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National Biosecurity Strategy (NBS)
The Commonwealth of The Bahamas

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Introduction

In October 2002, The Bahamas began a project valued at approximately \$250,000, of which \$132,500 was awarded under the UNEP-GEF Global Biosafety Project, to aid in the development of a national biosafety framework. The main elements of this framework were to be

- a regulatory system
- an administrative system
- a decision making system that includes risk assessment and management
- mechanisms for public participation and information

The project endeavoured to build national capacity for decision-making with respect to Living Modified Organisms (LMOs) through mechanisms such as screening notifications and risk assessments. It also sought to increase public awareness on biotechnology and biosafety issues. This National Biosafety Framework (NBF) project enabled The Bahamas to develop a national policy on biosafety and biosecurity. Such policies did not previously exist.

The NBF project has involved consultation with Government officials within the Ministry of Health, Department of Agriculture, Department of Environmental Health Services, Department of Fisheries, Bahamas Customs Department and Bahamas Environment, Science and Technology (BEST) Commission. There has also been consultation with non-Governmental organizations, the private sector and concerned citizens. These have included the College of The Bahamas, Bahamas Medical Association, hotels, restaurants, pharmacists, physicians, students, religious groups and individuals with food allergies and special dietary needs. This effort to have as wide a consultation as possible facilitated the development of policies and a strategy that best incorporates the needs of The Bahamas and its people regarding safe use and handling of GMOs imported and used in the country as well as other aspects of biosecurity.

In discussions on the best way forward to develop the National Biosafety Framework, the National Coordinating Committee (NCC) agreed that a National Biosecurity Strategy that was more inclusive and comprehensive was the preferred approach. As a Small Island Developing State, The Bahamas is limited in its financial and human resources. Taking a comprehensive approach that would utilize administrative and regulatory mechanisms to address a myriad of related issues instead of reinventing the wheel for each issue separately makes effective use of the limited resources available to the country. This comprehensive approach would also enable The Bahamas to build on work completed under its National Biodiversity Strategy and Action Plan (NBSAP), the National Invasives Species Strategy and other biodiversity-related projects and programs. The NCC has also had discussions on the creation of an enabling Act that would allow regulations related to biosecurity to be developed.

The NCC also agreed on the scenario related to biosafety the draft Strategy would address. The scenario is as follows:

1. GM research should be allowed under specific conditions.
2. There should be no unauthorized commercial cultivation. With authorization, there should be mechanisms for risk analysis and applications for authorization would be evaluated on a case-by-case basis.
3. There should be labeling of products for consumer choice.

These components relate to open crop commercialization and high regulated food and environment. Under this scenario, commercial GM cultivation would be allowed with post monitoring and all products, both local and imported, will be available with labeling.

This National Biosecurity Strategy is a living document that must be amended with changes in technology and information available at country level. Having the flexibility to assure this is key to the success of implementation of the Strategy This Strategy represents an effort by The Bahamas to ensure fulfillments of its obligations under the Convention on Biological Diversity and the Cartagena Protocol and most importantly, to ensure the health of its people, environment and economy.

1.0 What is Biosecurity?

Biosecurity attempts to ensure that systems sustaining either people and other living things are maintained. This may include natural habitats as well as shelter and productive enterprise (especially agriculture) and deals with threats such as biological warfare or epidemics. It involves safeguarding the economy and environment, human health, and plants and animals, from the risks of introduced pests and diseases. Biosecurity also entails eradicating any pests and diseases that evade border controls, and controlling the impacts of those which have become an established part of the Bahamian environment.

Biosecurity covers several thematic areas including:

- Biosafety related to safe use and handling of biotechnology products
- Invasive alien species
- Consumer protection
- Intellectual property rights
- Access to genetic resources and benefit sharing
- Protection of traditional knowledge
- Conservation and sustainable use of biodiversity

1.1 Biodiversity

Biodiversity or biological diversity is the diversity of and in living nature. Though there is no single standard definition for biodiversity, it can also be described as the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.

Biodiversity helps to maintain ecological services in variable environmental conditions. Because of biodiversity, ecosystems have ecological resilience. Resilience is a measure of the ability of an ecosystem to maintain its health when faced with stresses or shocks.

These stresses or shocks may include natural disasters, such as hurricanes, fires, pollution and also biological invasions. We need to maintain the health of our ecosystems for their value as sources of water, food, raw materials, medicinal products, creative inspiration and beauty.

1.2 Biosafety, Biotechnology and GMOs

Biosafety is the prevention of large-scale loss of biological integrity, focusing both on ecology and human health. Biosafety protocol refers generically to rigorous professional standards or other attempts to protect biodiversity and involves addressing safety for the environment and human health in relation to modern biotechnology.

Biotechnology is technology based on biology, especially when used in agriculture, food science, and medicine. Biotechnology is any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use. Biotechnology has been practiced for hundreds of years with selective breeding in plants and animals for characteristics that are desired. Since the domestication of the first crops and farm animals, we have altered their genetic makeup through selective breeding and cross-fertilization. The results have been greater agricultural productivity and improved human nutrition.

Traditional methods for breeding and selection differ from modern biotechnology in that processes in the latter overcome natural physiological reproductive or recombination barriers. Modern biotechnology refers to the application of:

- In vitro nucleic acid techniques, including recombinant deoxyribonucleic acid (DNA) and direct injection of nucleic acid into cells or organelles; or
- Fusion of cells beyond the taxonomic family.

In recent years, advances in biotechnology techniques have enabled us to cross the species barrier by transferring genes from one species to another. We now have transgenic plants, such as tomatoes and strawberries that have been modified using a gene from a cold water fish to protect the plants from frost. Some varieties of potato and corn have received genes from a bacterium that enables them to produce their own insecticide, thus reducing the need to spray chemical insecticides. Other plants have been modified to tolerate herbicides sprayed to kill weeds. Living Modified Organisms (LMOs) and Genetically Modified Organisms (GMOs) -- are becoming part of an increasing number of products, including foods and food additives, beverages, drugs, adhesives, and fuels. Agricultural and pharmaceutical GMOs have rapidly become a multi-billion-dollar global industry.

Biotechnology is being promoted as a better way to grow crops and produce medicines, but it has raised concerns about potential side effects on human health and the environment, including risks to biological diversity. National activities in the area of biotechnology are currently limited and there is no production of Genetically Modified Organisms (GMOs) using biotechnological techniques in the country.

A Genetically Modified Organism (GMO) is an organism whose genetic material has been deliberately altered. Examples are diverse, and include commercial strains of wheat that have been modified by irradiation since the 1950s, transgenic experimental animals such as mice, or various microscopic organisms altered for the purposes of genetic research.

1.3 Invasives and other pests

The National Invasive Species Strategy of The Bahamas defines invasive alien species as alien species that become established in a new environment, then proliferate and spread in ways that are destructive to native ecosystems, human health and ultimately, human welfare. A species is regarded as *invasive* if it has been introduced by human action to a location, area, or region where it did not previously occur naturally (i.e., is not native), becomes capable of establishing a breeding population in the new location without further intervention by humans, and becomes a pest in the new location, threatening the local biodiversity.

Pests refer to destructive organisms, such as certain insects and weeds. It can be a matter of semantics when distinguishing between invasive species and pests as both can be detrimental to the environment and human welfare. They both have the propensity to proliferate and displace native species. The important thing is to recognize the threat these organisms pose, no matter which term we prefer to use in referring to them. Through biosecurity we are able to identify species that pose a threat and institute proper management controls to eliminate or minimize their negative impacts.

The negative economic and environmental impacts of invasives and pests include:

- Loss of genetic diversity, i.e. they dilute the gene pool through hybridization;
- Competition with native species, resulting in their loss or displacement;
- Introduction of diseases; and
- Change in the physical properties of the environment, such as decrease in the amount of dissolved oxygen in water and decrease of the amount of sunlight reaching an area.
- Direct economic costs related to damage caused by these species globally run into many billions of dollars annually.

Islands like those of The Bahamas are especially vulnerable to invasives and pests. Island species often have small populations and are unique when compared to continental species due to the isolation of islands throughout prehistoric times. This isolation has been provided by the natural barriers of oceans, mountains, rivers and deserts that have enabled these unique island species and ecosystems to evolve. Most island species are ill-equipped to defend against aggressive invading species and fare poorly in the face of competitors, predators, pathogens and parasites from other areas.

2.0 Visions, Goals and Policy Principles

2.1 Vision for Biosecurity in The Bahamas

The vision of the National Biosecurity Strategy (NBS) is to raise the awareness of all sectors of society of biosecurity and to incorporate biosecurity in national planning and decision-making for the economic, environment and social development of The Bahamas. Over the next three years, the Government will work in partnership with stakeholders and the community to implement the Biosecurity Strategy for The Bahamas as outlined in this document. All those with an interest in protecting the uniqueness of this island nation and its biodiversity are called on to participate in bringing the vision of biosecurity to fruition, through the achievement of goals, objectives and measurable targets that will support it.

The National Biosecurity Strategy sets an overall direction for biosecurity in The Bahamas, and identifies general areas for priority action. It has been developed with a clear focus on the future of The Bahamas, and the Bahamian people have played a vital role in its development. The Strategy encompasses environmental, commercial, cultural, public health, science, trade and travel sector interests. It applies to all natural habitats whether terrestrial, marine, or freshwater. It has been linked where appropriate with the concurrent development of the National Environmental Management and Action Plan for The Bahamas and with existing biosecurity systems established by Departments of Agriculture, Fisheries and Customs. The strategy provides guidance to all involved in biosecurity as well as raising general biosecurity awareness.

2.2 Strategy Goals

The goals of the National Biosecurity Strategy reflect the varied thematic areas that biosecurity involves. These goals are outlined and the mechanisms to achieve them are developed throughout the document.

2.2.1 Biosafety, biotechnology and GMOs

The primary goal related to biosafety, biotechnology and GMOs is implementation of the Cartagena Protocol on Biosafety which The Bahamas is a Party to. Achieving this primary goal will involve successfully completing the following secondary goals:

- i. Development of relevant legislation and regulations
- ii. Establishment of systems for risk assessment and management
- iii. Establishment of administrative systems to ensure biosafety and management of biotechnology and GMOs to include designation of a National Focal Point and Competent National Authorities
- iv. Development of mechanisms for public involvement in decision-making
- v. Development of mechanisms for the sharing of scientific assessments at the national and sub-regional levels
- vi. Establishment of national Biosafety Clearing House to enable participation in the global Biosafety Clearing House
- vii. Ensuring the protection of consumers through availability of information relating to products that can potentially impact their health and that of the environment.

2.2.2 Conservation and sustainable use of biodiversity

The primary goal related to conservation and sustainable use of biodiversity in implementation of the Convention on Biological Diversity which The Bahamas is a Party

to. Achieving this primary goal will involve successfully completing the following secondary goals:

- i. Integration of conservation and sustainable use of biodiversity in national planning and decision-making
- ii. Adoption of measures relating to the use of biological resources to avoid or minimize adverse impacts on biodiversity
- iii. Support of local populations to develop and implement remedial action in degraded areas where biodiversity has been reduced
- iv. Encouraging cooperation between Government agencies and between Government agencies and other sectors in developing methods for sustainable use of biodiversity
- v. Establishment of the national Clearing House to provide information on Bahamian biodiversity and to link to the CBD Clearing House Mechanism
- vi. Implementation of relevant components of the biodiversity programmes of work on inland waters, marine and coastal systems, agriculture, forests, dry and subhumid lands, and islands
- vii. Development and adoption of measures to address scientific assessments, incentives, ecosystem approach, monitoring and indicators, taxonomy, protected areas, public education and awareness, research and training, and technology transfer and cooperation.

2.2.3 Invasive alien species

The primary goal related to invasive alien species is implementation of the National Invasive Species Policy and Strategy (NISS) which was developed in March 2003 and adopted in July 2003. Achieving this primary goal will involve successfully completing the following secondary goals:

- i. Development and/or amendment of legislation related to invasive species management
- ii. Development of a database on invasive species that threaten Bahamian biodiversity
- iii. Establishment of a sequenced approach to invasive species control which would include prevention, rapid response, eradication and containment.
- iv. Preparation of strategic management plans for priority species as identified under NISS
- v. Eradication and control of priority species as identified under NISS
- vi. Capacity-building for officers and institutions involved in the identification, safe handling, holding and transfer of invasive species
- vii. Facilitating research on the occurrence, distribution and impacts of invasive alien species and invasive native species in The Bahamas
- viii. Development of a national mechanism for coordinated action in the field related to invasives
- ix. Development of monitoring programs for current and potential invasives in specified areas including all public areas, national parks, protected areas, freshwater sources and field stations
- x. Implementation of the Code of Conduct for Government related to invasive species.

2.2.4 Access to biological resources and benefit sharing

In recognition of The Bahamas' sovereign rights over its natural resources, access to biological resources, including genetic resources requires development of regulations and mechanisms for management of these resources. It is The Bahamas and its people that should benefit from utilization from natural resources of this country. To this end, the following must be achieved:

- i. Development/amendment of legislation and/or regulations for access to biological resources
- ii. Enforcement of existing regulations related to access and benefit sharing, i.e. current permitting systems
- iii. Establishment of administrative systems for management of access to biological resources
- iv. Establishment of mechanisms, including fee systems, for access to and utilization of biological resources
- v. Adoption of measures to ensure the sharing in a fair and equitable way of the results of research and development, and of the benefits arising from the commercial and other utilization of biological resources.

2.2.5 Protection of traditional knowledge

Traditional knowledge is also referred to as indigenous knowledge, cultural knowledge, folk ecology, ethnoecology and knowledge of the land. It is defined as a body of knowledge built up by a group of people through generations of living in close contact with nature. It includes a system of classification, a set of observations about the local environment and a system of self-management that governs resource use.

Traditional resources include plants, animals and other material objects that have sacred, ceremonial, heritage or aesthetic and religious qualities as well as economic and social values. An example of a Bahamian traditional resource would be the Queen conch (*Strombus gigas*).

In order to respect, preserve and maintain traditional knowledge, innovations and practices of the Bahamian people, the following steps need to be taken:

- i. Development of legal and other appropriate forms of protection for traditional knowledge, innovations and practices
- ii. Establishment of mechanisms to ensure the effective participation of local communities in decision-making and policy planning
- iii. Protection and encouragement of customary use of biological resources in accordance with traditional cultural practices that are compatible with conservation and sustainable use.
- iv. Promotion of wider application of traditional knowledge, innovations and practices with the approval and involvement of holders of such knowledge
- v. Facilitation of equitable sharing of benefits arising from the utilization of traditional knowledge, innovations and practices
- vi. Encouraging cooperation for the development and use of technologies including traditional technologies in pursuance of conservation and sustainable use of biodiversity.

2.2.6 Intellectual property rights

Intellectual property rights (IPRs) include industrial property law, patent law, trademarks, and plant breeders' rights. Patents, for example, give their owners sole control over inventions for a specified term of years during which they can control commercial use and sale of these inventions. In recent years, patents have been extended to discoveries of information already existing in the natural world such as DNA sequences of organisms, and modified gene sequences of plants and animals.

The trend towards privatization of such biological information has led to the view that such information has monetary value and countries are beginning to seek to regulate access to and sharing of benefits from their biological resources. There is considerable tension globally between existing IPR regimes and countries trying to develop regimes for access and benefit-sharing related to the biological and genetic resources. In order to balance IPR issues with the need to regulate access to and benefits derived from biological and genetic resources in The Bahamas, the following steps need to be taken:

- i. Review of existing legislation related to intellectual property rights in conjunction with development of access and benefit-sharing regulations to ensure cohesion rather than division
- ii. Development of measures to definitively assign rights over traditional knowledge, innovations and practices
- iii. Development or amendment of IPR systems to allocate benefits to traditional knowledge holders and thus provide incentives to conserve and sustainably use biodiversity
- iv. Ensuring IPR systems are well-developed and enforceable to facilitate The Bahamas' ability to negotiate with firms and individuals for sharing of benefits derived from new products and technologies based upon biological and genetic resources found in The Bahamas.

2.3 Policy Principles

2.3.1 Sustainable use of biological resources

Sustainable use is the use of biological resources in a way and at a rate that does not lead to the long-term decline of biodiversity. Sustainable use therefore maintains the potential of biological resources and thus biodiversity to meet the needs and aspirations of present and future generations.

2.3.2 Fair and equitable sharing of benefits

An important part of the biodiversity debate involves access to and sharing of the benefits arising out of the commercial and other utilization of genetic material, such as pharmaceutical products. Most of the world's biodiversity is found in developing countries, which consider it a resource for fueling their economic and social wellbeing. Foreign bio-prospectors have searched for natural substances to develop new commercial products, such drugs. Often, the products would be sold and protected by patents or other intellectual property rights, without fair benefits to the source countries.

When a microorganism, plant, or animal is used for a commercial application, the country from which it came has the right to benefit. Such benefits can include cash, samples of what is collected, the participation or training of national researchers, the transfer of biotechnology equipment and know-how, and shares of any profits from the use of the resources.

Work has begun to translate this concept into reality and there are already examples of benefit-sharing arrangements. At least a dozen countries have established controls over access to their genetic resources, and an equal number of nations are developing such controls. Amongst the examples:

- In 1995, the Philippines required bio-prospectors to get "prior informed consent" from both the government and local peoples.
- Costa Rica's National Institute of Biodiversity (INBIO) signed a historic bioprospecting agreement with a major drug company to receive funds and share in benefits from biological materials that are commercialized.
- Countries of the Andean Pact (Colombia, Ecuador, Peru, Bolivia and Venezuela) have adopted laws and measures to regulate access to their genetic resources. The bio-pro prospector is required to meet certain conditions, such as the submission of duplicate samples of genetic resources collected to a designated institution; including a national institution in the collection of genetic resources; sharing existing information; sharing research results with the competent national authority; assisting in the strengthening of institutional capacities; and sharing specific financial or related benefits.

2.3.3 Precautionary principle

The precautionary principle or precautionary approach states that when there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation. In this context, the proponent of an activity rather than the public should bear the burden of proof. The process of applying the precautionary principle must be open and informed, and must include potentially affected stakeholders. The process must also involve an examination of the full range of alternatives, including "no action".

2.3.4 Stewardship

Stewardship is the concept of responsibly managing all resources available to us for the benefit of present and future generations of people, plants, animals and other organisms. It includes any project, program or educational effort that will preserve, restore or otherwise manage natural, cultural and historical resources for the enjoyment of this and future generation.

2.3.5 Participation in decision-making

This principle is reflected in Principle 10 of the Rio Declaration which states that environmental issues are best handled with the participation of all concerned citizens.

Embodying this principle means ensuring:

- Each individual has appropriate access to information concerning the environment and public health;

- Opportunities to participate in the decision-making process;
- Participation is timely, effective, adequate and formal, and contains information, notification, dialogue, consideration and response; and
- Provision of effective access to judicial and administrative proceedings, including remedy and redress.

2.3.6 Prior informed consent

This principle has become a part of many multilateral environmental agreements. Prior informed consent involves the provision of detailed information to an importing country regarding a product or organism slated to be imported. Such information which is usually prescribed in regulations or application forms, enables the importing country to assess risks associated with the product or organism and make an informed decision on whether it wishes to import. Under the Cartagena Protocol on Biosafety, the prior informed consent principle is embodied in the Advance Informed Agreement (AIA) procedure. Other international agreements that incorporate this principle include the Stockholm Convention on Persistent Organic Pollutants (POPs) and the Basel Convention on Transboundary Movement of Hazardous Wastes.

2.3.7 Public awareness, education and outreach

This principle cuts across all principles and issues outlined in this strategy. Effective implementation of any policy or strategy must involve public awareness, education and outreach. This must occur at all levels of society from Cabinet Ministers to kindergarten students. An aware and educated public can foster the political will and changes in attitudes and behaviours that are vital to implementation of any comprehensive policy or strategy.

Mechanisms that aid in implementation of this principle include use of various media (e.g. radio, television, newspaper) and educational tools and materials at appropriate levels.

2.3.8 Sustainability

Sustainability is an economic, social, and ecological concept. It is intended to be a means of configuring civilization and human activity so that society and its members are able to meet their needs and express their greatest potential in the present, while preserving biodiversity and natural ecosystems, and planning and acting for the ability to maintain these ideals indefinitely. Sustainability is providing for the best for people and the environment both now and in the indefinite future. Sustainability affects every level of organization, from the local neighborhood to the entire globe. It relates to ensuring this Strategy can be implemented and systems under it effectively maintained through planning and the provision of necessary financial, infrastructural and human resources

2.4 National Biosecurity Policy

The Government of the Commonwealth of The Bahamas,

Recognizing its obligation as a Party to the Convention on Biological Diversity and the Cartagena Protocol on Biosafety,

Recognizing the need to develop and implement biosecurity systems for safeguarding the economy and environment, human health, and plants and animals of The Bahamas, from the risks of introduced pests, diseases and other threats,

Noting that the natural barriers to the movement of species, including pests and diseases, that provided the isolation essential for the evolution of unique and endemic species, have become increasingly ineffective,

Acknowledging that globalization and the emphasis of free trade provide even greater opportunities than hitherto for species to be introduced, either deliberately or accidentally, to new habitats, with the opportunity to become threats to biosecurity and biodiversity,

Aware that the impacts of species that threaten biodiversity are immense, insidious and often irreversible and that the costs due to their damage on a global scale are enormous, both in ecological and economic terms, and in terms of human welfare,

Recognizing that The Bahamas relies heavily on its natural resources, including biological and genetic resources, and has an open economy heavily dependent on imports,

Recognizing also that there are direct economic costs of control of alien animals, plants, diseases and pests,

Noting that introduced alien diseases and parasites of humankind not only result in suffering and perhaps death, but also have economic costs of medical treatments and the loss of productivity, and

Determined to conserve and sustainably manage the biological diversity of The Bahamas for the benefit of present and future Bahamians,

Has decided to adopt the following Policy:

To enact legislation and regulation for the control and eradication of threats to ecosystems, habitats, endemic species and the human health and welfare of The Bahamas;

To prepare and implement a National Biosecurity Strategy for The Bahamas which addresses the priorities and systems for achieving biosecurity and conservation and sustainable use of biodiversity;

To facilitate and manage research that will aid in development of biosecurity systems and conservation and management of biodiversity;

To prevent the introduction of alien pests and diseases into The Bahamas by regulatory and other mechanisms;

To promote, undertake and facilitate the reestablishment of native species, where appropriate, and the restoration of degraded habitats;

To promote public education, awareness and outreach on biosecurity and biodiversity at all levels of society by appropriate methods;

To promote international and regional cooperation that would aid in the fulfillment of this policy and implementation of the National Biosecurity Strategy;

To mandate such cooperation between Government Ministries, Departments and other Agencies including Non-Governmental Organizations and the private sector, as necessary, to implement this policy and to carry out the National Biosecurity Strategy; and

To promote and facilitate such institutional and infrastructural development as is necessary to enable Ministries, Departments and other Agencies to implement this policy and the National Biosecurity Strategy.

3.0 Why is biosecurity important for The Bahamas?

Just one new serious pest or disease could significantly threaten our entire future as a nation. New predators can catastrophically alter or even wipe out unique habitat and species that attract tourists and provide stock for economic activities. New diseases and pests can also damage agricultural production and affect trade in international markets. The economic consequences of failing to protect The Bahamas and its biological resources are dire. Failure can affect our jobs, our health and our lifestyle.

3.1 Priorities in biosecurity

Priority issues that necessitate the need for the establishment of effective biosecurity systems or are an important part of such systems are:

- i. Human health
- ii. Animal health – inclusive of native, naturalized and commercially important species
- iii. Plant protection - inclusive of native, naturalized and commercially important species
- iv. Border control
- v. Capacity building – including diagnostics
- vi. Risk analysis, monitoring/surveillance and management – inclusive of post-monitoring and confinement management with respect to GM research; ensure we address those species that have already been introduced but would not have undergone risk analysis prior.
- vii. Enforcement

3.2 Threats to biosecurity

Threats to biosecurity include:

- i. Bioterrorism
- ii. Trade (open ports) – including international mail

- iii. Travel/tourism
- iv. Illegal immigrants- as vectors for pests and diseases
- v. Poaching
- vi. Invasive species and their pathways – include biological control and problems associated with these
- vii. Diseases and pests
- viii. Migratory species- as vectors of diseases and invasives
- ix. Climate change
- x. Natural and human-induced disasters – including bioremediation methods for clean-up

3.3 Commercial and economic opportunities arising from biosecurity

Ensuring biosecurity systems are effectively managed can give rise to commercial and economic opportunities for The Bahamas. These include:

- i. Export of animals and plants – due to few diseases
- ii. Increased agricultural potential
- iii. Pharmaceuticals
- iv. Ecotourism
- v. Creation of jobs through biosecurity – e.g. specialized services associated with dealing with ship ballast and other waste

4.0 Regulating for biosecurity

Legislation and regulations related to biosecurity can be found in international and national law. The instruments outlined below are just a representation of legislation that does exist and are by no means exhaustive.

Section 4.1 International Law and agreements

4.1.1 Convention on Biological Diversity

In 1992, the largest-ever meeting of world leaders took place at the United Nations Conference on Environment and Development in Rio de Janeiro, Brazil. An historic set of agreements was signed at the "Earth Summit", including two binding agreements, the Convention on Climate Change, which targets industrial and other emissions of greenhouse gases such as carbon dioxide, and the Convention on Biological Diversity (CBD), the first global agreement on the conservation and sustainable use of biological diversity. The Commonwealth of The Bahamas was among the first of the small island developing states to become a Party to the Convention on September 2nd 1993.

The Convention on Biological Diversity is probably the most all-encompassing international agreement ever adopted. It seeks to conserve the diversity of life on Earth at all levels - genetic, population, species, habitat, and ecosystem - and to ensure that this diversity continues to maintain the life support systems of the biosphere overall. The Convention has three main goals:

- The conservation of biodiversity,
- Sustainable use of the components of biodiversity, and

- Sharing the benefits arising from the commercial and other utilization of genetic resources in a fair and equitable way

The Convention covers numerous issues related to attainment of its three main goals. The Conference of the Parties to the Convention have initiated work to achieve these goals through thematic work programs in the following areas of biodiversity – marine and coastal, agricultural, forest, inland waters, dry and sub-humid lands, and mountains. Of specific relevance to The Bahamas is the work underway to develop a program of work on island biodiversity.

There are also a number of key cross-cutting issues of relevance to all thematic areas. Essentially these correspond to the issues addressed in the Convention's substantive provisions in Articles 6-20. For example, work has been initiated on biosafety; access to genetic resources; traditional knowledge, innovations and practices (Article 8(j)); intellectual property rights; indicators; taxonomy; public education and awareness; incentives; and invasive alien species.

4.1.2 The Cartagena Protocol on Biosafety

In some countries, genetically altered agricultural products have been sold without much debate, while in others, there have been vocal protests against their use, particularly when they are sold without being identified as genetically modified. In response to these concerns, governments negotiated the Cartagena Protocol to address the potential risks posed by cross-border trade and accidental releases of LMOs. The Conference of the Parties to the Convention on Biological Diversity adopted the Cartagena Protocol on Biosafety as a supplementary agreement to the Convention on 29 January 2000. The Protocol seeks to protect biological diversity from the potential risks posed by Living Modified Organisms resulting from modern biotechnology. It establishes an advance informed agreement (AIA) 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.

The Protocol contains reference to the precautionary approach and reaffirms the precaution language in Principle 15 of the Rio Declaration on Environment and Development. The Protocol allows governments to signal whether or not they are willing to accept imports of agricultural commodities that include LMOs by communicating their decision to the world community via a Biosafety Clearing House, a mechanism set up to facilitate the exchange of information on and experience with LMOs. In addition, commodities that may contain LMOs are to be clearly labeled as such when being exported.

Stricter Advanced Informed Agreement procedures apply to seeds, live fish, and other LMOs that are to be intentionally introduced into the environment. In these cases, the exporter must provide detailed information to each importing country in advance of the first shipment, and the importer must then authorize the shipment. The aim is to ensure that recipient countries have both the opportunity and the capacity to assess risks involving the products of modern biotechnology.

4.1.3 WTO

The World Trade Organization (WTO) is the only global international organization dealing with the rules of trade between nations. The essential purpose of the WTO is to liberalize markets, by removing unnecessary, discriminatory and protectionist barriers to free trade.

The Cartagena Protocol and the WTO Agreements overlap, as the both contain rules that govern international trade in LMOs. The Convention on Biological Diversity Parties negotiating the Protocol, most of which were also WTO Members, were aware of this overlap and appear to have sought to design the Protocol in a way that would avoid conflicts with Parties' existing commitments under the WTO.

The WTO Agreement on the Application of Sanitary and Phytosanitary (SPS) Measures (SPMs) states that the principles of the SPS Agreement applies if GMOs in international trade pose a threat to human, animal and plant life or health in the importing country. Under this agreement, SPMs must be based on assessment of risks to human, animal and plant life and health. Risk assessment must take into account:

- Available scientific evidence
- Relevant economic factors including:-
 - Potential damage to production or loss of sales
 - Cost of control or eradication
 - Cost effectiveness of alternative approaches to limit the risks
- Stakeholder participation

The Bahamas is considering becoming a member to the WTO and will have to address the overlapping issue of trade in LMOs. Specifically, what kinds of trade-related measures are required authorized or justified under the Protocol, how will the WTO system take into account the Protocol and which WTO rules are relevant to risk management and assessment under the Protocol.

4.1.4 IMO – Ship Ballast, Hazardous Waste, Dumping at Sea

The International Maritime Organization is a specialized agency of the United Nations, which is responsible for measures to improve the safety of international shipping and to prevent marine pollution from ships. It recently developed agreement on ship ballast directly relates to biosecurity as it seeks to prevent the spread of invasive species through ship ballast being dumped in waters of countries that are not the country of origin of the ship. The ballast can contain organisms or their larval stages that can become a threat to native biodiversity. It also is involved in legal matters, including liability and compensation issues and the facilitation of international maritime traffic. It was established by means of a Convention adopted under the auspices of the United Nations in Geneva on 17 March 1948 and met for the first time in January 1959. It currently has 163 Member States.

4.1.5 Basel Convention

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal was adopted in 1989 and entered into force on 5 May 1992.

The Convention is the response of the international community to the problems caused by the annual worldwide production of hundreds of millions of tons of wastes. These wastes are hazardous to people or the environment because they are toxic, poisonous, explosive, corrosive, flammable, eco-toxic, or infectious. The Bahamas acceded to the Basel Convention on 12 August, 1992.

During its first decade (1989-1999), the Convention was principally devoted to setting up a framework for controlling the “transboundary” movements of hazardous wastes, that is, the movement of hazardous wastes across international frontiers. A central goal of the Basel Convention is “environmentally sound management” (ESM), the aim of which is to protect human health and the environment by minimizing hazardous waste production whenever possible. ESM means addressing the issue through an “integrated life-cycle approach”, which involves strong controls from the generation of a hazardous waste to its storage, transport, treatment, reuse, recycling, recovery and final disposal. A control system, based on prior written notification, was also put into place.

4.1.6 CITES Convention

The Convention on International Trade in Endangered Species (CITES) of Wild Fauna and Flora, entered into force on 1 July 1975 and now has a membership of 152 countries. These countries act by banning commercial international trade in an agreed list of endangered species and by regulating and monitoring trade in others that might become endangered thus facilitating conservation and sustainable use of biodiversity.

4.1.7 Cotonou Agreement

The Cotonou Agreement is the principal framework for co-operation between the European Union and 77 countries in the African, Caribbean and Pacific (ACP) group. Signed in July 2000, the Cotonou Agreement succeeded the successive Lomé Conventions that originated in 1975. The framework agreement covers many aspects of co-operation, including the EC's aid to ACP countries, and the trade arrangements between the EU and those countries.

The central objective of the co-operation is to reduce and eventually eradicate poverty. The Agreement also recognises non-state actors as legitimate partners in the co-operation, an innovation that has been widely proclaimed as an important departure from the past.

4.1.8 International Plant Protection Convention (IPPC)

The International Plant Protection Convention is a multilateral treaty deposited with the Food and Agricultural Organization (FAO). Its purpose is to secure common and effective action to prevent the spread and introduction of pests of plants and plant products, and to promote measures for their control. The IPPC provides a framework for international cooperation which extends through to trade by recognition through the WTO-SPS Agreement.

It also provides a framework for harmonisation of phytosanitary measures by elaborating international standards and advocating the creation or management of national plant

protection agencies. International standards on phytosanitary measures (ISPMs) of relevance developed under the IPPC include:

- Guidelines for Pest Risk analysis on:-
 - How to analyse a risk posed by a pest
 - Assessment of that pest risk
 - Management of the pest risk

The IPPC also specifies that phytosanitary measures:

- Must meet minimum requirements
- Be non-discriminatory
- Be technically justified
- Must result in minimum disruption to international movement of goods and services, i.e. least trade-restrictive measures must apply

4.1.9 Codex Alimentarius

The Codex Alimentarius is a non-binding Code developed by the Codex Alimentarius Commission, an international working group functioning under the FAO and the World Health Organization (WHO). The Commission sets standards for food safety, quality and labeling. This body is working to draft principles for the risk analysis of foods derived from modern biotechnology. These principles will:

- Provide a framework for risk analysis on the safety and nutritional characteristics of foods derived from modern biotechnology
- Address food safety, safety analysis, and cross-sectoral coordination
- Address risk assessment, management and communication.

The draft principles do not address consumer protection.

4.2 Proposed national legislation, regulations and guidelines

4.2.1 Draft Biosecurity Act

Introduced alien plants, animals and disease organisms, pose serious risks to biological diversity and natural habitats, to agriculture and horticulture, to human health, and to the environment in general, in The Bahamas. The draft Biosecurity Act would address control, eradication and management of such organisms that threaten biosecurity. Components of this draft legislation would include the following:

- i. The term "unwanted organisms" to refer to:
 - Any species, subspecies, taxa below the subspecies level, variety, strain, cultivar or clone not native to, nor naturalized, in The Bahamas. Such *alien* species are considered to be *invasive* when they threaten the abundance and distribution of native and naturalized fauna and flora, and diminish or corrupt ecosystem functions. The term *new alien organisms*, refers to any alien species coming into The Bahamas for the first time, or a new species developed through genetic engineering (genetically modified organisms (GMOs) or living modified organisms (LMOs)).
 - Any species, subspecies, taxa below the subspecies level, variety, strain, cultivar or clone not native to, nor naturalized, in The Bahamas but recognized as

established and either presently posing a threat, or potentially posing a threat, to native and naturalized fauna and flora and to ecosystem function.

- Any species, subspecies, taxa below the subspecies level, variety, strain, or cultivar or clone that have been eradicated from The Bahamas, but where there is a possibility of reintroduction or reinvasion.
- Living modified organisms (LMOs) created by modern biotechnology. LMOs possess characteristics that would not occur in that species by natural selection, nor by conventional means of hybridization, by the incorporation into the host genome of genes from organisms that may well only occur outside the species, genus, family, and even the Kingdom.

Unwanted organisms may include animals (mammals, birds, reptiles, etc.), plants, arthropods (insects, spiders and kin), fungi, bacteria, viruses and mycoplasmas.

- ii. The purpose of the Biosecurity Act is to provide for:
 - The eradication or effective management of *unwanted organisms* already in the country. This will necessitate reliable information on the distribution of such organisms, a prioritization based on sound science, a review of the control options available, and costing of these options within a time frame.
 - The regulation of the entry of all alien organisms into The Bahamas, by a system of permits based on environmental risk analyses. The regulations must also provide for the control of "risk goods", which are defined as any organism, organic material, other thing or substance, that (by reason of its nature, origin, or other relevant factors) may reasonably be suspected to constitute, harbour, or contain, an organism that may cause harm to natural habitats or to human and animal health; or that may interfere with the diagnosis, management, or treatment, of unwanted alien organisms.
 - The regulations must allow for the legal introduction of biological control agents to control invasive animals, invasive plants or vectors of diseases or pests of humans, animals and of useful plants. Such introductions must be carried out according to internationally recognized guidelines and protocols, and conditions of release and management may be stipulated.
 - Because of the archipelagic nature of The Bahamas, the opportunity exists to declare and to manage and maintain certain islands free of invasive alien species and/or of genetically modified organisms (GMOs) (see Annex V).
- iii. The Act must establish an administrative framework for implementation and ensure optimal use of current manpower, provide for inter-governmental-agency collaboration, the involvement of non- governmental organizations, and public consultation and involvement at both the planning and implementation stages.
- iv. The eradication of established unwanted organisms is generally expensive and often long-term, and needs to be reviewed on an island-by-island and species by species basis. This review must include economic costs, including not only removal but also disposal.

4.2.2 Regulations for management of unwanted organisms (including invasive species and other species that threaten biodiversity)

Regulations must address the management of the risks to indigenous biodiversity and habitats, and to important introduced organisms (e.g., food crops and ornamentals), from both intentional and unintentional introductions of unwanted organisms, and the spread of such organisms within The Bahamas.

Regulations components will include:

- ❑ The creation of a decision-making and risk analysis management framework and capacity, to critically review all proposals for the introduction of alien organisms, and where introduction is allowed, to set conditions and to monitor compliance.
- ❑ The authority to, after careful analysis of all the data, declare an island to be maintained free of all unwanted organisms, including LMOs, after public consultation with the stakeholders.
- ❑ Measures to control the introduction and establishment of new alien organisms (including living modified organisms) by effective border control, surveillance and emergency responses for the exclusion and eradication of unwanted organisms.
- ❑ Embodiment of the precautionary principle, one of the cornerstones of the Convention on Biological Diversity (CBD). This principle should be used as a guide to decision making in the face of uncertainty. The precautionary principle is ineffective when used as a last resort: this often results in bans or moratoriums.
- ❑ The authority to exercise the legal concept of eminent domain where this is justified, to be determined on a case-by-case basis.
- ❑ The authority to develop and implement a strategy to maintain and develop coordinated expertise and technical capacity within relevant agencies to enable efficient and effective emergency response actions to unwanted organisms.
- ❑ Periodic review of whether biosecurity management is being effectively coordinated with respect to indigenous biodiversity and habitats.
- ❑ Establishment of effective methods of assessing and managing risks from unwanted organisms to indigenous biodiversity in conjunction with those methods for introduced species.
- ❑ Assessment of the probability and likely scale of adverse effects on indigenous biodiversity and habitats from potential introductions of organisms including those that are not presently in The Bahamas, but may be accidentally introduced through international trade and travel, and that are already in The Bahamas but which have yet not become widespread.
- ❑ The authority to develop appropriate risk analysis and management procedures between government agencies to ensure consistent approaches to assessing the ecological, social and economic risks posed by pests, weeds and diseases, including the definition of agreed levels of biosecurity risk.
- ❑ The authority to develop and implement indicators and strategies for assessing the effectiveness of biosecurity management in protecting indigenous biodiversity and habitats and important deliberately introduced species.

- ❑ Measures to educate travelers, importers, nurserymen, landscapers and contractors about the risks posed to native biodiversity by the illegal and accidental importation of unwanted organisms.
- ❑ Measures to ensure that the development of import health standards incorporates a risk analysis of threats to native biodiversity and habitats.
- ❑ The ability to continue to improve an integrated border control system with the Customs Department, the Royal Bahamas Police Force and the Royal Bahamas Defense Force to minimize the risks to biosecurity from accidental or illegal importation of unwanted organisms.
- ❑ Minimization of the loss of indigenous biodiversity through illegal trade.
- ❑ Provide for liability and redress, including restoration and compensation, for damage to biodiversity.
- ❑ Development of mechanisms to make available to importing countries any relevant information that The Bahamas has on the potential invasiveness of species being exported.
- ❑ Management of the introduction of new organisms (including living modified organisms) so as to avoid adverse impacts the native biodiversity and habitats of important introduced species.
- ❑ Development and application of an integrated risk assessment framework that can be consistently applied for assessing the risks posed to biodiversity by the importation of new organisms (including living modified organisms).
- ❑ Eradication or contained introduction of organisms that have the potential to become serious threats to the native biodiversity and habitats of The Bahamas, and commercially important introduced species.
- ❑ Development and implementation of procedures to prevent the escape from captivity of imported organisms with the potential to become unwanted organisms.
- ❑ Raising of public awareness about introduced species that pose a potential threat to indigenous biodiversity and habitats.

4.2.3 Regulations for control and management of GMOs

The Cartagena Protocol outlines regulatory and administrative requirements related to LMOs. Components of these regulations will address GMOs and would include:

- Designation of National Focal Point and Competent National Authorities for control and management of GMOs.
- Development and maintenance of national Biosafety Clearing House (nBCH).
- Development and maintenance of administrative systems for ensuring procedures are followed related to control and management of GMOs, including advanced informed agreement, risk assessment, notifications, information dissemination and processing of applications.
- Establishment of list of detailed information to be provided in applications and risk assessments related to GMOs.
- Establishment of measures to prevent the unintentional transboundary movements of GMOs.
- Establishment of labeling requirements related to GMOs intended for food, feed or in processing.

- Provide for the designation of confidential information and details what constitutes such information.
- Outline the process for public participation in decision-making including timeframes for notification, comment, dialogue and response.
- Ensuring transparency in the decision-making process.

4.2.4 Regulations for conservation and sustainable use of biological resources

The Convention on Biological Diversity establishes an inter-connected web of obligations on countries to conserve biological diversity, to use the components of biodiversity in a sustainable way, and to share the benefits arising out of the use of genetic resources. Components of these regulations will include:

- Measures to achieve in situ conservation including establishment of protected areas, and protection of ecosystems, habitats and viable populations.
- Measures to promote environmentally sound and sustainable development in areas adjacent to protected areas with a view to enhancing protection of these areas, including the authority to establish buffer zones with specified distances.
- The authority to develop and implement plans and management strategies for the rehabilitation and restoration of degraded ecosystems and habitats and recovery of threatened species.
- The authority to institute measures to manage and mitigate the processes and categories of activities that threaten biosecurity and biodiversity.
- The authority to develop measures for ex situ conservation and to regulate and manage collection of biological resources from natural habitats for ex situ conservation purposes.
- Ensure action by Government agencies to integrate biosecurity and biodiversity in national plans, programs and policies and in national decision-making.
- Adoption of measures relating to use of biological resources to avoid or minimize adverse impacts on biodiversity.
- Support local communities to develop and implement remedial action in degraded areas where biodiversity has been reduced.
- Charge all Government agencies to cooperate between themselves and also with the private sector and NGO community to develop methods for sustainable use of biological resources.
- Provide for establishment and maintenance of programs for scientific and technical education and training in measures for the identification, conservation and sustainable use of biodiversity.
- Promote and facilitate research which contributes to biodiversity conservation and sustainable use.
- Measures to promote and encourage understanding of the importance of biodiversity and development of educational tools and programs to facilitate public education and awareness building.
- Adoption of economically and socially sound measures that act as incentives for biodiversity conservation and sustainable use.
- Development of emergency response mechanisms to ensure conservation of biodiversity during activities or events that present a grave and imminent danger to biodiversity.

- The authority to develop and implement procedures requiring environmental impact assessments of proposed projects, programs and policies that are likely to have adverse effects on biosecurity and biodiversity with a view to avoiding or minimizing such effects.
- Provide for liability and redress, including restoration and compensation, for damage to biodiversity.

4.2.5 Access and benefit-sharing regulations (inclusive of regulating research utilizing biological and genetic resources)

Components of these regulations will include:

- The authority to develop procedures for access to biological resources which may include prior informed consent and permitting fees.
- Measures to ensure benefits from commercial or other utilization of biological and genetic resources from The Bahamas are shared with this country and its people through mechanisms such as royalties, technology transfer, information sharing, training and capacity building opportunities and the like.

4.2.6 Regulations for the protection of traditional knowledge

Traditional knowledge has often been used in recent years by modern industry to develop new products and techniques without the involvement and consent of the holders of such knowledge, who have also received none of the resulting benefits. Components of these regulations will include:

- The mandate to establish mechanisms to ensure the effective participation of local communities in decision-making and policy planning;
- A charge to respect, preserve and maintain traditional knowledge relevant to the conservation and sustainable use of biological diversity;
- Mechanisms to promote wider application of traditional knowledge with the approval and involvement of the indigenous and local communities concerned; and
- Mechanisms to ensure the equitable sharing of the benefits arising from the utilization of such traditional knowledge, which may be achieved through establishment of prior informed consent, permitting fees, royalties and the like with the revenue being directly applied to protection and preservation of traditional knowledge.

4.2.7 Amending current legislation and regulations

I. Under the Agriculture and Fisheries Act (Chapter 223) the Minister may make rules for all or any of the following purposes:

- (a) to define areas hereinafter called “*protected areas*” within which it shall be unlawful for any person except a licensee especially licensed in that behalf to plant, propagate, take, uproot or destroy any species of plant;
- (b) the issue, amendment, transfer or revocation of licenses for any purpose of this Act or any rules made thereunder and the terms and conditions upon which such license may be issued, amended, transferred or revoked;
- (c) to conserve, uproot, or destroy any specified kind of plant;

- (d) to provide for the examination, seizure, forfeiture and disposal of any articles taken, captured, destroyed or killed contrary to the provisions of a licence or any of the rules made under this Act”;

Clause 4.(c) would seem to adequately provide for the control and/or the eradication of invasive alien plant species.

II. Under the Plants Protection Act (Chapter 231) no plants whatsoever, nor the packages thereof, shall be imported into The Bahamas except under and subject to the rules.

The Minister may by order

- (a) absolutely or conditionally prohibit the importation directly or indirectly from any country or place named in the Order of any plants, or any article packed therewith, or any package which in the opinion of the Minister are or are likely to be a means of introducing a plant disease into The Bahamas.
- (b) from time to time, when deemed necessary, declare any district or area within The Bahamas or any place within any such area, to be a place infected or suspected of being infected with a plant disease;

Emphasis in the Plant Protection Act appears to be on plant diseases rather than on plants *per se*, and invasive plants are nowhere mentioned.

III. Under the Plants Protection Rules, no plants whatsoever as defined by the Act nor the packages that contain the same as defined by the Act shall be imported into The Bahamas except under the following conditions:-

- (a) all such plants and packages shall be landed at the Port of Nassau, except when permission has been obtained from the Minister to land the same at any other port or place in The Bahamas, upon such conditions as to landing and otherwise, as may be determined by the Minister with reference to the same;
- (b) all such plants and packages shall be delivered up by the importer to the Comptroller of Customs, who shall cause them to be conveyed to such place as shall be determined by the Minister, and the Comptroller may also for such purpose take charge of any such plants and packages immediately upon their arrival in The Bahamas, and prior to the delivery thereof to the importer. Upon such delivery the Comptroller shall give to the importer a receipt showing the time and date of such delivery.
- (c) a permit issued by the Minister authorizing the importation of such plants and packages into The Bahamas is obtained.

The rules refers to the need for a phytosanitary certificate, but allows for the inspection of plants (and packages) if no such certificate is produced, allows for fumigation or disinfection, etc., if the Minister deems it necessary, allows for seizure, forfeiture and destruction, refers to issuance of certificate setting forth that the plants and package have been fumigated, disinfected, etc., requires owner of occupiers of land within a district or area declared or suspected of being infected with a plant disease to report the presence such disease.

The rules also state that no plant, tree, shrub, herb or vegetable nor the cuttings, bulbs, seeds, berries or grafts thereof, nor the fruit or products thereof, nor the root, trunk, stem,

branch or leaf of any plant, tree, shrub or herb, nor the whole or any part of any growing, dying or dead plant (including emptied pods, husks or skins), shall be removed, carried coastwise or waterborne to be so carried from the Island of New Providence to any Out Island of The Bahamas except with the written permission of an officer or servant of the Ministry duly authorized by the Minister to give such permission.

The Rules do not adequately address the procedures to be adopted in issuing permits for importation of plants. There is no “clean” and/or “dirty” list: There is no provision in either the Plant Protection Act or the Rules for Pest Risk Assessment or Environmental Impact Assessment.

5.0 Mechanisms for risk assessment and management

Risk Assessment involves:

- Identifying new or altered hazards
- Identifying changes relevant to human health
- Safety assessment which should account for unintended and intended effects (goal is to determine if the new food is as safe as, and no less nutritious than the conventional counterpart it is being compared with)

Risk Management involves:

- Measures for –
 - food labeling
 - conditions on marketing approvals
 - post marketing monitoring
 - development of techniques to detect or identify foods derived from modern technology
- Making an account for uncertainties identified in risk assessment
- Managing uncertainties

Risk communication processes should be:

- Transparent
- Open to public scrutiny

Potential risks that may need to be considered in the evaluation of an application for the introduction of a GM food or technology to The Bahamas may include:

- Modifications that have been made to this product compared to a conventional variety
- Impacts on human health
 - Nutritional viability
 - Allergens
- Impacts on environment
 - Impacts on marine environment
 - Containment measures
 - Growth rate/reproduction
 - Processing and disposal of waste

The risk analysis process for the evaluation of an application for the introduction of a GM food or technology to The Bahamas may include the following steps:

- Selection of an expert committee to conduct Risk Assessment
- Review of the existing data on the GMO
 - Evaluation of data originating from different regions
 - Consider the length of study/the need for additional study
 - Consider the point of origin of the organism – its native environment in comparison to our own
- Analysis of impacts on environment and human health
- Audit of management and monitoring requirements
- Public review of Risk Assessment and/or Environmental Impact Assessment (only after approval of the document by relevant competent national authority)

Pest risk assessment is the evaluation of the probability of the introduction and spread of a pest and the associated potential economic consequences.

6.0 Public participation

Public participation is a process of encouraging all interested and affected parties to contribute to solving problems, setting priorities, designing strategies, increasing ownership and taking responsibility for action. It is both a tool for development as a way of reaching development aims, and a development goal in its own right.

Participation in the National Biosecurity Strategy aims to encourage the public and interested stakeholders to be aware of, and contribute to, the research development, implementation and monitoring of this framework.

How does it work?

Participation works through using relevant tools and processes that are designed to encourage consultation, debate and discussion and elicit contributions from the public around certain key issues, such as biosecurity.

There are different levels of participation initiatives which can work independently and together:

1. Citizen led initiatives
2. Joint decision-making and prioritizing
3. Consultation
4. Information sharing

Investing in public education and awareness

Meeting the objectives of this Strategy will require changes in behaviour at all levels of society, from the individual to the Cabinet. These will largely be brought about by changes in attitude, which will require greatly increased investments in public education and awareness. An increased awareness of the importance of biodiversity and biosecurity will be necessary in order to generate the levels of public opinion favourable to the necessary policy and behavioural changes, which in turn will reinforce pressure on

decision-makers to demonstrate the political will to push through change at governmental and intergovernmental levels.

In developing the educational and public awareness programs called for under the National Biosecurity Strategy, agencies and individuals involved in its implementation will need to identify different target audiences, the specific educational and informational needs of these, and develop appropriately focused materials. All avenues need to be explored: formal education systems, mass media, informal education, and specialist training. The biodiversity and biosafety clearing-house mechanisms should become an important tool for education and public awareness, particularly through the development of national clearing houses providing access to national biodiversity and biosafety information in a national context.

Increasing stakeholder involvement in decision-making

Persons at lower economic levels are those most immediately and severely affected by environmental degradation. They are also often expected to bear much of the cost of maintaining biodiversity, for example in the form of foregone benefits of land conversion when areas are set aside for the protection of unique or threatened ecosystems or species. Unless they are fully involved in decision-making, it is unlikely that long-term solutions to the problem of biodiversity loss including development of biosecurity systems can be found. In developing mechanisms to ensure such involvement, it is vital that issues of gender and social structure are properly addressed.

The National Coordinating Committee has recognized the central role that full stakeholder participation will play in the successful implementation of the various aspects of the National Biosecurity Strategy. Organizations representing the private sector, in particular those sectors that use biological resources or have an impact on biodiversity, must be fully engaged in efforts to implement this Strategy.

Partnership with Local Government Councils

The National Coordinating Committee agrees there is a need to establish tangible, ongoing and effective arrangements between Central Government and Local Councils at a number of levels. The major issue is ensuring formal inclusion of Local Councils in the strategic decisions responding to an incursion, or handling the new invader within pest management.

A Local Council and Central Government forum needs to be formed to address the issues of pest and disease management with a national perspective. The forum needs to set clear and transparent boundaries, for management of pests and diseases between those boundaries, and to facilitate a combined effort to manage pests. The designated Coordinating Body must be part of such an arrangement.

7.0 The BCH and development of the National Biosafety Clearing House (nBCH)

One of the future activities remaining to fulfill the Cartagena Protocol is the development of a national website to link to the BCH, which is currently in its pilot phase.

The Biosafety Clearing-House (BCH) [<http://bch.biodiv.org/>] is an information exchange mechanism established by the Cartagena Protocol on Biosafety to assist Parties to implement its provisions and to facilitate sharing of information on, and experience with, living modified organisms (LMOs). The BCH is essential for the successful implementation of the Protocol. It assists Parties and other stakeholders in different ways in the implementation of the Protocol.

The Clearing-House concept

The term clearing-house originally referred to a financial establishment where cheques and bills are exchanged among members. Today, its meaning has been extended to include *any agency that brings together seekers and providers of goods, services or information, thus matching demand with supply*. The BCH fulfills this role by facilitating exchange of biosafety information among Governments and other stakeholders. It provides a dynamic platform, where information is registered and where it can be easily searched and retrieved.

Information in the BCH is owned and updated by the users themselves, thus ensuring its timeliness and accuracy. By allowing easy and open access to key information, the BCH fosters greater transparency in the implementation of the Protocol and this facilitates effective participation of the public and civil society in the decision-making process. The BCH also facilitates scientific and technical cooperation between Parties and other relevant stakeholders,

For industry and other stakeholders the BCH allows easy access to information vital to their activities, including details of the national contacts, relevant laws and regulations governing LMO activities and the decisions and declarations made by Parties, especially with regard to transboundary movements.

The pilot phase of the BCH consists of a Central Portal with linkages to a distributed network of national, regional and international nodes/databases. The Central Portal is the gateway to all sections of the BCH, including the search pages, the Management Centre where information is entered or updated, links to other relevant websites and the toolkit that helps users to understand how to use the BCH. It functions essentially as an interactive site map to assist in the navigation and use of the BCH.

The BCH functions like a ‘central information marketplace’ where the providers and users of biosafety information interact and exchange that information in a transparent manner. To fulfill its role, the BCH has been designed to make finding and providing information as clear and intuitive as possible, for example by providing common formats and standardised terminology. In addition, the BCH website is available in all six UN languages.

Potential users of the Biosafety Clearing-House are:

- Governments
- Industry
- Other stakeholders

Different stakeholders can use the BCH to find and to provide information on national contacts, national laws and decisions and declarations, as well as other information and resources relevant to the implementation of the Protocol, such as information on capacity-building, the roster of experts and links to other websites in particular other international biosafety-information exchange mechanisms. Governments that are not Parties to the Protocol are also encouraged to contribute appropriate information to the BCH (Article 24.2). All information available in the BCH is considered as non-confidential.

8.0 Ensuring the strategy is implemented

Guidelines for implementation, includes developing target dates and/or logframes as well as monitoring and indicators for success. Terms of reference for the coordinating body/mechanism must be outlined. Ensuring strategy implementation also involves recognition of the importance of political will or will at the highest level to make this happen and sustain it.

8.1 Coordinating body/lead agency

A Coordinating Body for Biosecurity (CBB) should be established under the Biosecurity Act, to have primary responsibility for the control, testing, release, importation, containment and development of new or alien organisms. Every application to import, develop, release or field test new or alien organisms must be considered by the CBB, which will give public notification, of the following:

- Applications to import or manufacture for release any new or alien organism;
- Applications to release any new organism/GMO from containment;
- Applications to field test a genetically modified organism or crop; and
- Applications to import, release or use, a new organism in an emergency.

Applications to import into containment or develop in containment any new organism, or applications to develop any genetically modified organism in containment, will be notified by the CBB if there is likely to be significant public interest. Any person may make a submission to the CBB on any publicly notified applications. Hearings will be held on an application if the CBB considers it necessary, the applicant has requested a hearing, or a submitter wishes to be heard.

Existing institutions and mechanisms that may constitute a part of or evolve into the CBB may include:

- The Department of Agriculture which controls permitting for import of plant and animal species and regulates movement of organisms in cooperation with Bahamas Customs Department.
- Department of Agriculture, Department of Fisheries and Department of Environmental Health Services which are all involved with ensuring food safety.
- Ministry of Health and Department of Environmental Health Services which are involved with public health and control of disease-causing organisms.
- The BEST Commission which is the focal point agency for the Convention on Biological Diversity and the Cartagena Protocol as well as the National Executing

Agency for the NBF project to ensure the country is progressing in fulfillment of its obligations under the Convention and Protocol.

There is also a bill to create a Department of Environment Protection and Planning (DEPP) before Cabinet. It is suggested that this Department could also be the lead agency for all matters of biosecurity.

The designation requirements under the Cartagena Protocol may be fulfilled as follows:

- Cartagena Protocol Focal Point – BEST/DEPP
- Biosafety Clearing House Focal Point – Secretariat for Biosecurity Advisory Board (BEST/DEPP)
- Competent National Authority(s) – BEST/DEPP, Department of Agriculture, Department of Fisheries, Ministry of Health, Department of Environmental Health Services
- Final decision regarding applications – Director(DEPP), Undersecretary(BEST)

It is suggested there also be a Biosecurity Advisory Board, which will make recommendations to the decision maker and with composition as follows:

- BEST/Department of Environmental Protection and Planning
- Department of Agriculture
- Department of Fisheries
- Department of Environmental Health Services
- Ministry of Trade/Consumer Affairs
- Ministry of Health
- Customs Department
- Royal Bahamas Police Force
- Royal Bahamas Defense Force
- Bahamas National Trust
- Co-opted members, as necessary (such as College of The Bahamas)
- A (local) representative of CITES

The Secretariat for the Biosecurity Advisory Board will be provided by BEST/ Department of Environmental Protection and Planning, which will receive and respond to notifications and ensure timelines are adhered to for responses. Other agencies that may be involved include the Department of Lands and Surveys, Ministry of Public Works/Water and Sewerage Corporation, Ministry of Foreign Affairs and Ministry of Financial Services and Investments. The Advisory Board should be provided with an honorarium dependent on attendance. This Board should also be formalized by instituting service agreements with heads of agencies, for sustainability of the system.

Technical expertise required for such an Advisory Board may include:

- | | |
|-----------------------|---------------|
| ▪ Genetics | ▪ Nutrition |
| ▪ Microbiology | ▪ Toxicology |
| ▪ Marine biology | ▪ Virology |
| ▪ Fisheries (biology) | ▪ Chemistry |
| ▪ Food safety | ▪ Engineering |

- Sociology
- Economics
- Statistics/Biometrics

Non-safety issues to be considered by the Board may include:

- Cultural considerations
- Aesthetics
- Costs
- Economic impact
- Tourism implications
- Equity
- Benefits
- National image

Information required for making a final decision on the new organism may include:

- Technical information, on containment experiments, trials, etc.
- Cost/benefit analysis
- Technical review of the Risk Assessment/Environmental Impact Assessment (site specific)
- Results of public consultation
 - Release of results
- Approval by Cabinet

Interim measures should be implemented until the Coordinating Body on Biosecurity and the Biosecurity Advisory Board are established. It is recommended that the National Coordinating Committee function as Biosecurity Advisory Committee with Secretariat support from BEST as an interim measure.

8.2 Resource and infrastructure needs

There are many national needs for implementation of this Strategy related to capacity, skill, training, equipment, institutions and the like. The needs related to specific areas are outlined below.

8.2.1 The application process

The current application process involves making application for import of goods. While the application addresses a variety of goods that may be imported, it is the invoices of import that are necessary for seeing what is actually brought in.

The application is submitted to the Department of Agriculture one week in advance of the purchase of the goods. The permit issued by the Department of Agriculture allows certain items, with conditions.

8.2.2. Border control procedures

On arrival, the Department of Agriculture gets a copy of the invoice from the importer. The Agriculture desk at the dock stamps all invoices as seen. Then, they proceed to the Department of Environmental Health Services and the Customs Department. The original is kept by the Department of Agriculture. Invoices and SPS certificates are presented on arrival of the goods. Live things are inspected on arrival at the port, but there are staffing problems with appropriate officers not always available for inspections. SPS certificates are examined in some ports, but not all. It is not usually the Customs Department that examines SPS certificates. The Department of Agriculture stamps the invoice

accompanying goods as an indication to the Customs Department that the invoices and documents have been reviewed by the Department of Agriculture. There is also the problem that importers do not always produce the required documents. There is the major problem that as an archipelago, The Bahamas has many ports and there is not a regulatory presence at every port.

There are generally no inter-agency meetings on the Family Islands, but on certain islands, agencies do make an effort to cooperate. Cooperation and communication need to happen on a regular basis in an organized manner.

The Department of Environmental Health Services deals with human health concerns, i.e. fitness for human consumption. This department only inspects food products, no live plants or animals. They check meat certificates and original invoices. The Department of Agriculture is concerned with the animal and plant health perspective – items that may carry organisms that may affect local plant and animal health. The Department of Agriculture does not regulate seeds and chemicals, only plants and animals. No agency currently deals specifically with genetically modified organisms. No agency has a mandate to address overall biosecurity, and thus certain components of biosecurity are addressed while others are neglected.

There are no facilities to test and to confirm concerns on diseases and pests. The Public Analyst Laboratories in New Providence and Grand Bahama check for bacteria and chemicals that can negatively impact human health. Container inspections and x-ray machines would be helpful.

Alerts for outbreaks elsewhere that may affect goods coming to The Bahamas are necessary to quarantine and block entry to suspect goods.

In terms of occupational health and safety for border control officers, gloves are worn for examinations. No masks or any other safety apparatus are utilized. There is no occupational health and safety training and this needs to be implemented in many sectors related to biosecurity including for farmers and health inspectors. For example, there is no rabies vaccine in the country, even though border control officers inspect for rabies. The knowledge of how to respond to worst-case scenarios is a part of health and safety training, and is necessary for dealing with animals, including possibly rabid animals.

Training needs to occur for border control officers, including those from Customs Department, Department of Agriculture, Department of Fisheries, Royal Bahamas Police Force and Royal Bahamas Defence Force, in identification of those organisms deemed unwanted as well as any new procedures instituted under the Biosecurity Strategy. A quarantine facility is also necessary. Quarantined animals are now kept in the airport hall.

A penalty system for smuggling needs to be implemented.

The Department of Agriculture currently performs risk analysis for animal health and plant health. IICA has done an assessment, and the protocol issue is being addressed, i.e. the procedure for risk assessment under certain circumstances. Customs is creating a database to include risk assessments. However, it is not known what is on each island that should be protected against, except where there has been a serious economic impact. There is also no standardized process for risk analysis.

Compliance by importers is not always good. Staffing (manpower and education) is an issue – needs capacity building. A protocol needs to be put in place for communication and cooperation, for approvals, sharing of information, invoices, etc. Also, there is a problem with the Form C-19, which is for the pre-clearance of goods (before they are landed) under specific terms that are often circumvented, e.g. other goods are added to the shipment without permission.

The point was made that the Ministry of Tourism and the Embassies are giving out the wrong information about entry requirements to The Bahamas. Travel agents also contribute to the problem. We need to make known to the international world what our requirements are. Better inter-agency communication is required to address the issue, also institutional capacity. Tourists need to be searched by Customs and Agriculture, and to be questioned, both air and sea arrivals, especially since there are more sea arrivals than air.

8.2.3 Labeling

A classification system to denote GMOs is necessary. There is an international standard for waybills. However, coded goods are denoted on the invoices, and only large computerized companies do this. With respect to the feasibility of The Bahamas insisting that suppliers code their goods, global efforts are already being made to cause across-the-board goods classification by exporters, i.e. by the WTO. Currently, The Bahamas is only an observer to these agreements.

Instituting labeling requirements for imported goods might include requesting companies who send goods to the Bahamas to include codes on their invoices. It is thought that most companies who send goods to The Bahamas do have the capability. The penalty for non-compliance would result in goods being held by the Customs Department.

With labeling being instituted, a list of GM products would need to be provided for field officers' use. Lists of GM products could be published by the Department of Agriculture or another regulatory organisation, and posted in stores for consumer awareness. The effort will require a massive public education campaign. Food consumers have a right to know what they are buying. Seeds will require a different approach.

8.2.4. Food security

Self-sufficiency in some food items is possible. It will require application of technologies such as greenhouses and hydroponics. Applicable financing is also available, but Government has not prioritized the issue.

With feasibility studies for necessary approaches to address the issues, we could expect to take approximately five years to start seeing a turn around in our level of food security. Such a project would need to be facilitated with cooperatives, soft loans, incentives, protective tariffs, etc. All of these require Government support. There also needs to be public education to support the Government's perspective and to encourage '*buying Bahamian*'. This includes marketing and consumer education, especially of the large wholesalers and retailers.

Government commitment is necessary for studies to be made, and for short, medium and long-term planning. Project proposals need to be developed to capitalize on available international funding. Stakeholder consultations revealed the opinion that a culture of dependence is fostered by current political systems.

8.2.5. Access and Benefit-Sharing and Research

The Department of Agriculture grants permits and SPS certificates for the export of plant samples. Researchers are asked to submit their papers and findings to the Department of Agriculture on completion of their research. There needs to be clarification as to whether the permits/documentation prohibits the use of samples for commercial research, products, etc. (any purpose other than research), without the permission of The Bahamas Government.

Researchers come to the Customs Department with all of the required permits. The officer checks the papers, but they do not do an inspection unless the researcher mentions they possess an export permit export or the need for one to the Customs officer.

There is regulation of export of agricultural products (e.g. cascarilla bark) through a permitting system, but there is currently no mechanism in place to prevent researchers from smuggling plants or animals out of the country. Regulation of this sector would require manpower. Alternatively officers who already look for contraband might be trained to also regard biosecurity violations as contraband.

8.2.6. Financial requirements

The only way that Coordinating Body for Biosecurity (CBB) can become an agency that collects money that is used for its own operating costs is to go the route of becoming a corporation. If the CBB is to be retained as a Government department, then the policy now is to reduce the number of Government agencies that are collecting money. Money collected can only be used for specific purposes, otherwise it is returned to the Public Treasury/Consolidated Account.

There is also the problem of retaining qualified staff on Government salary scales as a Government department. A corporate structure would enable establishment of salary scales that would be more attractive to those highly qualified persons that will be needed to staff the CBB.

8.3 Research related to biosecurity

To facilitate informed decision-making related to biosecurity, research is needed in many areas including:

- Genetics
- Traditional knowledge, innovations and practices
- Assessing invasive potential
- Distribution and abundance of invasive species
- Distribution and abundance of species, habitats and ecosystems
- Economic valuation of biological resources and biological system services

8.4 The Future

Annex I Current regulatory framework for biosecurity

Bahamian Law and Institutional Arrangements:

- Ch. 227 Pharmacy
 - Relates only to the sale of drugs and devices
- Ch. 229 Penicillin
 - Relates to penicillin and other anti-microbial organic substances produced by living organisms
 - Includes sale, export and research
- Ch. 232 Environmental Health Services
 - Relates to any aspect of the environment that is likely to endanger the public's health
- Ch. 236 Food Act
 - Labelling and advertisement
 - Adulteration, Standards, and Sale
 - Importation and labelling
 - Regulations
 - Enforcement
 - Disclosure
- Ch. 237 Quarantine
 - Relates to entry and segregation of diseases, disease vectors, infected persons, and of vessels, persons, vectors arriving from an infected place
- Ch. 242 Agriculture and Fisheries Act
 - Provides for the supervision and development of agriculture and fisheries
 - Includes licensing for specific circumstances
 - Addresses liabilities
 - Could be amended to cover products of biotechnology
- Ch. 244 Fisheries Resources (Jurisdiction and Conservation)
 - Protected Areas
 - Permits and licences
- Ch. 244 [subs.] Fisheries Resources Regulations
 - Aquaculture
 - Permits and Licences (for culture, research, import or export)
- Ch. 246 Animal Contagious Diseases
 - Prohibition of imports

- Ch. 246 [subs.] Animal Contagious Diseases
 - Prohibition of Imports
 - (Import Control) Regulations
- Ch. 247 Animals (Control of Experiments)
 - Conditions – section 5 may provide a loophole in the regulation of GM research
- Ch. 248 Wild Animals Protection Act
 - Licences to take, capture and export wild animals
- Ch. 249 Wild Birds Protection
 - Exports
 - Licences for scientific purposes
- Ch. 250 Plants Protection Act
 - Relates to plant diseases and to a lesser extent insect pests
 - Importation of Plants
 - Depends on Customs Officers for implementation of some of its components
 - Definition of ‘plant disease’ would require some adaptation to cover risks from GMOs/LMOs
 - The authority of this Act is possibly relevant to the implementation of a policy regarding the import and planting of GM crops and feeds
 - Exclusion of products from specific countries will most likely not comply with WTO rules
- Ch. 250 [subs.] Plants Protection
 - Importation of Plants Orders
 - Plants Protection Rules
- Ch. 298 [subs.] Import Control Regulations (Foods, Plants and Animals)
 - Provides for the use of permits, licenses, certificates and other means to control imports
 - Covers all goods imported and could therefore be relevant to products of biotechnology
 - The competent authority can appoint other agents – i.e. agriculture inspectors could be given authority under this Act
 - May only require an Order specifying GMOs/LMOs as a class of goods
 - The new class could be subdivided into those goods that are ‘pre-approved’ and those requiring risk analysis prior to entry
 - Provides for prosecutions
 - Allows for ‘advisors’ to the competent authority
 - The exclusion of goods under this Act may be counter to WTO rules
- Ch. 299 Export Control Regulations
 - Covers all goods exported and trans-shipped
 - Only relevant if GMOs/LMOs are produced in country
 - Export licenses may be used for whatever biotech products are allowed
 - Biotech products would need to be included in the schedule
- Ch. 323 Copyright
 - Refers only to artistic works
- Ch. 324 Industrial Property

- Covers patents – right to make, use, exercise and vend the invention (or the subject of the patent)
- Section 3(2) extends this Act to cover agricultural applications (for things or processes)
- Limitation – section 9(1)(b) exempts application to plants, animal varieties, or ‘essentially biological processes for the production of plants or animals’, which is essentially what biotech/LMOs is all about.
- Exemption – section 19(4): use of the product or process in the production of another product or substance or the import of another product made from the patented item for use or sale.
- Ch. 358 Bahamas Agricultural and Industrial Corporation
 - Promotion of agriculture

International Instruments Related to Biosecurity:

- BIO Trade group representing the biotechnology industry
- FAO/WHO Codex Alimentarius
- International Treaty on Plant Genetic Resources
- International Plant Protection Convention (IPPC)
- FAO/Code of Conduct for the Import and Release of Exotic Biological Agents
- FAO/Code of Conduct for Responsible Fisheries
- FAO/International Code of Conduct on Plant Biotechnology as it affects the Conservation and Utilisation of Plant Genetic Resources
- OECD/Safety considerations for biotechnology
- The Aarhus Convention (UNECE)
- Agenda 21, Chapter 16
- Convention on Biological Diversity (1992)
- Cartagena Protocol on Biosafety (2000)
- UNEP Technical Guidelines on Biosafety (1995)
- UN Convention on the Law of the Sea (1982)
- UN Guidelines for Consumer Protection (1985)
- UNIDO/Voluntary Code of Conduct for the Release of Organisms into the Environment
- IUCN Position Statement on Translocation of Living Organisms
- WTO Agreement on the Application of Sanitary and Phytosanitary (SPS) Measures

The UNEP Technical Guidelines on Biosafety guidelines focus on human health and environmental safety for all biotechnology applications (research, commercial or developmental), and provides a framework for information exchange compatible with the biosafety protocol and the Clearing House Mechanism.

Annex II

Overview of Bahamian Biodiversity

Few of the major taxonomic groups of the Bahamian fauna and flora have been sufficiently studied to draw reliable conclusions as to the total biodiversity of The Bahamas. Many of the data are interpolated or extrapolated from records elsewhere. The often conveniently rounded off global totals are indicative of the uncertainty for certain taxa. Note that the totals may or may not include alien invasive species, as the number of these is in constant flux.

Table 1. Microorganisms including larger fungi

Division	Global Total	Bahamas Total	Comments
Viruses	1,000	10	Underestimate
Bacteria	<3,000	Unknown	
Blue-green bacteria	1,700	30	Underestimate
Fungi	1.5 M	193	Underestimate
Lichen fungi	16,000	197	

The number of viruses is speculative since viral taxonomy and ecology are in their infancy. Free-living viruses are thought to occur in fresh and salt water. Estimates of bacteria are taken from other countries, but many species are global in their distribution. Totals for The Bahamas would include free-living, parasitic and saprophytic bacteria, including those pathogenic species that cause human and animal diseases. Blue-green bacteria are thought to be abundant in warm waters and in The Bahamas form mats in hypersaline lakes and blue holes. There are limited studies of fungi in The Bahamas. Like the bacteria, fungi can be saprophytic or pathogenic, causing diseases of plants and animals. More obvious are toadstools and bracket fungi.

Table 2. Simple animals

Division	Global Total	Bahamas total	Comments
Protozoa	30,800	200	
Sponges	5,000	132	West Indies data
Corals	9,000	111	Underestimate

Protozoa are single-celled organisms. Most of the Bahamian examples are foraminifera: organisms with a simple shell. Deep-water sponges are poorly known and are not included. The Bahamian total is based on old West Indian data. Corals are very important to The Bahamas, as they form reefs, providing habitat for fish and other marine life, but are relatively poorly studied.

Table 3. More complex animals

Division	Global Total	Bahamas Total	Comments
Flatworms	12,200	12	Bermuda data
Nematodes	12,000	??	Not known
Earthworms	12,000	??	Not known
Molluscs	50,000	162	
Sea spiders	??	31	Belize data

Little is known about the flatworm taxa in The Bahamas. Similarly little is known about the nematodes, which can be free-living or parasitic on plants, mainly on the roots, or internal parasites in animals. Earthworms include marine species, but there have been few real studies. Molluscs include the queen conch, of commercial importance, and several other marine species, as well as terrestrial snails. Sea spiders are a little known group: note the extrapolation from Belize.

Table 4. Arthropods

Division	Global Total	Bahamas Total	Comments
Spiders and Kin	50,000	59	Bermuda data
Insects	751,000		
Thrips	1,500	38	
Beetles	220,000	228	Bermuda data
Lady bugs	??	14	
Termites	1,700	12	Turks and Caicos data
Bugs	??	90?	
Dragonflies	4,500	27	
Flies	64,000	149	
Butterflies	100,000	90	More in Exuma?
Bees, wasps and ants	100,000	231	

There are few reports on spiders and their kin in The Bahamas, and the number may be considerably higher than the data for Bermuda. Except for butterflies, work on the taxonomy and ecology of insects in the Bahamas is sparse, and some islands have only been casually collected. Note the high global totals and the rounding-off, indicative of uncertainty.

Table 5. Marine animals

Division	Global Total	Bahamas Total	Comments
Crustaceans	30,000	276	Bermuda data
Lobsters, crabs, etc.	1,500	??	
Starfish	6,100	350	
Sharks & kin	843	17	
Bony fish	18,150	488	No deep water data
Marine mammals	(4,000)	30	Underestimate

Crustacean numbers are probably underestimated. Some are of economic importance, particularly the spiny lobster, but the group, as a whole has not been fully researched. Starfish have been well studied, and the total for The Bahamas includes 150 shallow water species and 200 deep-water species. The shark group includes rays. They are not commercially fished in The Bahamas. Populations are probably fairly stable. The bony fish group includes several commercially fished species and some sports fishing for marlin, sailfish and tarpon and others. There is a limited number of freshwater species due to the scarcity of fresh surface waters. The blue holes have a number of distinct fish species. Some 30 species of marine mammal may be seen in Bahamian waters, many of

which are migratory. The total includes several species of whale some eleven dolphins. Note that the global total for mammals refers to all mammals.

Table 6. Terrestrial animals

Division	Global Total	Bahamas Total	Comments
Amphibians	4,184	6	
Reptiles	6,300	94	Several subspecies
Birds	9,040	270	
Breeders		88	
Migrants		182	
Mammals	(4,000)	15	

Amphibians require fresh water to complete their life cycle, and the scarcity of fresh surface waters in the Bahamas, limits the number of taxa. Six species of frog are reported. The total for reptiles includes several subspecies: there are 26 species of iguanas and 63 subspecies, and 10 species of snake and 24 subspecies. The total also includes two freshwater turtles and four sea turtles that nest in The Bahamas. Detailed records are available for birds and for most islands and cays. About half the total bird species are sea and fresh water birds. There is also the Bahamas parrot and two species of owl. The total for mammals for The Bahamas include 15 non-domesticated species. Introduced mammals include rats and mice and the raccoon, as well as dogs and cats and livestock. The hutia is the only endemic terrestrial mammal, but 10 species of bat breed in The Bahamas.

Table 7. Higher plants

Division	Global Total	Bahamas Total	Comments
Algae			
Green	7,000	100	Underestimate
Brown	1,500	30	Underestimate
Red	4,000	79	Underestimate
Other	12,500	??	Not known
Ferns	10,000	47	Underestimate
Mosses	18,600	69	Underestimate
Gymnosperms	529	3	Reliable
Monocotyledons and Dicotyledons	220,000	1,302	Reliable

Seventy-five macro species of green algae plus 25 deep-water species have been described. Most green algae are unicellular and those have not been described. Thirty brown algae have been reported from San Salvador alone, plus 79 macro red algae species. It is suspected that there may be more than 100 species of moss in The Bahamas, and the figure for ferns is considered an underestimate. The three gymnosperms are cone-bearing trees, but there may be some recent introductions. The monocots and dicots include many plant forms and uses: trees, vines, shrubs, grasses and sedges, and food crops, fruits, ornamentals and medicinal plants. There are probably many introduced food plants and ornamentals that are not included in the total.

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Bahamas Country Study 1992

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ANNEX III

Glossary

Biodiversity or **biological diversity** is the diversity of and in living nature. Biological diversity has no single standard definition. One definition holds that biological diversity is a *measure of the relative diversity among organisms present in different ecosystems*. "Diversity" in this definition includes diversity within species, among species, and comparative diversity among ecosystems.

Biological resources include genetic resources, organisms or parts thereof, populations, or any other living component of ecosystems with actual or potential use or value for humanity.

Biodefense refers to short term, local, usually military measures to restore biosecurity to a given group of persons in a given area - in the civilian terminology, it is a very robust biohazard response. It is technically possible to apply **biodefense** measures to protect animals or plants, but this is generally uneconomic. However, protection of water supplies and food supplies are often a critical part of biodefense.

Biopiracy can refer to:

- unauthorised use of biological resources such as plants, animals, organs, microorganisms, and genes;
- unauthorised use of traditional communities' knowledge on biological resources;
- unequal share of benefits between a patent holder and the indigenous or local community whose resource and/or knowledge has been used;

- patenting of biological resources with no respect to patentable criteria (novelty, non-obviousness and usefulness).

Bioprospecting is the collecting of biological samples including plants and animals, and the collecting of traditional or indigenous knowledge to aid in the discovery of genetic or biochemical resources. Bioprospecting is usually undertaken for economic purposes (e.g. new drugs, crops, industrial products).

Biosafety is the prevention of large-scale loss of biological integrity, focusing both on ecology and human health.

Biosafety protocol refers generically to rigorous professional standards or other attempts to protect biodiversity.

Biosecurity attempts to ensure that systems sustaining either people or animals are maintained. This may include natural habitats as well as shelter and productive enterprise (especially agriculture) and deals with threats such as biological warfare or epidemics. It involves safeguarding the economy and environment, human health, and plants and animals, from the risks of introduced pests and diseases. **Biosecurity** also entails eradicating any pests and diseases that evade border controls, and controlling the impacts of those which have become an established part of the Bahamian environment.

Biotechnology is technology based on biology, especially when used in agriculture, food science, and medicine. Biotechnology is any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use. [See also definition for **modern biotechnology** below.]

Bioterrorism is terrorism using germ warfare, an intentional human release of a naturally-occurring or human-modified toxin or biological agent.

Capacity building is the building and/or strengthening of human resources and institutional structures for effective operation and implementation of their mandates.

The **Cartagena Protocol on Biosafety** is an international agreement on biosafety, as a supplement to the Convention on Biological Diversity. The Bahamas ratified the Protocol in January 2004. The protocol makes clear that transboundary movement of products created from new technologies must be based on the

precautionary principle and thus allow developing nations to balance public health against economic benefits. It will for example let countries ban imports of a genetically modified product if they feel there is not enough scientific evidence the product is safe and requires exporters to label shipments containing genetically altered commodities such as corn or cotton.

Conservation is an ethic of resource use, allocation, exploitation, and protection. Its primary focus is upon maintaining the health of the natural world including its forests, fisheries, habitats, and biological diversity. Secondary focus is on materials conservation and energy conservation, which are seen as important to protect the natural world.

Contained use means any operation, undertaken within a facility, installation or other physical structure, which involves GMOs that are controlled by specific measures that effectively limit their contact with, and their impact on, the external environment.

The **Convention on Biological Diversity** is an international treaty that was adopted at the Earth Summit in Rio de Janeiro in 1992. The Bahamas ratified the Convention on 2 September 1993. The Convention has three main goals:

- conservation of biological diversity;
- sustainable use of its components; and
- fair and equitable sharing of benefits arising from genetic resources.

Country of origin of genetic resources means the country which possesses those genetic resources in *in-situ* or within ecosystems and natural habitats.

Country providing genetic resources means the country supplying genetic resources collected from *in-situ* sources, including populations of both wild and domesticated species, or taken from *ex-situ* sources or places outside their natural habitat, which may or may not have originated in that country.

Deoxyribonucleic acid (DNA) contains the genetic code and transmits hereditary traits. It is a nucleic acid that is bound in double helical chains by hydrogen bonds between the bases, forming the basic material in the chromosomes of the cell nucleus.

Domesticated or cultivated species means species in which the evolutionary process has been influenced by humans to meet their needs, e.g. farm animals, pets and crops.

Ecology is the branch of science that studies habitats and the interactions between living things and the environment. The term was coined in 1866 by the German biologist Ernst Haeckel from the Greek *oikos* meaning "house" and *logos* meaning "science." To ecologists, the environment includes both the abiotic environment -- non-living things like climate and geology -- and the biotic environment -- living things like plants and animals. Much of ecological research is concerned with the distribution and abundance of organisms and how they influence and are influenced by their environment.

Ecological or ecosystem diversity is the variety of ecosystem types (e.g. forests, grasslands, lakes, wetlands and oceans) and their biological communities that interact with one another and their non-living environments.

Ecoregions are defined by the World Wildlife Fund as "relatively large units of land or water containing a distinct assemblage of natural communities and species, with boundaries that approximate the original extent of natural communities prior to major land-use change". Others have defined ecoregions as areas of ecological potential based on combinations of biophysical parameters such as climate and topography.

Ecosystem means a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.

An **epidemic** is a widespread disease that affects many individuals in a population. An epidemic may be restricted to one locale or may even be global (pandemic), such as the HIV virus.

Ex-situ conservation means the conservation of components of biological diversity outside their natural habitats.

Ecotourism essentially means ecological tourism, where ecological has both environmental and social connotations. It is defined both as a concept/tourism movement and as a tourism sector.

Environmental health is defined by the World Health Organisation as: Those aspects of human health and disease that are determined by factors in the environment. It also refers to the theory and practice of assessing and controlling factors in the environment that can potentially affect health.

Environmental health services are defined by the World Health Organisation as:

Those services which implement environmental health policies through monitoring and control activities. They also carry out that role by promoting the improvement of environmental parameters and by encouraging the use of environmentally friendly and healthy technologies and behaviours. They also have a leading role in developing and suggesting new policy areas.

Genetic diversity is the variability of the genetic make up among individuals within a single species. It is the genetic differences among populations of a single species and those among individuals within a population.

Genetic material means any material of plant, animal, microbial or other origin, containing functional units of heredity, e.g. chromosomes, DNA.

Genetic resources mean genetic material of actual or potential value.

A **Genetically Modified Organism (GMO)** is an organism whose genetic material has been deliberately altered. Examples are diverse, and include commercial strains of wheat that have been modified by irradiation since the 1950s, transgenic experimental animals such mice, or various microscopic organisms altered for the purposes of genetic research. [See also definition of **Living Modified Organisms** below.]

Globalization (or **globalisation**) in its literal sense is a social change, an increase in connections among societies and their elements due to, among others, the explosive evolution of transport and communication technologies.

Habitat means the place or type of site where an organism or population naturally occurs.

In-situ conditions means conditions where genetic resources exist within ecosystems and natural habitats, and, in the case of domesticated or cultivated species, in the surroundings where they have developed their distinctive properties.

In-situ conservation means the conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings and, in the case of domesticated or cultivated species, in the surroundings where they have developed their distinctive properties.

The term **invasive species** usually refers to a certain subset of those species defined as introduced species. A species is regarded as *invasive* if it has been introduced by human action to a location, area, or region where it did not previously occur naturally (i.e., is not native), becomes capable of establishing a breeding population in the new location without further intervention by humans, and becomes a pest in the new location, threatening the local biodiversity.

Intellectual property or **IP** refers to certain kinds of exclusive rights to intellectual capital, some forms of which can expire after a set period of time, and other forms of which can last indefinitely.

Living Modified Organisms or **LMOs** are any living organisms that possess a novel combination of genetic material obtained through the use of modern biotechnology.

A **living organism** is any biological entity capable of transferring or replicating genetic material, including sterile organisms, viruses and viroids.

Mandatory labelling of consumer products enables moral purchasing and avoidance of health problems like allergies. It is mandated in most developed nations, and increasingly in developing nations, especially for food products, e.g. "Grade A" meats..

Modern biotechnology refers to the application of:

- In vitro nucleic acid techniques, including recombinant deoxyribnucleic acid (DNA) and direct injection of nucleic acid into cells or organelles; or
- Fusion of cells beyond the taxonomic family

Both processes overcome natural physiological reproductive or recombination barriers and are not techniques used in traditional breeding and selection.

Natural resources are commodities that are considered valuable in their relatively unmodified (natural) form. A commodity is generally considered a natural resource when the primary activities associated with it are extraction and purification, as opposed to creation. Thus, mining, oil extraction, fishing, and forestry are generally considered natural-resource industries, while farming is not. Natural resources are often classified into renewable and non-renewable resources. Renewable resources are generally living resources (fish, coffee, and forests, for example), which can restock (renew) themselves at approximately the

rate at which they are extracted. Non-living renewable natural resources include water, wind, tides and solar radiation — *compare with renewable energy*.

Organic farming is a way of farming that avoids the use of synthetic chemicals and genetically modified organisms (GMOs), and follows the principles of sustainable agriculture.

Phytosanitary measures are based on assessment of risks to human, animal and plant life and health. They include measures to avoid or minimize such risks. Examples of measures include quarantine and labeling.

Precautionary principle or **precautionary approach** states that when there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

Protected Areas are locations which need and/or receive protection because of their environmental, cultural or similar value. A Protected Area as defined by the World Conservation Union (IUCN) is *An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means.*

Renewable energy is energy from a source which can be managed so that it is not subject to depletion in a human timescale . Sources include the sun's rays, wind, waves, rivers, tides, biomass, and geothermal. Renewable energy does not include energy sources which are dependent upon limited resources, such as fossil fuels and nuclear fission power.

Risk assessment involves:

- Identifying new or altered hazards
- Identifying changes relevant to human health
- Safety assessment should account for unintended and intended effects (goal is to determine if the new food is as safe as, and no less nutritious than the conventional counterpart it is being compared with)

Species diversity is the variety of species, whether wild or domesticated, within a particular geographical area. A species is a group of organisms which have evolved distinct inheritable features and occupy a unique geographic area. Species are usually unable to interbreed naturally with other species due to

factors such as genetic divergence, different behavioural and biological needs, and separate geographic locations.

Sustainability is an economic, social, and ecological concept. It is intended to be a means of configuring civilization and human activity so that society and its members are able to meet their needs and express their greatest potential in the present, while preserving biodiversity and natural ecosystems, and planning and acting for the ability to maintain these ideals indefinitely. Sustainability is providing for the best for people and the environment both now and in the indefinite future. Sustainability affects every level of organization, from the local neighborhood to the entire globe.

Sustainable development, according to one definition, demands that we seek ways of living, working and being that enable all people of the world to lead healthy, fulfilling, and economically secure lives without destroying the environment and without endangering the future welfare of people and the planet. It is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Traditional or indigenous knowledge is a body of knowledge built up by a group of people through generations of living in close contact with nature. It includes a system of classification, a set of observations about the local environment and a system of self-management that governs resource use.

Wildlife is the term for all wild animals and plants in their natural communities.

ANNEX IV

Biodiversity – Related Web Links

Convention on Biological Diversity

<http://www.biodiv.org>

Cartagena Protocol on Biosafety

<http://www.biodiv.org/biosafety>

Biosafety – Related Sites

1. <http://binas.unido.org/binas>
Biosafety Information Network and Advisory Service
2. <http://www.icgeb.trieste.it>
The International Centre for Genetic Engineering and Biotechnology
3. <http://www.oecd.org/ehs>
OECD's Work on Environmental Health and Safety
4. <http://irptc.unep.ch/biodiv>
UNEP International Register on Biosafety
5. <http://binas.unido.org/binas>
Biosafety Information Network and Advisory Service (BINAS)
6. <http://www.bioline.org.br/by>
Biosafety Journal by Bioline International
7. <http://www.fao.org/waicent/faoinfo/sustdev/RTdirect/RTre0034.htm>
Food and Agricultural Organization
8. <http://www.iisd.org>
International Institute for Sustainable Development
9. <http://iopi.csu.edu.au/iopi>
International Organization for Plant Information
10. <http://www.maf.govt.nz/biosecurity/bio-strategy/>
New Zealand Biosecurity Strategy
11. <http://www.cdc.gov/od/ohs/biosfty/biosfty.htm>
CDC Office of Health and Safety – Biosafety
12. www.oecd.org
Organization for Economic Cooperation and Development
13. <http://cities.org>
Convention on International Trade in Endangered Species of Wild Fauna and Flora
14. <http://unep-wcmc.org/cms/>
Convention of Migratory Species of Wild Animals
15. <http://www.un.org/esa/sustdev/csd.htm>
Commission for Sustainable Development (ECOSOC)

Biodiversity Cooperation Sites

1. <http://www.abi.org>
Association for Biodiversity Information
2. <http://www.bcnet.org>
Biodiversity Conservation Network is part of the Biodiversity Support Program, which is funded by USAID
3. <http://www.ctsp.org>
The Conservation Technology Support Program (CTSP).
4. <http://cesimo.ing.ula.ve/GAIA>
GAIA Project - A Multi-Media Tool for Natural Resources Management and Environmental Education (EU - Venezuela)

5. <http://ice.ucdavis.edu>
ICE - Information Center for the Environment (University of California)
6. <http://iisd.ca>
IISD - International Institute for Sustainable Development
7. <http://www.codata.org>
International Council for Science CODATA- Committee on Data for Science and Technology
8. <http://www.ipgri.cgiar.org>
International Plant Genetic resources Institute (IPGRI)
9. <http://irf.org/irbiodiv.html>
Island Resource Foundation - Biodiversity Conservation Programme for the Eastern Caribbean
10. <http://eosps0.gsfc.nasa.gov>
NASA's Earth Observing System (EOS)
11. <http://www.npws.nsw.gov.au/science/biodiv.htm>
New South Wales Biodiversity survey and monitoring
12. <http://www.species2000.org>
Species 2000 has the objective of enumerating all known species of plants, animals, fungi and microbes on Earth as the baseline dataset for studies of global biodiversity.
13. <http://www.unep-wcmc.org>
The World Conservation Monitoring Centre.
14. <http://biosafety.ihe.be> Belgium Biosafety Clearing House
15. <http://www.agro.stoas.nl/NICBN>
National Information Centre on Biodiversity of the Netherlands (NICBN)
16. <http://www.chm.org.uk>
CHM UK
17. <http://www.ubavie.gv.at>
Austrian Federal Environment Agency
18. <http://wwwamb.casaccia.enea.it/chm-cbd>
Italian CHM Link

Related Conventions Sites

1. <http://unfccc.int>
United Nations Framework Convention on Climate Change
2. <http://www.basel.int>
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal
3. <http://www.cites.org>
CITES - Convention on International Trade in Endangered Species
4. <http://www.ramsar.org>
The Convention on Wetlands, signed in Ramsar, Iran, in 1971
5. <http://www.unccd.int>
United Nations Secretariat of the Convention to Combat Desertification

Related United Nations Sites

1. <http://www.un.org>
United Nations Homepage
2. <http://www.undp.org>
United Nations Development Programme
3. <http://www.unep.org>
United Nations Environment Programme
4. <http://www.unesco.org>
United Nations Educational, Scientific and Cultural Organization

Other Related Sites

1. <http://www.aphis.usda.gov>
Animal and Plant Health Inspection Services
2. <http://binas.unido.org/binas>
Biosafety Information Network and Advisory Service (BINAS)
3. <http://www.bioline.org.br/by>
Biosafety Journal by Bioline International
4. <http://www.iisd.org>
International Institute for Sustainable Development
5. www.oecd.org
Organization for Economic Cooperation and Development
6. <http://www.foodsafety.gov/~fsg/bioterr.html>
United States Food and Drug Administration
7. <http://www.nature.org>
The Nature Conservancy
8. http://www.wto.org/english/tratop_e/envir_e/issu1_e.htm
Committee on Trade and Environment
9. <http://globalecology.stanford.edu/DGE/Gisp/index.htmlhome.htm>
Global Invasive Species Programme
10. <http://www.worldbank.org>
The World Bank is the world's largest source of development assistance

ANNEX V

Islands and Cays to be managed and maintained free of all alien organisms, and if alien organisms are already present, they will be eradicated.

- All uninhabited islands and Cays
- Eleuthera
- Exuma Islands
- Andros (Mangrove Cay and South Andros)
- Great Iguana
- Long Island
- Cat Island
- Crooked Island
- Long Cay

- Acklins Island
- Berry Island
- Whale Island
- Little Whale Cay
- Bimini Islands
- Mayaguana
- San Salvador
- Ragged Island Range
- Rum Cay
- Samana Cays
- Plana Cays

Islands and Cays where alien invasive organisms are already present, and where alien organisms may be introduced and managed after environmental risk assessments. This category does not preclude eradication of specific organisms already present.

- Abaco (except for Green Turtle Cay, Hope Town, Moore's, Great Guana Cay, Man of War Cay, Walkers Cay, Pensacola Cay, etc)
- Andros (North Andros)
- New Providence