio-Economic Development

1.0 BACKGROUND

Biotechnology embraces a set of techniques which are based on the application of biological processes inclusive of conventional biotechnology (e.g. fermentation technologies and plant and animal breeding) and modern biotechnology (e.g. rDNA technology, molecular and cellular biology, biochemistry, immunology and information technology). These techniques are powerful tools which, if used appropriately and in conjunction with sound sector development planning, can harness resources to stimulate further social and economic development within CARICOM Member States. Any regime developed to support biotechnological applications within the CARICOM region should do so to enhance economic development and therefore must be consistent with safeguarding human and animal health and ensuring environmental protection, while capturing the benefits of biotechnology for the region.

Integral to the development of various biotechnologies is the concept of innovation and the protection of products of the innovative process in the form of intellectual property rights (IPRs). A national system to protect the intellectual property (IP) of innovations is essential to encourage the production, adaptation and use of new technologies as well as the dissemination of information relevant to such technologies. Further, the promotion and development of regionally harmonised mechanisms to facilitate the protection of intellectual property are critical to the further development of biotechnology industries in the region.

Of equal importance is the access to, and protection of, genetic resources which can have an impact on the use of biotechnology as a valuable tool for the conservation and sustainable use of such resources in the development of key industries and the production of resulting products and services in areas such as food and agriculture, pharmaceuticals and health and wellness.

Additionally, the CARICOM regional biotechnology and biosafety policy must be constructed in such a way that it seeks harmonisation with existing sector policies developed to sustain the regional agenda of sustainable socio-economic development, regional integration and overall competitiveness of key economic sectors. The national development agenda of Member States will also form the context for which the policy will be developed as ultimately regional policy initiatives must be implemented at the national level.

1.1 BIOTECHNOLOGY AND BIOSAFETY: GLOBAL CONTEXT

Modern biotechnology has widespread application in a range of sectors and is strategically used globally for enhanced economic growth, private sector competitiveness and global health. Global research and development efforts related to modern biotechnology have focussed primarily on the following areas: Agriculture and food; medicine and healthcare; industrial production processes, energy and the environment and information technologies (nano-technology). The global biotechnology industry in 2007 had an estimated value of US\$29.9 billion¹ with a 60% projected growth by 2012. Companies in the medical and healthcare sectors generated the highest market value of all sectors.

There are essentially four main sub-categories of biotechnology based on the field of application. White biotechnology which is also referred to as grey biotechnology, include the application the techniques of biotechnology in industrial processes for example the use of micro-organisms for soil remediation. Red biotechnology involves medical processes such as medical therapies and the development of novel drugs. Green biotechnology include those application used in agriculture and the environment for example the use of biofertilisers and bio-pesticides in agriculture and the manipulation of plants and animals to produce species that are more productive. Blue biotechnology refers to those techniques used in relation to marine or aquatic applications.

The tools of modern biotechnology are extensively used to provide the primary food producing sectors with key inputs such as agronomically improved crops, new and improved plant varieties for the non-food sector and enhanced animal breeds; veterinary pharmaceuticals and diagnostics; critical assays and tests; and enhanced feed and food additives. Biotechnology tools often used within the agri-food sector include selective genetic markers, gene modification; embryo techniques; micropropagation; and various enzyme techniques. The next wave of biotechnology applications in the agri-food sector is expected in the area of functional foods with enhanced qualities.

Biotechnology applications in the medical and healthcare sectors have allowed for the production of a number of new drugs and innovative medical services and procedures that meet growing consumer demand for affordability, availability, safety and ethics. Applications are primarily in areas related to the discovery, development and production of novel drugs such as bio-pharmaceuticals and small-molecule drugs; recombinant vaccines; immuno-assays and nucleic acid-based tests.

It is expected that biotechnology will make significant contributions in a range of healthcare issues including the treatment of diabetes, cardiovascular disease and organ replacement treatments through cell-based therapies to regenerate

¹ Ernst and Young: 2008 Global Biotechnology Industry Report. www.ey.com. Data obtained from analysis of companies in the Americas and Europe.

diseased tissue and organs. Future therapies will be related to stem cells, gene therapy, RNA interference, and nano-medicine for more specific, targeted and effective medical treatments. Additionally, developments in the area of tropical diseases are expected to produce tangible results as it relates to the use of modified insect vectors for the control of diseases such as dengue and malaria.

The manufacturing sector uses biotechnology to produce a range of industrial products using processes largely involved with the utilisation of enzymes and or microorganisms. These processes are favoured because of their greater efficiency and lower energy consumption as well as reduced negative environmental impacts and the novelty of products produced. Applications include the use of enzymes in making detergents; food products (wine, bread); textiles; polymers; chemicals; vitamins and other food additives.

Plant-based materials can provide both molecular building blocks and more complex molecules for the manufacturing, energy and pharmaceutical industries. Further, biotechnological applications are successfully used for the production of biofuels such as bioethanol and biodiesel and the development of specific biosensors.

Biotechnology applications have been utilised in innovative ways to solve severe environmental problems association with contamination and pollution; and the development of cleaner industrial products and processes. Engineered microorganisms and enzymes are successfully used in bioremediation for the treatment of solid waste, and contaminated water, soil and air. Biosensors have been developed mainly for detection of specific pollutants.

A critical question to ask is how biotechnology can be used by CARICOM Member States to deal with key issues related to sustainable development especially in light of global issues such as raising food and fuel prices and the potential negative impacts of climate change.

CARICOM Member States, most of which are Small Island Developing States (SIDs), have made a commitment to global sustainable development initiatives as articulated in several multilateral agreements such as the Rio Declaration on the Environment and Development; Agenda 21 (sustainable development and trade); the United Nations Framework convention on Climate Change as well as the Convention on Biological Diversity (CBD). The Global Conference on Sustainable Development of Small Island Developing States held in Barbados 25, April to 6 May 1994 and the Mauritius Strategy for Sustainable Development held in Port Louis 10-14 January 2005, crystallised the principles and commitment of SIDs in relation to these agreements, in particular Agenda 21, and translates them into specific policies, actions and measures that should be taken at all levels to enable SIDs to achieve sustainable development. CARICOM Member States have endorsed these measures and have

incorporated sustainable development initiatives into national and regional programmes for economic development.

Developing a regional policy for biotechnology and biosafety which address specific sustainable development objectives of using the human, cultural and biological assets of the region to enhance the quality of life of the peoples of CARICOM including their health, well-being and safety, reinforces the developmental objectives of CARICOM regional governments in this regard.

Integral to the issue of sustainable development is the potential impact of climate change on the livelihood of peoples within CARICOM. Projected climate change impacts have been identified to include, a decline in crop yields, acidification of oceans with a negative effect on coral reefs; and threatened ecosystems. Biotechnology applications as articulated in this document can be used to mitigate climate change impacts by reducing greenhouse gases; by developing crops which are adaptable to a range of soil and climatic conditions; and by increasing crop productivity and yields.

Additionally, the Millennium Development Goals (MDGs)² has as one of its primary objectives combating global poverty and accelerating progress of human development. One key component of reducing poverty is to enhance the ability of a nation to provide its people with access to affordable, safe and nutritious food. In this regard, biotechnological advances as applied to agricultural development to increase crop yields per acre, to enhance food quality and post harvest shelf life, to produce varieties which are adapted to varied adverse soil conditions; can be used as one mechanism, in conjunction with others, to achieve this objective.

1.2 BIOTECHNOLOGY AND BIOSAFETY: CARICOM CONTEXT

Within the CARICOM region, biotechnology research and applications are still in the early stages of development and is mostly limited to cell biology and diagnostic techniques and as a consequence the requisite framework to enable both R&D and utilisation of products of biotechnology are not in place. There is, however, a growing understanding and appreciation of the wide scope of the potential economic benefits to the development of the region's industries especially in agriculture and food, healthcare, energy, environmental management, conservation and bio-prospecting. There is also a growing awareness that the development and use of biotechnology must occur within a policy framework which supports trade, innovation, effective technology exploitation, overall public awareness and an appropriate legal and regulatory

² UN-MDGs: reduction of hunger and poverty; the improvement of rural livelihoods and human health; facilitating equitable, socially, environmentally and economically sustainable development.
www.undp.org/mdg

framework for biosafety, protection of biodiversity, and protection of IPRs and overall increased competitiveness of the public and private sectors in all economic sectors.

The success of the implementation strategy set out in this policy document will rely on CARICOM Member States making a commitment to apply the policy principles at the national level. This level of commitment will depend on the understanding of how biotechnology and biosafety fit within overall regional development, regional integration and national objectives for economic development.

The Revised Treaty of Chaguaramas (the Revised Treaty)³ sets the context for which a CARICOM Regional Biotechnology and Biosafety Policy and Strategy will operate. The implementation of the policy will be influenced by the mandate of the various Organs of the Community namely, the Conference of Heads of Governments and the Community Council of Ministers as assisted through: (i) the Council for Finance and Planning (COFAP); (ii) the Council for Trade and Economic Development (COTED)⁴; (iii) the Council for Foreign and Community Relations (COFCOR) and (iv) the Council for Human and Social Development (COHSOD).

While the Revised Treaty in its entirety is generally applicable to the implementation of the provisions within the Regional biotechnology and biosafety policy there are specific articles which should be highlighted as biotechnology application can be directly utilised to assist in the achievement of their objectives. Of particular importance are the articles of Chapter 4 of the Revised Treaty dealing with Policies for Sectoral Development. For example:

- Part One on Industrial Policy (Articles 51-55) speak to micro and small economic enterprises development, development of the services sector and sustainable development. The biotechnology and biosafety policy will address the development of businesses directly resulting from the creation of products and services which can lead to innovative entrepreneurial activity spinning-out from enhanced regional biotechnology activity.
- Provision within the new biotechnology and biosafety policy will address application of biotechnology to enhance agricultural production, the production of new agri-products, services and processes and the sustainable utilisation of natural resources indigenous to Member States. In this regard, Part Two of the Revised Treaty which addresses Agricultural Policy (Articles 56-61) is relevant. Specific areas such as articulation of a regional agricultural policy; natural resource management;

³ The Revised Treaty of Chaguaramas Establishing the Caribbean Community including the CARICOM Single Market and Economy was signed at Chaguaramas on 4, July 1973. www.caricom.org

⁴ The mandate for the development of the CARICOM Regional Biotechnology and Biosafety Policy and Strategy came through COTED

marketing of agricultural products; fisheries and forest management and development are addressed under these articles.

- The successful implementation of the provisions of the Regional biotechnology and biosafety policy will rely on existing supportive mechanisms in addition to making recommendations for the development of new supportive systems. Part Three of the Revised Treaty addresses Common Supportive Development under Articles 63-77. Of relevance to the biotechnology and biosafety policy are articles which speak to (i) Human Resources Management (Article 63); Research and Development (Article 64); Environmental Protection (Article 65); Protection of Intellectual Property Rights (Article 66); Standards and Technical Regulations (Article 67); Harmonisation of Investment Incentives (Article 67) and Legal Infrastructure – dealing with harmonisation of laws and administrative procedures (Article 74).

It is important that CARICOM Member States recognise the importance of development of the regional biotechnology and biosafety policy within the framework of existing obligations and the significance of lending support to the implementation of provisions within the policy to enhance their social and economic development.

Within in the context of the CARICOM Single Market and Economy (CSME) the rules guiding the integration process especially as it relates to the movement of goods, services and labour will influence the implementation of provisions within the biotechnology and biosafety policy. Ongoing work among Member States to simplify procedures through harmonisation of applications, forms and processes will create the platform for which similar activities will be conducted in relation to the movement of GM products within the region as well as materials and expertise related to biotechnology R&D. Thus the policy must address harmonisation of administrative and technical procedures related to the import and export of GM products into the region and among Member States. Of relevance will be application forms and procedures for: risk assessment and management, monitoring and testing.

A major concern for CARICOM Member States is the repositioning of the agricultural sector and the development of institutions and mechanism to effect such repositioning. The Jagdeo Initiative (JI)⁵ addresses these concerns by identifying the key binding constraints to agricultural development in the region as well as by defining critical interventions to address these constraints. The JI has as its vision:

“ By 2015, agriculture will have made sustainable progress in its contribution to sustainable growth, with a framework of transparent institutions and good governance that enable the transformation of its

⁵ Presented by President Jagdeo and endorsed by the Conference of CARICOM Heads of Governments in July 2004

products and processes, encourages investment, drives entrepreneurship and assures an acceptable and consistent level of food security.”

This biotechnology and biosafety policy fits squarely within this vision since biotechnology applications can be effectively used by CARICOM Member States to address the constraints identified within the JI especially in relation to agricultural health and food safety systems, research and development, land and water management, human resource development, marketing (new products, processes and services), management of information systems and development of risk management systems.

The provisions of the regional biotechnology and biosafety policy and strategy are complementary to those provided within other relevant regional and national policies in key productive sectors. Further, the policy takes a look at current regional development and projected growth in these sectors and develops a set of objectives to guide such growth by employing appropriate biotechnologies, and establishing relevant biosafety systems and best practices.

The development of a viable biotechnology sector within the CARICOM region will be contingent on Member States allocating an appropriate level of resources to support biotechnology and biosafety initiatives at the national and regional levels which are geared towards establishing an operational and administrative framework to ensure sustainability of policy objectives.

Notwithstanding the regional context for which the biotechnology and biosafety policy must be framed, focus must also be placed on relevant multilateral trade and economic partnership agreements for which Member States are a party to. It is within these agreements that Member States must find opportunities to help support biotechnology and biosafety programmes. For example, with respect to the CARIFORUM-EU Economic Partnership Agreement (EPA), Member States should examine opportunities to support R&D, eco-innovations and technology creation and commercialisation.

Biotechnology initiatives within the CARICOM region are spearheaded by a number of institutions within various countries. Notably is the work undertaken within the framework of the University of the West Indies (UWI) and other tertiary institutions as well as other regional institutions which have an R&D thrust. The programmes undertaken by these institutions are varied and covers a range of biotechnology applications including agriculture (UWI, the Caribbean Agriculture and Development Institution (CARDI) and research arms of the Ministry of Agriculture, food, forestry and fisheries in countries); food technologies (Caribbean Industrial Research Institute (CARIRI) – Trinidad and Tobago, the Scientific Research Council (SRC) – Jamaica); networking and technical assistance (Inter-American Institute for Cooperation on Agriculture (IICA), and PROCICARIBE).

Research initiatives undertaken by regional institutions have yielded a number of successes such as the development of new disease resistant anthurium varieties, new anthurium flower colour and transgenic papaya varieties resistant to devastating papaya ringspot virus; molecular characterisation of animal breeds and plant species; micropropagation protocols for a variety of tropical plants; new biochemical compounds suitable for use as bio-pesticides; and the development of biosensors using enzyme technologies.

The CARICOM region has the potential to develop and expand biotechnology research capabilities in agricultural, industrial, environmental and medical biotechnologies. These key focal areas are the main programmes identified under the proposed University of the West Indies Region-Wide Biotechnology Programme.⁶ In this regard focus must also be placed on the deliberate development of bio-industries within the region. These industries can be centred on the research priority areas with the development of specific research parks e.g. Energy, bio-pharmaceuticals and agricultural diagnostics. Such initiatives will require developing partnerships among regional academic and research institutions, external research groups and both the public and private sectors.

At the regional level there will be the need to develop a framework for Member States to provide incentives to encourage investment in the development of innovation centres and expansion of key research programmes in all priority clusters. Such initiatives have been used by developed countries such as the UK to spur economic growth in selected regions.

The state of agro-biotechnology in the region and its potential for development to enhance agricultural production and competitiveness in this key sector has been documented in a number of position papers prepared by regional institutions and provides baseline information for which a regional policy related to biotechnology can develop. Notable of these is the Strategy for a Caribbean Programme on Biotechnology and Biosafety an initiative by the IICA⁷.

Recognising the important potential of biotechnology to further economic development and the need for CARICOM Member States to effectively manage any risk posed by the trade in products of biotechnological research, the COTED mandated the establishment of the CARICOM Working Group on Biotechnology/GMO (the Working Group) with representation from prominent biotechnology experts within the region. The working group has been given a mandate to mobilise information, analyse technical information and to develop a

⁶ Proposal For Mounting the University of the West Indies Region-Wide Biotechnology Programme. Submitted by the University of the West Indies to Ministries of Agriculture in CARICOM Member States for discussion and for consideration for endorsement.

⁷ Strategy for a Caribbean Programme on Biotechnology and Biosafety: An Initiative by the Inter-American Institute for Cooperation in Agriculture and other Regional stakeholders in the wider Caribbean Region. July 2006.

regional policy and strategic framework to place the region in a position to articulate and implement a regulatory framework to enhance the development of the region while protecting the region's biodiversity.

To lend support to the implementation of a regional biotechnology and biosafety policy, there is a cadre of biotechnology and biosafety experts currently working in key areas such as research and development, policy development, development of biosafety and biosecurity systems, intellectual property protection and management of IP assets, biodiversity and environmental management, trade and marketing. These experts can be mobilised to facilitate the development of a regional framework for biotechnology development and biosafety management.

Financial support for biotechnology and biosafety programmes in the region is limited, therefore, funding mechanisms for the expansion of initiatives related to biotechnology and biosafety will need to be identified and pursued at all levels. In this regard there will be the need to provide incentives to encourage investment and collaborations for the development of innovation centres and expansion of key research programmes in all priority clusters and to sustain the requisite support systems to facilitate trade and technology transfer of products of biotechnology research and development initiatives.

The development of a viable regional biotechnology sector will therefore rely on an appropriate investment environment to attract adequate financing to facilitate research and development activities in regional priority areas, and the establishment of effective biosafety systems for testing, risk assessment and management and monitoring. CARICOM Member States have an effective track record in the development of incentives at the national and regional levels to facilitate investment in key sectors such as financial services and tourism, similar incentive mechanisms can be utilised to expand the biotechnology sector.

The region has made significant strides forward in the application of the tools of biotechnology in several key areas such as agriculture and industry however; it is essential to have coordinated application of biotechnology in a wider scope especially in relation to the commercial exploitation of the results of research efforts. There is need at the regional level to clearly articulate biotechnology research and development priorities, guided by national R&D priorities, and to coordinate research and development efforts to achieve real growth in key sectors relevant to regional economic development.

An assessment of the region's institutions critical to the development of biotechnology and biosafety capacity indicate that there is the need to expand capacity in areas of research and development, application and adoption of new technologies and techniques to expand and enhance regional competitiveness in key sectors as well as into new markets. There is also the need to address the region's limited human resource and institutional capacity to regulate issues

related to biosafety to ensure that risks to the environment and health are balanced against potential benefits to be derived from the use of biotechnology.

Another area of concern with respect to the development of a viable biotechnology industry and biosafety regulatory mechanism is the slow response of Member States to the development of appropriate legal and regulatory framework to deal with biodiversity issues especially in relation to access to genetic resources and benefit sharing from such access as well as access to traditional knowledge and technologies. Further, several institutions and agencies within the region which will have a direct role to play in the development of biotechnology R&D initiatives do not have in place appropriate policies dealing with identification, ownership and management of their IP assets. It is essential to have these mechanisms in place if the region is to benefit from the utilisation of its vast genetic resources and the application of biotechnology to develop useful products, services and processes from these resources.

Additionally, there must be greater attention placed on the commercial exploitation of research results as a mechanism to further regional economic growth and to harness the wealth inherent in our resources - human and biological. Human capital must be developed to enhance the capabilities within regional institutions to deal with technology transfer, both in-house and out-sourced; the institutional framework in relation to technology transfer – e.g. patent drafting, licensing, management of technology transfer offices, and IP asset management must be strengthened. Further, the legislative framework in relation to intellectual property protection must be harmonised at the regional level and provision made for simplified application procedures and for expeditious processing of applications especially in relation to patent examinations.

The following provides a brief analysis of the CARICOM region's key strengths and weaknesses in relation to developing a viable biotechnology industry and efficient biosafety regulatory framework.

<i>Strengths</i>	<i>Weaknesses</i>
<ul style="list-style-type: none"> • Most CARICOM Member States have adopted the Cartagena Protocol and have developed National Biosafety Frameworks 	<ul style="list-style-type: none"> • Small economies of scale
<ul style="list-style-type: none"> • Good system of Universities and Colleges with International linkages 	<ul style="list-style-type: none"> • Limited sources of financing
<ul style="list-style-type: none"> • Common English language communication among most Member States 	<ul style="list-style-type: none"> • Lack of specialised skills
<ul style="list-style-type: none"> • Stable political environment in the majority of Member States 	<ul style="list-style-type: none"> • Lack of cohesiveness in institutional framework
<ul style="list-style-type: none"> • Biotechnology is scale neutral 	<ul style="list-style-type: none"> • Lack of statistical information
<ul style="list-style-type: none"> • Genetic diversity in natural resources in particular tropical crops, soil organisms and marine resources 	<ul style="list-style-type: none"> • Failure to recognise the value of innovation and creativity
<ul style="list-style-type: none"> • Valuable genetic resources in relation to coffee, cocoa, 	<ul style="list-style-type: none"> • Human capital development not clearly linked

cotton, peppers, sheep, spices	to areas of national or regional priorities		
<ul style="list-style-type: none"> Well developed Tourism industry and an expanding services sector 	<ul style="list-style-type: none"> Education system not geared to foster innovation 		
<ul style="list-style-type: none"> History of developing investment incentive packages to attract investment in specific sectors 	<ul style="list-style-type: none"> General lack of knowledge on IPRs including the commercialisation thereof 		
<ul style="list-style-type: none"> Regional Mechanism in CARICOM 	<ul style="list-style-type: none"> Limited number of R&D and academic institutions with IP policies 		
<ul style="list-style-type: none"> Biotechnology research being conducted at UWI and other tertiary institutions 	<ul style="list-style-type: none"> Low percentage of GDP allocated to R&D at national level 		
<ul style="list-style-type: none"> Good network of CARICOM regional agencies which can support the implementation of the strategy. E.g. Caribbean Disaster Emergency Response Agency (CDERA); Caribbean Environmental Health Institute (CEHI); Caribbean Agricultural Research and Development Institute (CARDI); Caribbean Regional Centre for the Education and Training of Animal Health and Veterinary Public Health Assistants (REPAHA); Caribbean Centre For Developmental Administration (CARICAD); Caribbean Food and Nutrition Institute (CFNI), 	<ul style="list-style-type: none"> Poor regulatory environment 		
<ul style="list-style-type: none"> State of the art facilities being developed by some Member States to facilitate functioning of their Agricultural Health and Food Control Systems 	<ul style="list-style-type: none"> Limited public-private-academic partnerships and therefore R&D activities not market driven 		
<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> No Businesses developed to take R&D results to the public 		
<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> Limited public engagement in decision making with respect to biotechnology and biosafety 		
<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> Public awareness programmes not coordinated at the regional level or sustained 		
<table border="0" style="width: 100%;"> <tr> <td style="width: 50%; text-align: center;">Opportunities</td> <td style="width: 50%; text-align: center;">Threats</td> </tr> </table>		Opportunities	Threats
Opportunities	Threats		
<ul style="list-style-type: none"> Growth of the knowledge industries internationally 	<ul style="list-style-type: none"> Weakening economy due to international 4 financial crisis 		
<ul style="list-style-type: none"> Growing interest in the local knowledge industries by Government, creators and investors 	<ul style="list-style-type: none"> Biotechnology will be top down and not stakeholder driven 		
<ul style="list-style-type: none"> Geographical proximity to large markets in North and South America for new products developed in key sectors 	<ul style="list-style-type: none"> Missed opportunities to exploit resources and greater dependence on extra regional institutions to do so 		
<ul style="list-style-type: none"> Development of diversified tourism industry with potential for expansion in culinary, eco-, and health tourism 	<ul style="list-style-type: none"> Further dependence on foreign technology and innovations 		
<ul style="list-style-type: none"> Strengthening of institutional framework 	<ul style="list-style-type: none"> Limited commercialisation of regional innovations 		
<ul style="list-style-type: none"> Multilateral, Bi-lateral trade agreements and economics partnership agreements with potential opportunities to expand the biotechnology sector 	<ul style="list-style-type: none"> Brain and creative drain due to lack of exploitation opportunities and competitive compensation which results in the loss of the human capital needed 		
<ul style="list-style-type: none"> Huge biomass production from key agricultural industries with potential for biofuel, feed, fertiliser, bioenergy development 	<ul style="list-style-type: none"> R&D under funded and continued loss of human capital as a result of limited opportunities 		
<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> Opposition to biotechnology R&D and product development 		
<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> Inefficient regulatory mechanism for risk assessment and management 		

1.3 BIOTECHNOLOGY AND BIOSAFETY: NATIONAL CONTEXT

Since 2001 CARICOM Member States, with the aid of funding from the Global Environment Facility (GEF), have been assiduously developing national frameworks to deal with issues related to biosafety. These activities have been in a direct response to meeting Member State's obligations under the Convention on Biological Diversity Article 19.3 which make provision for Parties to the Convention to "*consider the need for and modalities of a protocol setting out appropriate procedures relating to the handling and use of LMOs*" – the Cartagena Protocol on Biosafety. These frameworks are now in place for the majority of CARICO Member States which are about to commence a regional initiative, also supported by the UNEP-GEF, to implement the various elements of their biosafety frameworks. Trinidad and Tobago is yet to finalise its national biosafety framework.

CARICOM Member States have used different approaches to address biotechnology and biosafety management within their national policies. Generally, Member States have taken a similar approach to the development of their biosafety systems which are in keeping with their obligation under the CBD. (See Table 1 for summary matrix showing how Member States have addressed specific issues within their draft legislation).

In terms of overall oversight for the operation and administration of the biosafety system countries tend to have a National Biosafety Committee, Scientific Advisory Council, a National Competent Authority and GEF focal point, or their equivalent. There are however some areas of differences worth mentioning as this will have implications for the harmonisation of biosafety systems at the regional level.

A key area of divergence among the approaches taken by Member States is in relation to labelling. While all countries have addressed labelling within their draft national legislation, some countries are specific in requiring labelling on products destined for food, feed and processing containing GMOs or labelling of the GMO itself. Belize makes such a labelling provision mandatory while other countries such as Dominica require labelling in relation to LMOs being transported. Most countries require the label to indicate that the product "may contain" GMOs or LMOs. Saint Lucia however, has taken the approach that if the product contains greater than 1% GMO it should be labelled.

Within the various national draft pieces of legislation there is variance with respect to precisely what is being labelled as some countries make reference to LMOs as required under the Biosafety Protocol while others require labelling of GMOs. There is therefore need for harmonisation with respect to what is being labelled.

Table 1 Key provisions in the various biosafety policies and legislation from CARICOM Countries										
Country	Legislation/ policy/ regulation	Key Areas Addressed								
		Bio-technology	Biosafety	Bio-security	Access & Benefit Sharing	Enforcement	Biodiversity Management	Labelling	Intellectual Property / technology transfer	
Antigua & Barbuda	Antigua and Barbuda Biosafety and Biotechnology Management Bill Draft, 2005	X (Bio-technology R&D policy to be annexed to the biosafety Act)	X				X		X (transporting)	
Bahamas	National Biosecurity Bill Draft		X	X	X Brief mention	X	X Inventory not management	X (Requirements for)	X	
Barbados	Draft National Biosafety Framework for Barbados		X			X		X Establish requirements for)		
Belize	Draft National Biosafety Policy, October 8, 2006		X			X		X Mandatory		
Dominica	Dominica Biosafety and Biotechnology Management Act 2004	X (Bio-technology R&D)	X			X		X (transporting)		
Grenada	Draft Bill on Biosafety AN ACT to regulate and manage biotechnology, to establish the National Biosafety Authority, and for incidental and connected matters		X			X		X		
Guyana	Final Draft National Biosafety Framework for Guyana. 2007	X Biotechnology Research, Innovation and Enterprise Development Bill [to be	X	X		X		X		

Table 1 Key provisions in the various biosafety policies and legislation from CARICOM Countries									
Country	Legislation/ policy/ regulation	Key Areas Addressed							
		Bio-technology	Biosafety	Bio-security	Access & Benefit Sharing	Enforcement	Biodiversity Management	Labelling	Intellectual Property / technology transfer
		drafted]							
Haiti	Avant- Projet de loi portant sur la Prevention des risques Biotechnologiques en Haiti. August 2005		X				X		
Jamaica	Legal and policy framework for the implementation of the Cartagena Protocol on Biosafety		X				X		X (identification of LMO on package as may contain)
St. Kitts and Nevis	Draft National Biosafety Framework Of Saint Christopher (St. Kitts) and Nevis , Draft Biosafety Act, 2007.		X				X		X (Label as may contain GMO)
Saint Lucia	Saint Lucia - Biosafety Act - Final Draft - May 2006		X				X		X (authorised product with greater than 1% GMO, products)
Suriname	National Biosafety Framework for Suriname, April 2004		X				X		X (GMOs and products)
Saint Vincent and The Grenadines	Saint Vincent and the Grenadines Biosafety Act, 2007		X				X		X (Products and organism)
Trinidad and Tobago	Not published		X				X		

Further, provision will need to be made for testing for the presence of the GMO/LMO in food, feed and processed products. This need for testing will require the establishment of laboratory facilities within the region to carry out the required tests. Such facilities will need to be appropriately certified and be compliant with international standards. In this regard, provision will need to be made for CARICOM Member States to recognise and accept test data posted by other Member States, thus reducing the need for each country to incur costs for testing each import from another Member State. Additionally, there must be consensus among countries as to the feasibility of the labelling requirements as set out in their draft legislation taking into consideration factors such as cost, time for receipt of decision on the consignment and availability of facilities and resources to make decisions in a timely manner.

Very few CARICOM Member States have developed policies or strategies to address biotechnology. Countries such as Jamaica and Trinidad and Tobago have developed a policy which specifically speak to biotechnology while others have sought to address the matter in a cursory manner through their national biosafety framework e.g. Grenada, Guyana, Dominica and Antigua and Barbuda.

Antigua and Barbuda has a draft Biosafety and Biotechnology Management Bill which address biosafety management in detail and makes reference to the need to annex a Biotechnology R&D policy to the Biosafety Act. Guyana has taken the approach of making provision within their NBF to provide an outline for the detailing of a Biotechnology Research, Innovation and Enterprise Development Bill to be developed in the future. The Bahamas has taken an inclusive approach and within their draft National Biosecurity Bill have addressed biosafety, biosecurity, and biodiversity management and access and benefit sharing.

As indicated however, only Jamaica and Trinidad and Tobago has developed a national biotechnology policy. Common to both national policies is the application of best biotechnological advances to fully exploit rich biological resources, which can be found in each country, to further socio-economic development. The policies speak to creating an enabling environment to grow the national biotechnology industry and the creation of new businesses based on the results of biotechnology R&D. Human resource development in key sectors, the development of an investment platform to spur biotechnology activity on key sectors as well as the development of appropriate regulatory and institutional framework to manage biotechnological development at the national level are key areas addressed in both policies.

Member States and regional organisations have been involved in several stakeholder consultations and public awareness campaigns geared toward building expertise in biosafety management and educating the public to the nature and scope of biotechnology and the biosafety issues relevant to trade; plant, animal and human health; and the environment. What is now required is a up the level of these programmes and to engage the public and decision makers

in effective discussions on how the region can sustainably use the techniques of biotechnology to further regional economic development, integration and global competitiveness.

2.0 OPPORTUNITIES: CARICOM REGIONAL BIOTECHNOLOGY INDUSTRY

There are a number of opportunities in several areas of biotechnology which can be commercially exploited by CARICOM Member States to enhance economic growth and social development. Analysis of national documents related to biosafety, biotechnology, science and technology and agriculture, and of data collected during consultations conducted at the national level has revealed that the region can have a comparative advantage in several areas including:

2.1 AGRICULTURE AND FOOD

For the CARICOM region, agriculture and food production related to specific commodity crops such as sugarcane, cotton, rice, coconuts, cocoa, coffee, peppers and spices can be targeted for improvement using biotechnology. Areas of important focus are identified as:

- a. The development of diagnostic kits for plant diseases. The Scientific Research Centre (SRC) in Jamaica is currently spearheading such initiatives and has identified collaboration partnership with Cuba. This area of focus can be further expanded to include animal diagnostics.
- b. The development of specific biosensors to detect compounds or group of compounds using enzyme technologies. Work at the UWI St. Augustine campus can be expanded in this regard.
- c. The use of microbial technologies to develop biopesticides and biofertilisers. Work underway in Guyana to identify unique soil microorganisms for their potential to degrade chemical residue in soils and to convert post harvest waste to useful products can form the basis for further biotechnology R&D at the regional level.
- d. The production of natural products from medicinal plants is a key area for which work is currently being undertaken at the UWI, Mona Campus and at the Barbados Community College. There is regional interest in this area and combined with biodiversity management and conservation initiatives can serve as a key cluster of interest and the development of centre of excellence within the region.
- e. The production of transgenic crops with improved agronomic traits, improved adaptation to biotic and abiotic stresses and enhanced nutritive characteristics.
- f. The development of new flavours, food and feed supplements from existing and new sources.
- g. The expansion of animal breeding using conventional and new embryo techniques as well as using DNA techniques to characterise regional

species and the use of molecular techniques to identify genes of interests for breeding purposes as well as other non-conventional uses.

- h. The development of new ornamental plant varieties. Work underway at the St. Augustine campus should be expanded.

2.2 MEDICINE AND HEALTHCARE

Key areas of opportunity identified for the region include:

- a. Biotechnology applications to solve medical issues of relevance to the CARICOM region will be pursued. In this regard priority areas related to tropical diseases transmitted by insect vectors (dengue and malaria) and to chronic non-communicable diseases have been identified. Collaborative research initiatives will be fostered among regional centres in Cuba for the development of vaccines and medical therapies. Strategic networking and research partnerships will be developed with other hemispheric and international research groups undertaking R&D of relevance.
- b. It is estimated that is a US \$40 Billion global industry. It is recognised that the region can build a niche in several areas including recuperative health, specialised services such as *in vitro* fertilisation, cosmetic surgery and wellness spas. The use of therapies, products and services developed from biotechnology applications can facilitate the expansion of this key sector in the region. The development and expansion of services within the health and wellness sector will require an appropriate regulatory framework; ethical oversight; incentives to attract businesses and investors; and standardisation and certification based on internationally accepted standards and best practices. In this regard, mechanisms must be put in place to facilitate the transfer and adaptation of medical and healthcare technologies and techniques which can be used to enhance existing services and treatments offered in the region.

2.3 INDUSTRIAL APPLICATIONS

Key areas of opportunity identified for the region include:

- a. The development of food and industrial enzymes from existing and new bioresources.
- b. The development of specific biosensors for agriculture, mining, bioremediation and waste management.
- c. Use of biomass in the agricultural sector (rice, sugarcane waste) for the development of biopolymers

2.4 ENVIRONMENT AND ENERGY

The main areas of opportunity related to the application of biotechnology to environmental management and alternative energy are related to:

- a. The identification of microorganisms which can be used for waste management. CARICOM Member States such as Guyana, Suriname and Belize have identified their vast terrestrial and marine bio-reserves as potential sources of microbial and fungal strains and other microbes which can be identified for their potential to be used in industrial processes and in particular solid and liquid waste management.
- b. The development of biosensors for identification of water and mining pollutants is also an area of priority.
- c. Development of bioenergy sources – bio-diesel, bioethanol and possibly ammonia as sources of alternative energy for the region.

2.5 BIODIVERSITY MANAGEMENT FOR NEW PRODUCTS

The CARICOM region is biodiversity rich with respect to its terrestrial and marine resources. It is recognised that biotechnology can be used in areas of conservation and sustainable utilisation of these resources. The following opportunities have been identified:

- a. Characterisation of genetic resources for purposes of conservation, documentation and utilisation. In this regard, molecular techniques can be used in the identification process while other techniques can be used to produce new products (medicinal, essential oils, new food crops e.g. new edible mushrooms, flavour and other phenolic compounds as well as products for the cosmetic and nutraceutical industries).
- b. The development of micropropagation protocols for plant species identified as having commercial value as ornamentals, food crops or medicinal plants. Similarly, micropropagation protocols can be developed for recalcitrant plant species especially in relation to conservation and reforestation initiatives.
- c. Several countries which rely heavily on the fisheries sector have identified dwindling fish stocks as an area of concern and have expressed an interest in using biotechnology as a means to identify and conserve fish stock and for development of aquaculture.

2.6 BIOSAFETY MANAGEMENT

CARICOM Member States are currently focused on the establishment of legal, regulatory and institutional frameworks to deal with trade in products of biotechnology. The following have been identified as priority areas for the establishment and maintenance of regionally harmonised biosafety systems:

- a. The coordination of regional biotechnology and biosafety initiatives from a central 'coordinating unit' for more efficient management and utilisation of scarce human and financial resources. This central entity should be housed at the CARICOM level and be supported by regional governments and institutions, external funding and monies from the provision of services.
- b. The upgrade of laboratory systems to meet international standards and to deal with testing with respect to GMOs. The CARICOM regional laboratory network should consist of at least two state-of-the-art laboratory facilities which will be equipped to conduct detailed tests and analyses.
- c. Building human resource capacity with respect to risk assessment and management and monitoring and evaluation systems and other relevant areas.
- d. Fostering greater participation of regional experts in international biotechnology and biosafety fora related to the development of standards, certification and best practices.
- e. The recognition of test results and decisions made in relation to request for trade in LMOs in one Member State by other CARICOM Member States. This will require the development of harmonised legislation, forms and administrative procedures.

2.7 PUBLIC AWARENESS AND PERCEPTIONS

It is recognised that public awareness at all levels will be critical to the development of effective biotechnology and biosafety systems in the region. It is essential that decision makers within the region are fully cognizant of the economic benefits of biotechnology and the importance of having systems in place to facilitate the safe and sustainable use of such technologies. The following is relevant:

- a. The recognition by consumers that biotechnology can be used as a useful tool to foster regional economic development. In this regard, balanced regional public awareness campaigns should be launched utilising various modes of communication (TV, Radio, internet, brochures, and modelled 'what ifs' scenarios).

- b. Presentations to relevant regional government ministries and agencies to inform of the importance of supporting biotechnology and biosafety programmes at the national and regional levels and to also sensitise them to the existence of a regional biotechnology and biosafety policy and implementation strategy.
- c. The inclusion of biotechnology and biosafety issues in the regional curriculum for CXC, CAPE etc. as well as incorporation in tertiary level education programmes especially in agriculture, biology, innovation and entrepreneurship (including IP).
- d. The use of regional education networks of colleges and universities as avenues to carry out education programmes and to disseminate information especially related to research results.

2.8 INTELLECTUAL PROPERTY ASSET MANAGEMENT

Integral to the development of a viable regional biotechnology industry is the development of a framework for the protection, enforcement and commercialisation of intellectual and technology property. Most CARICOM Member States have intellectual property protection systems in place that are compliant with their World Trade Organisation (WTO) trade obligations under the TRIPs Agreement. Others however have not yet started to update old IP laws. Additionally, with the exception of the UWI, regional academic and R&D institutions and other agencies within the public and private sectors do not have institutional IP policies in place. Such systems are critical to the efficient management of IP assets in particular for purposes of exploitation and commercialisation of IPRs and technology property. The following IP related areas of priority have been identified:

- a. The development of harmonised updated WTO compliant IP laws.
- b. The harmonisation of procedures for granting of key IPRs such as patents, trademarks and industrial designs. There are currently discussions at the regional level in this regard and the Organisation of Eastern Caribbean States (OECS) countries have sought the assistance of the World Intellectual Property Organisation (WIPO) to facilitate their development of such a framework.
- c. For regional agencies, R&D institutions and academic and public sector agencies such as national agricultural research institutions to develop IP policies which address issues related to IP ownership, IP exploitation, contractual arrangements or institutional policy which speak to employees, visiting fellows/researches and students, sponsored research, collaborations etc. and IP ownership.
- d. The recognition that there are limited resources in Member States to individually deal with technology transfer, exploitation, negotiations, and appropriate technology agreements there is therefore the need to develop a regional mechanism for commercial exploitation of IP assets

where common facilities for IP and technology valuation, preparation of patent applications, identification of commercialisation partners, negotiations for technology and related information/knowledge access can be pooled and utilised by regional agencies.

- e. Regional R&D institutions should undertake IP audits and develop and manage IP portfolios.
- f. Regional academic institutions especially those focusing on science, technology and innovation, entrepreneurship and business management to include IP asset management modules in their syllabuses.

2.9 INFORMATION SHARING MECHANISMS

Access to information and knowledge are critical for economic development therefore, the development of information dissemination mechanisms will be critical to the creation, acceptance and utilisation of products of biotechnology. Within the regional context, the following have been identified as critical components for the expansion of biotechnology initiatives and the implementation of biosafety systems:

- a. The need to develop information sharing systems for biotechnology and biosafety. Such a system can be modelled after the biosafety clearing house (BCH) mechanism required under the CBD's biosafety protocol. The system should be web based and provide access to information on the types of research conducted, experts involved, funding and collaborations among other relevant information.
- b. The development of regional biotechnology/biosafety network to improve the existing pool of experts at the national level.
- c. Development of a database of experts with knowledge in all areas related to biotechnology and biosafety.

3.0 POLICY VISION

CARICOM Member States are leaders in innovative biotechnology research and development which produces products, services and processes to enhance competitiveness in key sectors while safeguarding and improving the quality of life of peoples within the CARICOM region.

4.0 GOAL

By 2020 to have a vibrant and integrated CARICOM regional biotechnology and biosafety programme comprising sound infrastructure, trained personnel, educated public and an effective regulatory framework to enhance the social, cultural and economic well being of the Region while safeguarding human health and the natural environment.

5.0 GUIDING PRINCIPLES

The guiding principles of the CARICOM Regional Biotechnology and Biosafety Policy are framed to reflect the CARICOM Member States' commitment to sustainable socio-economic development, increased competitiveness of key economic sectors and continued improvement of the well-being of their peoples.

1. Recognition that the techniques of biotechnology can be used as tools to enable the achievement of regional and national developmental goals and objectives and that the region should benefit from the safe and ethical use of such techniques.
2. Recognition that the development of the biotechnology industry in the Region must be guided by ethical considerations which take into account the values and cultural sensitivities of various indigenous communities in CARICOM Member States.
3. Recognition that the development of a viable biotechnology industry in the region should occur within the framework of an overall regional system to promote innovation and entrepreneurship in the area of science and technology.
4. Recognition that the regional biotechnology and biosafety policy and strategy must be developed within the context of Member States' commitments related to trade, the environment, agricultural health and food safety, public health, international standards and best practices, with the primary aim of furthering the development agenda of CARICOM Member States.

5. Recognition that CARICOM Member States have sovereign rights over the management and utilisation of genetic resources within their jurisdiction.
6. Recognition that biotechnology and biosafety initiatives within the CARICOM region can be strengthened by fostering greater collaboration among Member States, cooperation partners and the private sector to realise the benefits of biotechnology.
7. Recognition that sustainable use of biological resources should be a primary focus of regional governments and that regional biotechnology development should take into account the unique circumstance of environmental stewardship relevant to small island developing states.
8. Recognition that regional harmonisation of legislative, regulatory and institutional frameworks to facilitate further development of biotechnology and biosafety is critical.
9. Recognition that relevant human resource development strategies are integral to the development and sustainability of a vibrant and sustainable biotechnology sector.
10. Recognition that a public well educated on issues related to biotechnology, its benefits and risks, as well as an understanding of the biosafety mechanisms in place at the national and regional level is essential to foster consumer acceptance of the technology and biotechnology products

6.0 POLICY OBJECTIVES

The CARICOM regional biotechnology and biosafety policy is framed within five main thematic areas:

6. Expanding applications of biotechnology in CARICOM Member States
7. Development of biosafety regulatory systems
8. Development of appropriate legal, regulatory and institutional frameworks
9. Human capital development
10. Education, training and public awareness

6.1 Strategic Objective: Expanding applications of biotechnology in CARICOM Member States

The primary focus of the this strategy will be to provide a roadmap to expand the biotechnology industry in CARICOM Member States to enhance socio-economic and environmental benefits and sector competitiveness at the national and regional levels. Specific focus will include:

- a. Facilitating development of key biotechnology research and development clusters
- b. Exploitation and Commercialisation of biotechnology products and services for competitiveness
- c. Providing support for Innovation Systems
- d. Providing a framework to facilitate investment in biotechnology and biosafety initiatives

Strategic Objective: Expanding applications of biotechnology in CARICOM Member States						
Strategic Objective	Key Strategies	Expected Outputs	Schedule			Proposed strategic partners
			Short Term (1-2 yrs)	Medium Term (3-6 yrs)	Long Term (7-10 yrs)	
6.1 (a) To facilitate development of key research and development clusters	i. Identify key research priorities for the region and develop appropriate clusters, incubators and networks in those key areas to establish competitive biotechnology and related businesses for which the CARICOM Member States are likely to have a comparative advantage. It is essential that these priorities be aligned with national imperatives, market demand and regional expertise.	<p>Analytical Report on a R&D audit in key sectors such as agriculture and food; medicine and healthcare; industry; environment & energy identifying the status of activity in Member States, percent GDP, private sector involvement. To assess the potential competitiveness of biotechnology activity in these sectors</p> <p>Mapping of CARICOM Member States in relation to their competitiveness in biotechnology sub-categories (blue, red, green and white)</p> <p>Biotechnology businesses / bio-parks established in at least two key areas (e.g. agriculture and food and industrial applications)</p>		X	X	CARICOM Member States UWI CARDI IICA NIHERST
	ii. Review regional ' draft Road Map for Commercialisation of	Regional workshop held to assess the Commercialisation roadmap - CARICOM	X			

Strategic Objective: Expanding applications of biotechnology in CARICOM Member States						
Strategic Objective	Key Strategies	Expected Outputs	Schedule			Proposed strategic partners
			Short Term (1-2 yrs)	Medium Term (3-6 yrs)	Long Term (7-10 yrs)	
	Biotechnology' to move process forward	Member States Selection of at least three project for commercialisation process commenced		X		SRC UWI CARDI NIHERST
	iii. Facilitate development of "Regional Centres of Excellence for R&D" / "Regional Bio-Techniques Entrepreneurial Innovation Centres" in areas related to agriculture in key commodity groups; management of marine resources; conservation and utilisation of genetic resources; industrial processes – development of diagnostics, biosensors, biofertilisers, biopesticides, biopolymers; alternative energy – biodiesel, bio-ethanol;	Report on socio-economic and financial assessment of identified centres of excellence with associated strategic business plan for their establishment and sustainability Establishment of centre of excellence in related to agricultural biotechnology, and industrial biotechnology		X		CARICOM Member States GEF UWI
	iv. Strengthen regional capacity to collaborate with international biotechnology research centres and programmes to build relationships for technology development partnerships geared to meeting regional R&D priorities. Full use will	Sources of technical assistance and funding for key projects unidentified, project proposals submitted and funding obtained Projects funded through the EU eco-innovation and framework projects	X	X	X	CARICOM Member States UWI IICA NIHERST
				X	X	

Strategic Objective: Expanding applications of biotechnology in CARICOM Member States						
Strategic Objective	Key Strategies	Expected Outputs	Schedule			Proposed strategic partners
			Short Term (1-2 yrs)	Medium Term (3-6 yrs)	Long Term (7-10 yrs)	
	be made of opportunities within multilateral agreements to assist in this regard e.g. the CARIFORUM-EU EPA	Joint collaborative project proposals submitted with CARICOM regional and international partners		X	X	
	v. Build critical mass around each area of priority cluster and seek to utilise existing regional human resources and expertise of expatriate regional experts	Database of regional experts in biotechnology and biosafety developed, accessible and updated every 2-3 years. Database to include expatriate experts Capacity needs identified for the successful development and sustainability of priority cluster	X X	X	X	CARICOM Member States UWI CARDI NIHERST CCST IICA
6.1 (b) Exploitation and commercialisation for competitiveness	i. Developing the framework to facilitate the application and commercialization of new technologies. To achieve this objective it will be necessary to build regional capabilities in areas related to management of technology transfer offices, skills in negotiating technology transfer agreements and finding industry partners for technologies developed in the region.	Guidelines developed to establish IP policies in regional academic and R&D institutions IP policies integrated into the operational procedures of academic, R&D and private sector entities at the national level Guidelines and best practices developed for the management of technology transfer Capability for management of		X X X	X X	CARICOM Member States (IPOs) UWI, other universities and colleges WIPO AUTM

Strategic Objective: Expanding applications of biotechnology in CARICOM Member States						
Strategic Objective	Key Strategies	Expected Outputs	Schedule			Proposed strategic partners
			Short Term (1-2 yrs)	Medium Term (3-6 yrs)	Long Term (7-10 yrs)	
		technology transfer office developed in at least three key regional institutions Technologies identified and commercialisation terms successfully negotiated IP portfolios developed for regional institution such as UWI, colleges		X		
6.1 (c) Providing support for Innovation Systems	i. Liaising with Registrars of intellectual property offices (IPOs) in Member States to ensure that intellectual property laws meet minimum international requirements	IP laws of Member States updated to international requirements and harmonised		X	X	CARICOM Member States (IPOs)
	ii. Facilitating the establishment of regional innovation centres/ biotechniques entrepreneurial innovation centres to promote innovation at the national level. Each centre of excellence will focus on a key priority area identified by member states and will build a biotechnology R&D and entrepreneurial cluster around that priority	Feasibility report on the cost and benefits and economic and financial assessment for the establishment of specific biotechnology centres of excellence within priority areas At least 5 biotechnology and biosafety related businesses established in the region Biotechnology foresighting exercise conducted and recommendations		X		CARICOM Member States CDB NIHERST SRC UWI

Strategic Objective: Expanding applications of biotechnology in CARICOM Member States						
Strategic Objective	Key Strategies	Expected Outputs	Schedule			Proposed strategic partners
			Short Term (1-2 yrs)	Medium Term (3-6 yrs)	Long Term (7-10 yrs)	
		discussed during a regional workshop				
		Recommendations from foresighting project integrated into the 10 year biotechnology and biosafety strategic plan		X		
	iii. Facilitating the review and further development of the regional science and technology policy to be inclusive of innovation and entrepreneurship and provide guidelines to countries to develop their national science, technology and innovation policy and strategy	Updated Regional science and technology policy integrating biotechnology and biosafety issues		X		CARICOM CCST Member States
		Model science, technology and innovation policy which address biotechnology and biosafety developed		X		
		CARICOM Member States implement development of national science, technology and innovation policy		X	X	
6.1 (d) Providing a framework to facilitate investment in biotechnology and biosafety initiatives	i. Facilitate the development of effective funding mechanisms for both the public and private sector to make strategic investments in R&D to support innovations in biotechnology and biosafety initiatives that meet national and regional developmental priorities	Tax Incentives developed for private sector investment in biotechnology and biosafety initiatives		X	X	CARICOM Member States Central Bank (Member States) Private sector Associations National Chamber of Commerce
		Incentives for private sector in Member States to invest in R&D (in-house and out-sources)		X	X	
		Incentives for private sector in Member States investing in national		X	X	

Strategic Objective: Expanding applications of biotechnology in CARICOM Member States						
Strategic Objective	Key Strategies	Expected Outputs	Schedule			Proposed strategic partners
			Short Term (1-2 yrs)	Medium Term (3-6 yrs)	Long Term (7-10 yrs)	
		biotechnology and biosafety funding mechanisms Incentives for private sector in Member States investing in regional biotechnology initiatives or contributing to regional biotechnology/ biosafety funding schemes		X	X	
	ii. Develop guidelines for Member States to implement appropriate fiscal incentives to attract strategic financial and research partnerships critical for investing in the regional biotechnology industry and to develop key international markets for resulting products	Guidelines developed and promulgated with respect to developing the CARICOM region as a preferred location for establishment of R&D facilities in areas of priority (fiscal incentives and tax regime, other incentives for private sector investment) Regional biotechnology and biosafety financing conference conducted Financial and technical support provided to Member States to implement R&D fiscal and other incentives. Member States implement appropriate fiscal and other incentives to attract investment in biotechnology R&D and for development of appropriate biosafety	X	X	X	CARICOM Member States
			X			
				X	X	
				X	X	

Strategic Objective: Expanding applications of biotechnology in CARICOM Member States						
Strategic Objective	Key Strategies	Expected Outputs	Schedule			Proposed strategic partners
			Short Term (1-2 yrs)	Medium Term (3-6 yrs)	Long Term (7-10 yrs)	
		systems Incentive scheme to commercialise research results developed and Member States implementing such schemes Incentives for companies establishing technical and vocational training institutes in specific biotechnology and biosafety related areas Exemptions on educational equipment especially related to the use of ICTs to facilitate e-learning systems for biotechnology and biosafety		X	X	
	iii. Provide guidelines for the creation of liquidity in venture capital markets and the valuation of intellectual property for purposes of securitisation of IP assets to provide funds for biotechnology R&D and other related initiatives	Workshop on IP securitisation and monetisation in life sciences conducted Accounting agencies and financial institutions updated on current industry best practices related to IP valuation and securitisation		X		
	iv. Provide a mechanism for a regional R&D fund (e.g. regional	Framework for operation and management of regional R&D Fund		X		CARICOM Member States

Strategic Objective: Expanding applications of biotechnology in CARICOM Member States						
Strategic Objective	Key Strategies	Expected Outputs	Schedule			Proposed strategic partners
			Short Term (1-2 yrs)	Medium Term (3-6 yrs)	Long Term (7-10 yrs)	
	research endowment fund; biotechnology and biosafety endowment fund) to address regional biotechnology and biosafety initiatives and to have a similar national R&D fund (e.g. science and technology R&D fund), to more specifically address country needs	developed Regional competitive R&D Fund Established Establishment of competitive R&D Fund in Member States Guidelines for the access to the EU Framework Programme for Research and Technological Development developed Collaborative project proposals for submission under the EU framework programme developed (regional and individual Member States) Biotechnology/biosafety Human resource development fund established	X	X	X	UWI CDB IICA
	v. Develop a mechanism for seed funding of innovative biotechnology businesses based on results of regional initiatives or based on technologies transferred to increase efficiency and competitiveness of regional	Report on mechanisms to establish seed funding for biotechnology projects Funding mechanism developed at national and regional levels Guidelines for access to the fund		X	X	CARICOM Member States

Strategic Objective: Expanding applications of biotechnology in CARICOM Member States						
Strategic Objective	Key Strategies	Expected Outputs	Schedule			Proposed strategic partners
			Short Term (1-2 yrs)	Medium Term (3-6 yrs)	Long Term (7-10 yrs)	
	bio-businesses	developed and disseminated Institutions having access to seed funding		X	X	
	vi. Liaise with strategic partners in regional commodity groups such as the those established for the coconut, sugarcane, cotton, rice and palm oil industries to establish a funding mechanism directly from these groups to fund biotechnology and biosafety initiatives to directly promote the expansion and global competitiveness of these industries	Guidelines developed for the operation of regional commodity group R&D Fund Individual commodity group funds established to assist in funding relevant biotechnology R&D and development of biosafety risk assessment and management systems relevant to the commodity		X	X	Commodity groups CARICOM Member States IICA NIHERST

6.2 Strategic Objective: Development of biosafety regulatory systems

The strategy under this objective will be to facilitate the development of appropriate regulatory framework for biosafety within CARICOM Member States, and harmonisation of relevant administrative procedures at the regional level, to ensure effective risk assessment and management related to the introduction of new biotechnologies. Specific strategies will include:

- a. To facilitate integration of biosafety policy in national plans and policies.
- b. To facilitate harmonisation of biosafety legislation and regulations.
- c. To provide a framework for the oversight of the implementation of regional biotechnology and biosafety initiatives.
- d. To facilitate the development and execution of capacity building programmes.

Strategic Objective: Development of biosafety regulatory systems in CARICOM Member States						
Strategic Objective	Implementation Strategies	Expected Outputs	Schedule			Proposed strategic partners
			Short Term (1-2 yrs)	Medium Term (3-6 yrs)	Long Term (7-10 yrs)	
6.2 (a) To facilitate integration of biosafety policy in national plans and policies	i. Review draft national policies of CARICOM Member States and ensure integration into biotechnology, and other relevant policies	Biosafety and biotechnology policies linked and joint work programmes developed and executed	X	X	X	CARICOM Member States GEF EDF
	ii. To collaborate with regional and international agencies to facilitate the implementation of biosafety frameworks articulated by Member States	Execution of the regional NBF implementation project	X	X		
	iii. Biosafety initiatives integrated into the development plans of key sectors such as agriculture, environment, health, education, sustainable development	Joint activities among key sectors to further national and regional biosafety agenda	X	X	X	
	iv. Strengthening of political and public support for implementation of biosafety initiatives at national and regional levels	Biosafety work plans discussed Regional Head of Government meetings	X	X	X	
6.2 (b) To facilitate harmonisation of biosafety legislation and regulations	i. Coordinate update of national legislation which will support implementation of NBFs	Biosafety legislation of CARICOM Member States updated and harmonised	X	X		CARICOM Member States GEF EDF
	ii. To facilitate the development of a regional mechanism to address	Standard forms, procedural and administrative manuals developed	X	X		

Strategic Objective: Development of biosafety regulatory systems in CARICOM Member States							
Strategic Objective	Implementation Strategies	Expected Outputs	Schedule			Proposed strategic partners	
			Short Term (1-2 yrs)	Medium Term (3-6 yrs)	Long Term (7-10 yrs)		
	critical issues related to applications for trade of living modified products within the CARICOM region	Standard mechanisms, procedures and protocols for e.g. labelling, placarding, risk assessment developed and operational	X	X		GEF EDF UWI IICA	
	iii. Support establishment of testing facilities to monitor status of GMOs/ LMOs	At least two facilities in selected Member States upgraded to facilitate testing Bio-waste strategy developed at national level with regional consideration		X	X		
6.2 (c) To provide a framework for the oversight of the implementation of regional biotechnology and biosafety initiatives	i. Facilitate the establishment of CARICOM Regional biosafety advisory body/ task force	CARICOM-GEF MOU finalised and promoted at national levels Advisory body/ task force established with mandate, roles and responsibilities and reporting structures formalised 3 year workplan and budget of Advisory body/ task force Working linkages established with national competent authorities in CARICOM Member States	X X X	 X		CARICOM Member States GEF CDB	
	ii. Promote coordination of research	Guidelines for lab-based R&D and for	X	X	X		

Strategic Objective: Development of biosafety regulatory systems in CARICOM Member States						
Strategic Objective	Implementation Strategies	Expected Outputs	Schedule			Proposed strategic partners
			Short Term (1-2 yrs)	Medium Term (3-6 yrs)	Long Term (7-10 yrs)	
	assessment and monitoring of biosafety	bio-ethics developed and promulgated among CARICOM Member States Guidelines developed for undertaking socio-economic and environmental impact assessment relevant to biosafety	X	X	X	Member States GEF
6.2 (d) To facilitate the development and execution of capacity building programmes	iii. Review regional biosafety capacity needs assessment and prioritise identified needs to develop projects	Capacity needs action plan developed with programmes for national and regional activities (capacity needs related to training and awareness are considered cross-cutting and will be addressed in a specific section of the policy/strategy)	X			CARICOM Member States GEF

6.3 Strategic Objective: Development of appropriate legal, regulatory and institutional frameworks

The activities undertaken to achieve this objective will facilitate the development of appropriate legislative, regulatory and institutional framework for the effective execution of biotechnology and biosafety initiatives in the region. Specific focus will include:

- a. Supporting the implementation of environmentally sustainable initiatives in the Region
- b. Facilitating the development of regional and national innovation systems
- c. Ethically and socially responsible creation and use of biotechnology

Strategic Objective: Development of appropriate legal, regulatory and institutional frameworks						
Strategic Objective	Implementation Strategies	Expected Outputs	Schedule			Proposed strategic partners
			Short Term (1-2 yrs)	Medium Term (3-6 yrs)	Long Term (7-10 yrs)	
6.3 (a) Supporting the implementation of environmentally sustainable initiatives in the Region	i. Facilitate the development of mechanisms for the adoption of eco-innovations for business competitiveness	Report on eco-innovation provision Eco-Innovation provisions in the CARIFORUM-EPA with recommendations and guidelines for regional and national approaches for CARICOM Member States to participate in the EU Eco-innovation project. Facilitate execution of national workshops on participation in EU Eco-innovation project Eco-innovation projects with a biotechnology focus Projects submitted for funding from Member States directly and from an identified regional mechanism	X			CARICOM Member States GEF EDF EU funding mechanisms CDB
	ii. Ensure biotechnology research is designed and executed in a manner which seek to address among other things, environmental sustainability, biosafety and biodiversity utilisation	Development of an oversight body to review biotechnology R&D activities conducted at national and regional levels – e.g. national biotechnology & biosafety committees		X	X	CARICOM Member States GEF

Strategic Objective: Development of appropriate legal, regulatory and institutional frameworks						
Strategic Objective	Implementation Strategies	Expected Outputs	Schedule			Proposed strategic partners
			Short Term (1-2 yrs)	Medium Term (3-6 yrs)	Long Term (7-10 yrs)	
6.3 (b) Facilitating the development of regional and national innovation systems	i. Develop and institute a regional framework for development and support of national innovation and entrepreneurship systems at the national level	Innovation (or science, technology and innovation) policy developed and implemented by Member States		X		CARICOM Member States UWI NIHERST EDF DIFID IFAD
		Funding mechanism established to support innovation at national level (case studies – Jamaica, Trinidad and Tobago and Barbados)		X	X	
		National innovation competition with special prize for innovations in area of biotechnology		X	X	
	ii. Development of a regionally harmonised IP system to facilitate application and grant of IPRs	Harmonised regional intellectual property laws			X	CARICOM Member States WIPO
		Regional system for making to facilitate registration of specific IP protection e.g. patents, industrial designs, trademarks			X	
	iii. Provide appropriate framework to facilitate the development and commercialisation of biotechnology products, processes and services	IP policies implemented in regional academic and R&D institutions		X		CARICOM Member States UWI NIHERST EDF DIFID IFAD
		IP audits conducted at regional universities and colleges	X	X		

Strategic Objective: Development of appropriate legal, regulatory and institutional frameworks						
Strategic Objective	Implementation Strategies	Expected Outputs	Schedule			Proposed strategic partners
			Short Term (1-2 yrs)	Medium Term (3-6 yrs)	Long Term (7-10 yrs)	
		UWI business development offices expanded to include dedicated section to deal with technology transfer		X		AUTM
		Mechanism developed for UWI technology transfer facilities to offer technical support to other regional entities to facilitate their transfer of technology – shared facilities/services		X	X	
	iv.					
6.3 (c) Promotion of ethically and socially responsible creation and use of biotechnology	i. Promote the development of guidelines and best practices to guide the use of biotechnology in an ethically and socially responsible manner to facilitate the development, commercialization, sale and use of biotechnology products, processes and services	Biotechnology and ethics task force established Publication of biotechnology and biosafety best practices guide		X X		CARICOM Member States UWI NIHERST
	ii. Provide a mechanism for cultural, social and spiritual consideration to be taken into account with respect to the use of biotechnology to create new products, processes and	Procedure for engagement of indigenous communities and traditional groups in decision making developed Access and Benefit sharing		X X		Member States CARICOM Member States

Strategic Objective: Development of appropriate legal, regulatory and institutional frameworks						
Strategic Objective	Implementation Strategies	Expected Outputs	Schedule			Proposed strategic partners
			Short Term (1-2 yrs)	Medium Term (3-6 yrs)	Long Term (7-10 yrs)	
	<p>services. This is of significance when dealing with indigenous communities and access to genetic resources for biotechnology R&D</p> <p>iii.</p>	<p>framework developed in Member States.</p> <p>Appropriate links made with relevant ministries and agencies in member states to integrate biotechnology initiatives with those relevant to biodiversity access</p>		X	X	Member States CARICOM

6.4 Strategic Objective: Human Capital Development

To facilitate human capital development in key areas to position the region to obtain maximum benefits from the development and exploitation of biotechnology products and services. Specific focus will include:

- a. Identifying Human Capital Needs to meet priorities with respect to Biotechnology and biosafety management within CARICOM Member States.
- b. Developing mechanisms to enhance human capital in key areas necessary for biotechnology R&D.

Strategic Objective: Human Capital Development						
Strategic Objective	Implementation Strategies	Expected Outputs	Schedule			Proposed strategic partners
			Short Term (1-2 yrs)	Medium Term (3-6 yrs)	Long Term (7-10 yrs)	
6.4 (a) To Identify Human Capital Needs to meet priorities with respect to Biotechnology and biosafety management within CARICOM Member States.	i. Ascertaining the existing human resources and to identify gaps in knowledge-base to meet the demands for biotechnology R&D in key strategic clusters to enhance regional competitiveness and social wellbeing	Report on human capital needs assessment based on priority areas/clusters for biotechnology applications detailing the specific human resource needs within each cluster	X			CARICOM Member States UWI GEF NIHERST IICA
	ii. Develop a human resource strategy to strengthen capabilities to ensure a cadre of highly qualified and skilled personnel	<p>Development of a regional database of biotechnology/ biosafety experts</p> <p>A 10 year human capital development strategy with focus on primary, secondary and tertiary education levels</p> <p>A Regional Scholarship and Training Fund specifically for biotechnology and biosafety established</p> <p>Development of a biotechnology/biosafety Scholarship and Training Fund at national Level</p>		X		CARICOM Member States GEF

Strategic Objective: Human Capital Development						
Strategic Objective	Implementation Strategies	Expected Outputs	Schedule			Proposed strategic partners
			Short Term (1-2 yrs)	Medium Term (3-6 yrs)	Long Term (7-10 yrs)	
	iii. Promote the Design and implementation of programmes at the national and regional levels to attract key biotechnology experts in fields relevant to regional development	Guidelines for the development of a incentive package for establishment especially in relation to centre of biotechnology and biosafety excellence Incentives institutionalised by Member States		X		CARICOM Member States
6.4 (b) To Develop mechanisms to enhance human capital in key areas necessary for biotechnology R&D.	i. Facilitate the development of a Regional Biotech-Biosafety Training Programme in: patent drafting; technology Licensing; negotiating technology transfer and access to genetic resources agreements, biosafety risk assessment and management; testing for detection of modified nucleic acids, business management	Detailed regional biotechnology and biosafety training programme developed and approved by an identified body/agency Joint training programmes in biotechnology and biosafety executed at the national level Funding sourced and available to support approved training programmes in biotechnology and biosafety Development of a scholarship mechanism to assist human resource development in specialised areas related to	X X	X X	X X	CARICOM Member States UWI CARDI NIHERST IICA

Strategic Objective: Human Capital Development						
Strategic Objective	Implementation Strategies	Expected Outputs	Schedule			Proposed strategic partners
			Short Term (1-2 yrs)	Medium Term (3-6 yrs)	Long Term (7-10 yrs)	
		biotechnology and biosafety management for university degrees, post-doctoral fellowships, short training programmes and internships. (human Resource Development Fund)				
	ii. Facilitate the development of programmes at primary, secondary and tertiary institutions to enhance management skills in the emerging biotechnology industry so as to attract high quality researchers, to encourage entrepreneurship in bio-businesses, and to monitor demand and supply for specialist skills (e.g. patent drafting, technology licensing, IP asset identification and exploitation, valuation of IP and other intangible assets, securitisation and monetisation of IP assets)	Workshop conducted with regional examination bodies (CXC, CAPE), ministry of education and other training bodies to discuss inclusion of biotechnology and biosafety modules in the school syllabus for primary and secondary schools Biotechnology/ biosafety skills training needs assessment conducted		X		CARICOM Member States UWI NIHERST CXC CAPE Colleges Universities IICA CDB – (CTCS programme, AMF) GEF
	iii. Support the implementation of a biotechnology programme at	Biotechnology masters programme at UWI established	X	X		CARICOM Member States

Strategic Objective: Human Capital Development						
Strategic Objective	Implementation Strategies	Expected Outputs	Schedule			Proposed strategic partners
			Short Term (1-2 yrs)	Medium Term (3-6 yrs)	Long Term (7-10 yrs)	
	the University of the West Indies and other regional universities and colleges. Such programmes can provide future leaders in areas of biotechnology and biosafety identified as key to meeting regional objectives to expand biotechnology uptake in key sectors and areas of priority	Graduate programmes developed and advertised Students graduating from the UWI graduate programme in biotechnology R & D component of the biotechnology Masters programme established with core research teams e-learning component of the Master's programme developed and operational	X	X X	X X	UWI CARICOM Member States EDF DIFID IFAD
	iv.					

6.5 Strategic Objective: Education, training and public awareness

To promote Education, Training and public awareness for greater understanding of issues related to biotechnology and biosafety and their impact at the community level. Specific focus will include:

- a. Facilitating the design and implementation of appropriate public awareness campaigns
- b. Engaging civil society in decision making process
- c. Promoting Information sharing

Strategic Objective: Education, training and public awareness						
Strategic Objective	Implementation Strategies	Expected Outputs	Schedule			Proposed strategic partners
			Short Term (1-2 yrs)	Medium Term (3-6 yrs)	Long Term (7-10 yrs)	
	and which is geared towards explaining the scientific details of the technology and their impacts on lives and livelihoods	<p>Media packages developed and distributed</p> <p>Links form with International Food Information Council</p> <p>Regional media coverage of biotechnology and biosafety conference so footage can be used for training purposes</p>	X	X	X	IFIC CARICOM Member States UWI
	iii. Provide a forum for the public to access information related to biotechnology and biosafety, especially in relation to regional applications of biotechnology and biosafety processes	<p>Guidelines for dissemination and access to information developed and promulgated</p> <p>Biotechnology/biosafety Conference proceedings published and disseminated</p> <p>Publication showcasing biotechnology and biosafety R&D conducted in the region</p> <p>Biosafety and biotechnology issues presented at national regional and international symposia, conferences, and technical sessions – sector specific e.g. related to tourism,</p>	X	X	X	CARICOM Member States UWI CARDI NIHERST CCST SRC IICA GEF

Strategic Objective: Education, training and public awareness						
Strategic Objective	Implementation Strategies	Expected Outputs	Schedule			Proposed strategic partners
			Short Term (1-2 yrs)	Medium Term (3-6 yrs)	Long Term (7-10 yrs)	
		agriculture, investment, education, medicine, environment, energy etc. Ministries, Institutions and agencies hosting biotechnology and biosafety initiatives	X	X	X	
6.5 (b) To engage civil society in decision making process	i. Presentation of the Regional Biotechnology Biosafety Secretariat annual workplan to regional Heads of Governments	Regional heads informed on the biotechnology and biosafety work programmes	X	X	X	CARICOM Member States
	ii. Disseminate biotechnology and biosafety information to various relevant NGOs and civil society groups and develop a mechanism to include their input in development of regional biotechnology/ biosafety policies	Database of relevant NGOs categorised by location, and area of advocacy		X	X	CARICOM Member States CPDC IICA NIHERST GEF
		Training of NGOs in effective advocacy strategies specific to biotechnology and biosafety and mechanisms to be engaged in decision making at the national and regional levels Information and communication strategy developed	X		X	
	iii. Devise and promulgate an	Guidelines for a public		X		CARICOM

Strategic Objective: Education, training and public awareness						
Strategic Objective	Implementation Strategies	Expected Outputs	Schedule			Proposed strategic partners
			Short Term (1-2 yrs)	Medium Term (3-6 yrs)	Long Term (7-10 yrs)	
	effective regional public engagement/ participation strategy with respect to decision making in relation to biosafety issues and biotechnology R&D initiatives to be adopted by CARICOM Member States. To include review of access to information legislation at national level	engagement strategy developed to obtain input from the public on key decisions made in relation to biotechnology initiatives and biosafety matters Use of guidelines by Member States		X	X	Member States
6.5 (c) To promote Information sharing	i. Provide a mechanism to facilitate information sharing on regional biotechnology initiatives and biosafety processes.	Biotechnology information clearing house integrated with the BCH mechanism for biosafety		X	X	CARICOM Member States UWI CARDI
	ii. Promote the development of a CARICOM biotechnology/biosafety network geared towards providing a forum for regional biotechnology and biosafety experts, technicians and decision makers to interact to discuss relevant issues and also to provide a platform for R&D networking	Discussion and networking internet-based platform developed for biotechnology and biosafety. Links with existing biotechnology list serve	X	X	X	CARICOM Member States CARDI IICA

7.0 INSTITUTIONAL MECHANISMS

To achieve the objectives articulated in this policy, it will be necessary to establish a dedicated unit operating under the CARICOM framework. To be effective there will be an overall 'Science Technology Innovation Unit' which will have oversight for science and technology issues. Specifically in relation to biotechnology and biosafety there will be a 'Regional Biotechnology and Biosafety Commission/ Secretariat' established and approved by Member States.

The 'Regional Biotechnology and Biosafety Commission/ Secretariat' will be run by a core fulltime staff and by an advisory body. Core staff will have expertise in key areas relevant to biotechnology and biosafety as well as relevant regional and international trade issues. The advisory body will comprise experts will advise the Commission/ Secretariat on key biotechnology and biosafety issues on a consultative basis (similar to the Consultative Group for Agriculture proposed in the IICA document)⁸.

The 'Regional Biotechnology and Biosafety Commission/ Secretariat' will comprise regional experts in diverse areas including: science and technology, biotechnology, biosafety, trade, business development, marketing, IP asset management, health, environment, energy.

The 'Regional Biotechnology and Biosafety Commission/ Secretariat' will function:

- e. To provide guidance to Regional governments in all areas of biotechnology and biosafety through a regional mechanism.
- f. To facilitate the establishment of mechanisms to enhance the capacity of regional institutions to undertake cutting edge R&D in areas of biotechnology clusters and to provide for the testing of products of biotechnology to ensure safety for consumption, trade and environmental safety.
- g. Facilitate the development of appropriate biotechnology research centres of excellence and biotechnology parks to encourage the development of clusters around key core technologies of relevance to the region. E.g. alternative/renewable energy, bio-informatics, agriculture and food; medicine and the environment.
- h. Facilitate development of biosafety frameworks at the country level.

⁸ Strategy for a Caribbean Programme on Biotechnology and Biosafety: An Initiative by the Inter-American Institute for Cooperation in Agriculture and other Regional stakeholders in the wider Caribbean Region. July 2006.

- i. Provide for the establishment of harmonised mechanisms for the implementation and sustainability of biotechnology and biosafety systems in the region.

8.0 IMPLEMENTATION STRATEGY

The implementation of the objectives articulated in this policy document will take place in several phases. The first phase will focus on the establishment of an efficient operational framework to have oversight for the implementation of the strategic plan. Within this context, setting up of the CARICOM Science, Technology, Innovation Unit and resulting Secretariat will be priority and will be the focus of activities for the first year. It is envisioned that this Unit will be established, with the requisite, budget, staff and administrative support within the first year.

It is expected that the Regional Biotechnology and Biosafety Commission/Secretariat will be established within the first year of project activities. This Secretariat will be pivotal to executing the five year work plan as outlined below.

In phase 2 activities over years 2-5 are expected to result in laying the basic foundation framework for efficient and effective management of biotechnology and biosafety and related business development within the region. Within the context of biotechnology and biosafety, the action plan outlined below provides a 'roadmap' to put those basic building blocks in place. Emphasis is placed on developing the framework for R&D funding; biosafety capacity; harmonised IP systems; technology development, transfer and commercialisation; public awareness, education and training; R&D prioritisation; and regional and national fiscal and other incentives to attract R&D investment in key areas identified as critical to regional development. This second phase essentially will focus on capacity building.

Years 4-5 will focus primarily on review of the policy and strategy to evaluate success of implementation and to develop a 10 year strategic plan which will focus on the next phase of the policy, that is, the development of Biotechnology and biosafety centres of excellence within the region, and the regional innovation system with its requisite financial, administrative and human capital support systems.

8.1 Implementation strategy and Action Plan: Operational/ Administrative Framework

Table 2: Implementation strategy and Action Plan				
Key Objective	Major Activities	Timeframe (years after Approval by COTED)	Responsibility	Strategic Partners
To establish a CARICOM Science, Technology and Innovation Unit/Desk	To oversee areas related to Regional STI initiatives Setting guidelines for action relevant to biotechnology and biosafety and other areas of STI	1-6 months	Current CARICOM Unit responsible for biotechnology/ biosafety policy project	CDB, CARTFund EDF funding Member States GEF
To Appoint Senior STI programme manager	Current COTED Approved Working Group to: <ul style="list-style-type: none"> • Develop TOR/ job description • Advertise post • Selection of candidate • Salary scale 	1-6 months	Current CARICOM Unit Current GMO Working Group	CDB, CARTFund EDF funding Member States GEF
To establish a Regional Biotechnology-Biosafety Advisory Committee (RBAC)	<ul style="list-style-type: none"> • Appointment in 2 year cycles • Composition (12) – prominent scientist/ biotechnologists with range of expertise (e.g. STI, biotech, biosafety, business development, legal-regulatory-institutional, Commercialisation-technology transfer, fiscal-tax incentives, trade, education, research) • Provided an honorarium for serving on the committee • Not all positions need to be filled immediately as it is expected that as the biotechnology sector expands there will be need to add core expertise • Current working group is currently top heavy, with a heavy focus on agricultural biotechnology. This composition may be adequate in the interim as it is expected the immediate focus will be expanding agricultural biotechnology 	1-6 months	STI programme manager Current GMO Working Group	CDB, CARTFund EDF funding Member States GEF
To establish a Regional Biosafety Biotechnology Secretariat	Comprising senior STI programme manager and the RBAC Having oversight for: <ul style="list-style-type: none"> • Implementation of the biotechnology/ biosafety policy and strategy 	Establish within year 1 and ongoing To serve as the pivotal focal point for	STI programme manager Regional Biotechnology-Biosafety	CDB, CARTFund EDF funding Member States GEF IICA

Key Objective	Major Activities	Timeframe (years after Approval by COTED)	Responsibility	Strategic Partners
	<ul style="list-style-type: none"> Refining and executing the 5 year strategic implementation plan 4 year review of the strategy Assist in the establishment of national STI body in each Member State Liaise with government appointed National technical advisory Council for biotechnology and biosafety (focal points for biosafety and national biotechnology biosafety committees where they exist) Establish linkages with international centres of excellence with respect to regional projects Provide regional models and guidelines for implementation at national level in e.g. legal, regulatory, institutional and policy frameworks, ethics, standards and certification, biosafety, training, education and awareness Establishment and oversight of a Regional R&D fund Maintenance of a central human resource development database to be updated annually based on information obtained from similar national databases 	coordination of regional initiatives related to biotechnology and biosafety	Advisory Committee (RBAC)	
To establish Regional Biotechnology and Biosafety Working Groups/ Task Force	<p>In specific areas of priority to develop regional guidelines and projects in these areas e.g.:</p> <ul style="list-style-type: none"> R&D in specific areas of priority – development of centres of excellence Commercialisation and bio-business development Education, training, public awareness Legal, regulatory, policy and institutional frameworks for biotechnology and biosafety Provided with an honorarium Can be co-opted for specific programme 	Years 2 -5	Regional Biosafety Biotechnology Secretariat	CDB, CARTFund EDF funding Member States GEF FAO
To promote establishment of National STI Body and National	<p>Responsibility:</p> <ul style="list-style-type: none"> To prioritise national R&D initiatives Administer National R&D Fund 	Years 2-5	Regional Biosafety Biotechnology Secretariat	Member States CDB, CARTFund EDF funding GEF

Key Objective	Major Activities	Timeframe (years after Approval by COTED)	Responsibility	Strategic Partners
<p>Biotechnology & Biosafety Technical Advisory Council at the level of Member States</p> <p>Current framework for biosafety e.g. can be utilised and integrated into the proposed structure for efficiency</p>	<p>(other relevant funds such as innovation)</p> <ul style="list-style-type: none"> • Seek Public-private-Academia tripartite alliances to advance initiatives in key national priority areas • To liaise with Regional centres of excellence re collaborative research • The national STI Body to appoint National Technical Advisory Council for specific areas of priority including a National Biotechnology-Biosafety Technical Advisory Council • Develop a national HRD strategy related to biotechnology and biosafety to implement national and regional initiatives • Maintenance of a HRD database related to biotechnology and biosafety (as well as other areas of STI) and to update regional central database. Information can be used to inform national training priorities and scholarship allocations • Establish links with international R&D centres of excellence • To liaise with regional biotechnology and biosafety working groups as appropriate 		National Governments	

8.2 FIVE YEAR BIOTECHNOLOGY AND BIOSAFETY POLICY IMPLEMENTATION PLAN AND BUDGET

Component	Activity	Timeframe (Years) ⁹						Indicative Budget US \$	Proposed Financing/ Strategic Partners
		0	1	2	3	4	5		
Operational Framework	Establishment of CARICOM STI Unit							50,000.00	CARICOM Secretariat Caribbean Development Bank (AMF) Member States CARDI UWI EU (EDF)
	Appointment of Senior STI programme manager							400,000.00	
	Establishment of RBB Secretariat							500,000.00	
	Establishment of RBB Working Groups							260,000.00	
	Establishment of National BB Advisory Council/ entity							30,000.00	
	Appointment of Technical STI project officer – Biotechnology & biosafety							250,000.00	
	Acquisition of funding to support and sustain operational and administrative framework							15,000.00	EU (EDF), CARTFund (movement of goods – CSME)
Expansion of Regional Biotechnology	R&D Clusters							15,000.00	SRC, IICA, Member States CDB, EDF
	<ul style="list-style-type: none"> Review regional 'Road Map for Commercialisation of Biotechnology' to move process forward 								
	<ul style="list-style-type: none"> Review Regional multilateral trade agreements and other arrangements to identify sources of technical assistance and funding for key projects. Source funds 							40,000.00 75,000.00	CARIFORUM – EPA (eco-innovations, EU framework project) Caribbean Export facilities CRNM Member States – (CARIFORUM-EPA

⁹ Grey areas in the table indicate activities are ongoing and reflected in the budget.

Component	Activity	Timeframe (Years) ⁹						Indicative Budget US \$	Proposed Financing/ Strategic Partners
		0	1	2	3	4	5		
									implementation desk)
	Exploitation & Commercialisation								
	<ul style="list-style-type: none"> Develop guidelines to establish IP policies in regional academic and R&D institutions 							60,000.00	World Intellectual Property Organisation (WIPO), UWI, Other Universities and Colleges, R&D institutions Member States
	<ul style="list-style-type: none"> Facilitate the institution of IP policies at the national level 							390,000.00	Member States, WIPO,
	<ul style="list-style-type: none"> Review operations of regional technology transfer/ commercialisation offices and develop guidelines and best practices for the establishment of such offices based on a mechanism for collaboration 							75,000.00	UWI, WIPO
	<ul style="list-style-type: none"> Update IP systems in Member States (harmonisation) 							360,000.00	WIPO, Intellectual Property Offices in Member States CDB, CARTFund (free movement of goods & services) EDF
	Investment Framework								
	<ul style="list-style-type: none"> Develop framework for operation and management of regional R&D Fund 							50,000.00	UWI, CDB, Member States EDF,

Component	Activity	Timeframe (Years) ⁹						Indicative Budget US \$	Proposed Financing/ Strategic Partners
		0	1	2	3	4	5		
	<ul style="list-style-type: none"> Establish Regional R&D Fund¹⁰ 							30,000.00	
	<ul style="list-style-type: none"> Provide guidelines for establishment of national R&D Fund 							30,000.00	
	<ul style="list-style-type: none"> Establishment of R&D Funds in Member States¹¹ 							50,000.00	
	<ul style="list-style-type: none"> Review mechanisms for developing the CARICOM region as a preferred location for establishment of R&D facilities in areas of priority (fiscal incentives and tax regime, other incentives for private sector investment) 							30,000.00	Member States CDB, CARTFund EDF Central Banks Chamber of Commerce Private sector
	<ul style="list-style-type: none"> Provide guidelines for Member States to implement R&D fiscal and other incentives. Provide financial and technical support to establish such regimes 							20,000.00	
	<ul style="list-style-type: none"> Provide guidelines for establishment and operation of regional commodity group R&D Fund 							20,000.00	Various commodity Boards – e.g. cotton, coconut, sugarcane, rice, coffee, cocoa
	<ul style="list-style-type: none"> Review provisions under the CARIFORUM-EPA for the region to seek opportunities with respect to the EU Framework Programme for Research and Technological Development and 							15,000.00	Member States, UWI, NIHERST

¹⁰ Regional fund should have an estimated US \$25 million for R&D activities per annum

¹¹ Member States should seek to endow their R&D funds with US \$5-10 Million per year

Component	Activity	Timeframe (Years) ⁹						Indicative Budget US \$	Proposed Financing/ Strategic Partners
		0	1	2	3	4	5		
	develop guidelines for regional access to this programme								
	<ul style="list-style-type: none"> Develop project collaborative proposals for submission under the EU framework programme 							225,000.00	UWI, CDB, EDF Other EU funding mechanisms
Legal, Regulatory, Institutional & Policy Framework	Biosafety								
	<ul style="list-style-type: none"> Finalise CARICOM-GEF biosafety MOU 							5,000.00	CARICOM, GEF, Member States
	<ul style="list-style-type: none"> Establish working group on biosafety within the proposed CARICOM STI Unit 							40,000.00	
	<ul style="list-style-type: none"> Review regional biosafety capacity needs assessment and prioritise identified needs to develop projects 							10,000.00	
	<ul style="list-style-type: none"> Develop regional guidelines for development of common/harmonised forms, procedures for review of biotechnology R&D and applications for import and export of GM products 							20,000.00	Member States CDB EDF CARTFund (CSME free movement of goods) GEF
	<ul style="list-style-type: none"> Execution of the regional NBF implementation project 								GEF Member States
	<ul style="list-style-type: none"> Development of regionally harmonised protocols for Risk assessment and management 							75,000.00	Member States CDB, EDF
	<ul style="list-style-type: none"> Coordinate update of national legislation 							100,000.00	Member States GEF

Component	Activity	Timeframe (Years) ⁹						Indicative Budget US \$	Proposed Financing/ Strategic Partners
		0	1	2	3	4	5		
	which will support implementation of NBFs								CDB, EDF CARTFund (CSME free movement of goods)
	Environmentally sustainable Initiatives								
	<ul style="list-style-type: none"> Review the Eco-Innovation provisions in the CARIFORUM-EPA and provide guidelines for regional and national approaches to participate in the EU Eco-innovation project. Source funds to facilitate regional initiatives 							15,000.00	Member States EU funding mechanisms
	<ul style="list-style-type: none"> Facilitate execution of national workshops on participation in EU Eco-innovation project 							30,000.00	
	<ul style="list-style-type: none"> Submission of regional and national Eco-innovation projects for funding under the EU regime 							100,000.00	
	Regional and National Innovation Systems								
	<ul style="list-style-type: none"> Develop and institute a regional framework for development and support of national innovation and entrepreneurship systems at the national level 							200,000.00	Member States CDB, EDF UWI
	<ul style="list-style-type: none"> Development of a regionally harmonised IP system to facilitate application and grant of IPRs especially re 							100,000.00	Member States CDB EDF WIPO UWI

Component	Activity	Timeframe (Years) ⁹						Indicative Budget US \$	Proposed Financing/ Strategic Partners
		0	1	2	3	4	5		
	Patents, Trademarks and Designs to start								
Human Capital Development	Human Capital Needs Assessment								
	<ul style="list-style-type: none"> Conduct human capital needs assessment based on priority areas 						30,000.00	Member States GEF CDB EDF UWI	
	<ul style="list-style-type: none"> Development of a regional database of biotechnology/ biosafety experts 						15,000.00		
	<ul style="list-style-type: none"> Develop a 10 year human capital development strategy with focus on primary, secondary and tertiary education levels 						10,000.00		
	<ul style="list-style-type: none"> Development of a Regional STI Scholarship and Training Fund specifically for biotechnology and biosafety¹² 						800,000.00		
	<ul style="list-style-type: none"> Facilitate development of a STI scholarship and Training Fund at national Level¹³ 						40,000.00		
	Human Capital Development in biotechnology R&D management								
	<ul style="list-style-type: none"> Facilitate the development of a Regional Biotech-Biosafety Training Programme in: patent drafting; technology Licensing; negotiating 						750,000.00	Member States GEF CDB EDF UWI	

¹² Fund should have US \$ 400,00.00 per annum

¹³ National fund should be endowed with minimum US \$ 150,000.00 per annum

Component	Activity	Timeframe (Years) ⁹						Indicative Budget US \$	Proposed Financing/ Strategic Partners
		0	1	2	3	4	5		
	technology transfer and access to genetic resources agreements, biosafety risk assessment and management; testing for detection of modified nucleic acids, business management								
	<ul style="list-style-type: none"> Expedite introduction of biotechnology programme at UWI (all levels) 							25,000.00	UWI, Member States GEF FAO CDB EDF
Public engagement awareness and Education	Public Awareness Campaigns								
	<ul style="list-style-type: none"> Development of a STI website with appropriate links and various sections including biotechnology and biosafety 							20,000.00	GEF
	<ul style="list-style-type: none"> Development of an information clearing house integrated with the BCH mechanism for biosafety 							135,000.00	GEF
	<ul style="list-style-type: none"> Execute training workshops with regional media entities to educate the media on reporting on issues with a high science-based content 							300,000.00	Member States GEF Media Houses IFIC
	<ul style="list-style-type: none"> Facilitate and support the execution of a regional conference on biotechnology and biosafety 							160,000.00	Member States GEF CDB EDF UWI
	<ul style="list-style-type: none"> Development of 							80,000.00	Member States

Table 3: Five Year Biotechnology and Biosafety Policy Implementation Plan and Budget									
Component	Activity	Timeframe (Years) ⁹					Indicative Budget US \$	Proposed Financing/ Strategic Partners	
		0	1	2	3	4			5
	public awareness information pack (brochures, videos, TV, posters etc.) targeting varying levels of society; also development of guidelines for dissemination							GEF CDB EDF UWI	
	Engaging Civil Society								
	<ul style="list-style-type: none"> • Presentation of the STI –Regional Biotechnology Biosafety Secretariat annual workplan to regional Heads of Governments 						40,000.00	Member States EDF funding GEF	
	<ul style="list-style-type: none"> • Disseminate biotechnology and biosafety information to various relevant NGOs and civil society groups and develop a mechanism to include their input in development of regional biotechnology/ biosafety policies 						40,000.00	CPDC Select regional NGOs Member States GEF	
	<ul style="list-style-type: none"> • Devise and promulgate an effective regional public engagement/ participation strategy with respect to decision making in relation to biosafety issues and biotechnology R&D initiatives to be adopted by Member States to include review of access to information legislation at national level 						120,000.00	Member States GEF	

Table 3: Five Year Biotechnology and Biosafety Policy Implementation Plan and Budget									
Component	Activity	Timeframe (Years) ⁹						Indicative Budget US \$	Proposed Financing/ Strategic Partners
		0	1	2	3	4	5		
Monitoring and Evaluation	• Review of policy and strategy							6,000.00	
	• Development of 10 year strategic plan for regional biotechnology and biosafety with built-in benchmarks and review periods							15,000.00	
TOTAL:								5,991,000.00	

9.0 Glossary of Terms

Biodiversity	The variability among living organisms from all sources, including, <i>inter alia</i> , terrestrial, marine and other ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems. <i>Synonyms</i> : biological diversity, ecological diversity.
Bio-engineering	The use of artificial tissues, organs and organ components to replace parts of the body that are damaged, lost or malfunctioning
Biosafety protocol	An internationally agreed protocol set up to protect biological diversity from the potential risks posed by the release of genetically modified organisms. It establishes a procedure for ensuring that countries are provided with the information necessary to make informed decisions before agreeing to the import of such organisms into their territory. <i>Synonym</i> : Cartagena protocol
Biotechnology	<p>For the purpose of this CARICOM Biotechnology/ Biosafety Policy Biotechnology is defined as: the use of the whole organism or bio-molecular processes towards the production of goods, services and knowledge for commercial and other purposes.</p> <p>A narrower definition is of Bio-technology is one used by the Convention on Biological Diversity: "Any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use" (Convention on Biological Diversity)</p>
Modern bio-technology:	<p>The application of:</p> <ol style="list-style-type: none"> 1. <i>In vitro</i> nucleic acid techniques, including recombinant deoxyribonucleic acid (DNA) and direct injection of nucleic acid into cells or organelles, or 2. b. Fusion of cells beyond the taxonomic family, that overcome natural physiological reproductive or recombination barriers and that are not techniques used in traditional breeding and selection (Convention on Biological Diversity).
CARICOM	An organisation founded by the Treaty of Chaguaramas (Trinidad; 1973, revised 2001) with the purpose of promoting economic integration and development, especially in less-developed areas of the region.
CARICOM Member States	Antigua and Barbuda, Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Haiti (suspended 2004–6), Jamaica,

Montserrat, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, and Trinidad and Tobago. Anguilla, Bermuda, the British Virgin Islands, the Cayman Islands, and the Turks and Caicos Islands are associate members.

Convention on Biological Diversity	Signed by 150 government leaders at the 1992 Rio Earth Summit, the Convention on Biological Diversity is dedicated to promoting sustainable development. Conceived as a practical tool for translating the principles of Agenda 21 into reality, the Convention recognizes that biological diversity is about more than plants, animals and micro organisms and their ecosystems – it is about people and our need for food security, medicines, fresh air and water, shelter, and a clean and healthy environment in which to live. It has 3 main objectives: To conserve biological diversity; the use biological diversity in a sustainable fashion; and to share the benefits of biological diversity fairly and equitably. (source http://www.cbd.int/)
CSME	The regime established by the provisions of this Treaty replacing Chapters Three through Seven of the Annex to the Treaty Establishing the Caribbean Community and Common Market signed at Chaguaramas on 4 July 1973;
Genetically Modified Organism (GMO)	An organism that has been transformed by the insertion of one or more transgenes.
Intellectual Property Rights (IPR)	The legal framework, which includes patenting and plant variety protection, by which inventors control the commercial application of their work.
Living Modified Organism (LMO)	Living organism that possesses a novel combination of genetic material obtained through the use of modern biotechnology (Convention on Biological Diversity). Synonym of GMO, but restricted to organisms that can endanger biological diversity