

# **SELF-ASSESSMENT ON CLIMATE CHANGE ACTIVITIES IN TRINIDAD AND TOBAGO**

11<sup>th</sup> November, 2005

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## TABLE of CONTENTS

Background/Context .....	2
National Circumstances .....	2
<i>Greenhouse Gas Inventories</i> .....	3
<i>Programmes containing measures to facilitate adequate adaptation to climate change</i> .....	4
<i>CPACC</i> .....	5
<i>ACCC and MACC</i> .....	6
<i>Education and Public Awareness at the National Level</i> .....	6
<i>Current Institutional Arrangements</i> .....	6
Phase II Enabling Activities.....	7
<i>Priority Areas</i> .....	7
Institutional Framework for Project Implementation.....	10

# **SUMMARY REPORT**

## **SELF-ASSESSMENT ON CLIMATE CHANGE ACTIVITIES IN TRINIDAD AND TOBAGO**

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### **Background/Context**

Trinidad and Tobago (T&T) signed and ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 1994. The ultimate objective of this Convention as stated in Article 2 is the “stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system”. The Parties to the Convention are required to report on the steps that they are taking or envisage undertaking to implement the Convention. The report on these steps is known as a National Communication. In recognition of the principle of “common but differentiated responsibilities” enshrined in the Convention, the required contents of these National Communications and the timetable for their submission vary with the country. The Convention classifies Trinidad and Tobago as a non-Annex I country. As such, according to the Convention, it is required to submit its initial National Communication within 3 years of entry into force of the Convention or on the availability of financial resources.

The Initial National Communication of T&T was prepared in February 2001. It was executed by the Environmental Management Authority (EMA) and the Ministry of the Environment, under the supervision of a Cabinet-appointed Working Group to determine the Implications of Global Warming, Climate Change and Sea Level Rise. This Working Group was appointed in 1990 due to the government’s recognition of climate change and its impact.

An initial review of several documents and reports reveal that a fair amount of work has been done to deal with the issue of climate change and its impacts both before and after submission of the Initial National Communication. The objective of this exercise is to conduct an assessment of activities completed or under preparation that are relevant to the Second National Communication. It involves a stocktaking exercise and stakeholder consultation in order to build upon existing activities, institutions and knowledge. The other objectives of this assessment will be the identification of gaps and consultation with more stakeholders who could contribute to the national communication process. On the basis of this stocktaking and stakeholder consultation priorities will be identified for the preparation of T&T’s Second National Communication.

### **National Circumstances**

The national circumstances section of T&T’s Initial National Communication (INC) aimed to provide a relatively comprehensive overview of the country’s situation. As such this section contained information on:

- Physiography
- Climate – climate determinants, rainfall, temperature, flooding, El Niño.
- Political Structure
- Demographics
- Agriculture, Forestry, Land Use, Biodiversity
- Economic Profile
- Energy Profile
- Transport
- Institutional arrangements, national environmental policy and related natural resource policies.

The information and data provided in this and other sections covered a timeframe of 1990-1999. The information was obtained from various government departments and agencies which included but were not limited to:

- Ministry of Energy and Energy Industries
- Ministry of Food Production and Marine Resources
- Ministry of Works and Transport
- Central Bank
- Central Statistical Office
- Water and Sewerage Authority (WASA)
- Environmental Management Authority (EMA)
- Petroleum Company of Trinidad and Tobago (Petrotrin)

While most of the information provided under this section of the INC still remains relevant there may be a need for update in certain areas. Since submission of the INC there would have been changes with respect to land use, sectors such as agriculture and energy and also national policies. The SNC should especially address the accelerated pace of development in the energy sector and conversion of forested lands which has occurred since the reporting timeframe of the INC.

### ***Greenhouse Gas Inventories***

The INC provided the first national inventory of GHG emissions for the base year 1990. It was compiled and reported using the IPCC 1996 Revised Guidelines for National GHG Inventory. The inventory was prepared from data already documented in public institutions and private industries. The three GHGs inventoried in the INC were:

- 1) Carbon dioxide (CO<sub>2</sub>)
- 2) Methane (CH<sub>4</sub>)
- 3) Nitrous oxide (N<sub>2</sub>O)

The indirect acting GHG covered in the INC were:

- 1) Nitrogen oxides (NO<sub>x</sub>)
- 2) Carbon Monoxide (CO)
- 3) Non-methane volatile organic compounds (NMVOCs)
- 4) Sulphur dioxide (SO<sub>2</sub>)

Inventoried was done according to the following sectors: (1)Energy (2) Industrial activity (other than energy) (3)Agriculture (4) Land Use Change and Forestry (5) Waste (6) International Bunkers. In the INC, CO<sub>2</sub> fuel combustion emissions were estimated and reported using both the sectoral and reference approaches. Three other direct-acting GHGs not inventoried in the INC were: hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF<sub>6</sub>). A GHG was also not prepared for the solvent and other product use category due to lack of data in this area for the year 1990.

No direct measurements were carried out for the purpose of the compilation or verification of this inventory. It was further highlighted in the INC that data gaps exist with respect to taking proper inventory of private sector companies and their output. Additionally the INC did not provide the uncertainties associated with the estimates of production output. Significant uncertainty also resulted from the use of default emission factors provided in the IPCC guidelines. This uncertainty was created by the lack of emission factors that would be suitable and relevant to the scale of activities in Small Island Developing States (SIDS) and represents an area that needs to be addressed in future research. In the INC there was also a very significant discrepancy (40% difference) when CO<sub>2</sub> emissions were estimated using the sectoral and reference approach. It was thought that this discrepancy was due to the limitations in data collection from the variety of sources of original data used for the preparation of the inventory.

Through preparation of the INC the following concerns were noted:

- 1) The systems for management of data required for preparing GHG inventories need much improvement in the following areas :
  - systems to allow for increased use of direct measurements and surveys
  - proper inventory of private companies
  - standardization of methods used for estimating production output
- 2) Suitable and relevant emission factors need to be developed
- 3) Arrangements (institutional) need to be made to sustain data collection and archiving to ensure inventory preparation is a continuous process.

While the INC recognized the presence of data gaps and sources of uncertainty when preparing the GHG inventory, it did not propose an inventory system which could be used for data managing and archiving. It is therefore necessary for provisions to be made such that proposals are put forward in the SNC to create and implement an inventory management system. Data sharing has indeed been highlighted as one of the major obstacles in achieving obligations under the UNFCCC. It has been recommended that a policy for data sharing be developed to overcome this obstacle. It has been stated in the Guidelines for Reporting on Climate Change that the national GHG inventory is a key element of the national communications. As such the shortcomings of the systems used to develop the national GHG inventory in the INC must be adequately addressed in the SNC. It must also be ensured that data is available to report on those emissions not covered in the INC.

### ***Programmes containing measures to facilitate adequate adaptation to climate change***

The INC future climate scenarios focused on four main areas as follows: temperature, rainfall, sea level and extreme events. The INC further stated that to determine the possible impacts of climate change on the physical, biological and human resources of T&T would involve an “ongoing, long term and detailed technical assessment”. It was expected that the assessment would rely largely on the use of models. A major handicap identified at the time of the INC was that of insufficient relevant technologies and institutional and human technical capacity to conduct the required research. As such only one vulnerability study -- of the sugar industry – was carried out under the INC.

In this study the performance of sugar cane in Trinidad for the period 1970 to 1995 was measured in relation to climatic circumstances for the same period. The major finding of this study was that for every 1°C rise in temperature, the sugar cane yield was reduced by approximately three tonnes per acre. Therefore a continuation of the current trends in temperature rise which is consistent with climate change models could result in reduced sugar yields. Options put forward in the INC for adapting the sugar cane industry to climate change include diversification and the introduction of temperature resistant cultivars. Given the recent decline in the sugar industry this may no longer be relevant. However it has been recognized that there is a need for detailed vulnerability assessments within the different agricultural industries.

Other vulnerable sectors identified in the INC were:

- Terrestrial ecosystems (forestry, biodiversity)
- Aquatic ecosystems (coastal resources, fisheries and coral reefs)
- Hydrology and water resources management
- Infrastructure
- Human health

Specific vulnerable areas identified were the Caroni Basin, Nariva Swamp and Point Lisas Industrial Estate. The Caroni Basin was recognized in the INC and still is the most densely populated area of the country. It contains the greatest reserves of surface and groundwaters which supply a significant proportion of the needs of Trinidad. More seriously it is considered to be most vulnerable to the impacts of climate change. The Nariva Swamp is the largest and most diverse wetland ecosystem in T&T. It is described in the INC as “environmentally diverse and ecologically complex”. It is also of economic importance since the area is utilized for agriculture and fishing.

The INC states that due to its susceptibility to saltwater intrusion the Nariva Swamp is likely to be extremely vulnerable to sea level rise. The Point Lisas Industrial Estate has been developed on some portion of reclaimed land. Since the estate is just above sea level it is vulnerable to sea level rise and tidal variation. Given that the estate is one of the country's major GDP providers, the INC recognized that the vulnerability of its physical infrastructure and the resulting economic implications was a very important consideration.

While the INC has recognized these three very vulnerable areas, detailed assessments and adaptation programmes have not yet been developed. Point Lisas was included in a pilot study done through participation in the CPACC project. However they still therefore represent significant priority areas for the SNC.

It was stated in the Initial National Communication that T&T accounted for a miniscule fraction of global GHG emissions. As such, options for adapting to the impacts of climate change were recognized as a priority compared to GHG emission abatement. The INC has made reference to steps which could be taken at the national level to adapt to climate change. These included:

- Vulnerability studies
- Construction of structures such as sea walls, gabion baskets and offshore breakwaters
- Development of policies to restrict development in vulnerable areas
- Implementation and enforcement of existing policies related to land use, water resources, biodiversity, forestry etc.
- Training in the areas of climate change impact assessment, predictive computer modeling etc.

T&T has also participated in several regional adaptation programmes as follows:

- Caribbean Planning for Adaptation to Climate Change (CPACC) - 1997 to 2001
- Adaptation to Climate Change in the Caribbean (ACCC) – 2001 to 2004
- Mainstreaming Adaptation to Climate Change (MACC) – 2003-2007

### *CPACC*

The CPACC project was designed with the overall objective of supporting Caribbean countries in preparing to cope with the adverse effects of global climate change namely sea level rise, in coastal and marine areas through vulnerability assessment, adaptation planning and capacity building linked to adaptation planning. The CPACC project was based on nine components which were either regional-based or pilot-based. The four regional components which T&T was a part of were:

1. Design and establishment of sea level/climate monitoring network
2. Establishment of data bases and information systems
3. Inventory of coastal resources and use
4. Formulation of a policy framework for integrated coastal and marine management.

Participation in the regional based components allowed for the following:

- Designation of a National Focal Point (NFP) i.e. the local agency and person responsible for coordinating all CPACC related issues in the country. The NFP in T&T was the EMA. The EMA has continued in this capacity and still serves as the technical focal point for local UNFCCC activities under the guidance of the Cabinet appointed Climate Change Working Group.
- Setting up of a national repository for climate change data and information. The agency designated as the national repository was the Institute of Marine Affairs (IMA). The agency was also provided with a Coastal Resource Inventory System (CRIS).
- The Regional Archiving Centre (RAC) was established at the Centre for Geospatial Studies, UWI, St. Augustine). The RAC is responsible for the sea level and climate monitoring data received from the 18 monitoring stations sited throughout the region.
- Provision of 3 automated sea level and meteorological monitoring stations linked by satellite that provide ready and free access to data at any time – At present these 3 stations are not working due to

institutional inadequacies. This therefore represents an area that needs to be addressed for the Second National Communication.

- Initiation of the development of a National Climate Change Adaptation Policy – The Climate Change Working Group/EMA was given the responsibility for coordinating the development of this policy through consultation with government agencies, the public etc. Following this it was expected that a draft Policy Paper and the Implementation Plan would be prepared and submitted to the CPACC Regional Project Implementation Unit for review. Work on this policy is still in progress and represents yet another area that will require attention in the Second National Communication.

The pilot based component in which T&T took part, consisted of a pilot study on the economic valuation of resources in the largest industrial area located along the west coast from Point Lisas in the south to Waterloo in the north. The primary activities identified for this pilot study were: industrial, fishing, wetlands, agriculture, residential and commercial land use, limited domestic recreation. The results of this study can be used to further develop and circulate appropriate techniques for use throughout the country.

### ***ACCC and MACC***

The ACCC project was designed to maintain continuity on climate change issues after CPACC. It was stated that one of the key objectives of the project was to create conditions under which the region will be able to sustain climate change activities following the conclusion of CPACC. The ACCC project was funded by the Canadian International Development Agency and served as a bridge between CPACC and MACC by providing initial support to MACC activities. It was expected that MACC would use the institutional framework and response capacity developed under CPACC to mainstream climate change into development planning. It should be noted that MACC is still an ongoing project. However the implementation of MACC would have been implemented through some of the following activities:

- Expansion and strengthening of the existing knowledge base to facilitate global climate change impact assessment as a basis for decision making on adaptation to climate change. This process would allow for further enhancement of existing information and information tools developed under CPACC.
- Integration of climate change concerns into the planning and practices of highly vulnerable sectors and issues such as water resources, agriculture, forestry, food security, tourism, fisheries and health.
- Development of strategies to address the impacts of climate change across key economic sectors. This would include land use planning, infrastructure, disaster prevention and insurance.

### ***Education and Public Awareness at the National Level***

T&T had developed a public awareness programme for issues concerning global warming, climate change and sea level rise. The programme was executed by the EMA and targeted school children. It took the form of pamphlets, TV commercials, posters, competitions and lectures. A significant part of the programme also included cooperation with non governmental organizations and community based organizations in reaching out to coastal communities and stakeholders. A 2001 update on C7 implementation in T&T highlighted the following specific activities that were already ongoing or being planned:

- The Secondary Entrance Assessment exam now includes several sections dealing with climate change
- A number of pamphlets have been developed including “Climate Change for Kids”
- Discussions on the production of a video on the Environment which would include a segment on climate change
- Development of a 13 part video series on the Environment which would also include segments on climate change and its impacts.

### ***Current Institutional Arrangements***

Responsibility for environmental management in T&T lies with the Ministry of Public Utilities and Environment. The Environmental Management Authority falls under the jurisdiction of this Ministry and continues to serve as the technical focal point for all climate change activities in T&T. There is only one officer at the EMA assigned to Climate Change on a part-time basis. The officer chairs the Climate Change Working Group appointed by Cabinet since 1990 and also serves as the Secretariat. One of the identified strengths of the Working Group is that it has representation from relevant groups which include government ministries, NGOs and the private sector. Through participation in CPACC an institutional framework was developed wherein the EMA serves as the focal point for climate change activities. However, although the EMA serves as the focal point and the coordinating agency for all climate change activities, it is necessary for other relevant sectors to be involved in a more meaningful way. This is because it has been recognised that climate change is not strictly an environmental management issue. It is a cross-cutting issue that will impact on all sectors of the country.

## **Phase II Enabling Activities**

The project for preparation of the Initial National Communication (First Phase) focused on a wide range of capacity building activities in the area of vulnerability and adaptation, greenhouse gas inventories and energy related issues. A number of workshops and training exercises were also utilized during the course of the first phase to assist in its completion. It was stated in the Initial National Communication that expert judgement of T&T's level of vulnerability and adaptive capacity could only be provided through a series of consultations and workshops with key stakeholders. It therefore recognised that the assessment was not a quantitative or comprehensive one.

Subsequent to the completion of the Initial National Communication, it was proposed that Phase II enabling activities should be undertaken to maintain the capacity built during Phase I and build upon activities completed in the context of T&T's first national communication. It was expected that Phase II activities would allow the country "to extend current knowledge, facilitate the emergence of national networks, and promote the integration of climate change concerns into development planning dialogue" [Project Proposal titled Trinidad and Tobago : Climate Change Enabling Activity (Additional Financing for Capacity Building in Priority Areas )].

In the Second National Communication (SNC) it is expected that there will be improvements in the GHG inventory preparation so that previous data gaps are filled. The inventory year to be reported for the SNC is 2000. Three of the direct acting GHGs not inventoried in the INC- hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride- will be included in the SNC. This is in addition to the GHGs that were inventoried in the INC namely carbon dioxide, methane, nitrous oxide, nitrogen oxides, carbon monoxide, non methane volatile organic compounds and sulphur dioxide.

While it has been stated that data will be available for the year 2000 it is not certain whether higher tiers of the IPCC methodology would be adopted for specific source categories. There is a need for emission factors to be developed to suit national circumstances and work has already begun in this area. This represents a priority area which will be further addressed in the SNC. The institutional arrangements and procedures for collecting and archiving data for preparation of national GHG inventories have also been identified as a priority for attention.

### ***Priority Areas***

#### **1.1 Programmes containing measures to facilitate adequate adaptation to climate change**

The INC was able to provide a comprehensive overview of all the sectors likely to be vulnerable to climate change. Chapter 3 of the INC detailed not only the areas in which T&T was most vulnerable but also suggested ways in which we could adapt to climate change. Some of the vulnerable sectors identified in the INC were terrestrial and aquatic ecosystems, hydrology and water resources management, food and fibre production, human infrastructure and human health.

However apart from a vulnerability study done on the sugar cane industry, the INC was not able to report on any further studies or quantitative assessments done in the vulnerable sectors identified. The SNC should provide more detailed information on adaptation programmes undertaken through participation in regional programmes such as CPACC, ACCC and MACC. This should include the detailed findings of the pilot study done on the economic valuation of resources in selected coastal ecosystems at risk from sea level rise. There should also be follow up on the progress of some of the findings and measures highlighted in the INC. These included:

- Implementation of an integrated water resources planning and management programme to address water allocation in sectors such as agriculture, industry and tourism.
- Use of natural gas as a less carbon intensive fuel in the transport sector.
- Watershed management programme
- Intensive ongoing research programmes to address the issue of crop suitability, diversification and resiliency in light of projected temperature and sea level rise.
- Public awareness and education programmes
- Technology needs, capacity building, research and development relevant to climate change
- Incorporation of climate change into all relevant aspects policy, planning and development.

The above were highlighted as measures either ongoing or necessary to adapt to climate change. The SNC will therefore provide information on what has been done thus far to implement these measures. As it is likely that not all of these measures and recommendations put forward for adaptation would have been achieved, the SNC will also identify the constraints and barriers faced. It should be noted that during the consultation process, studies on vulnerability and adaptation to climate change were identified as significant priority needs for T&T. The INC made mention of Global Circulation Models (GCMs) which can give an indication of likely future climate changes for T&T. However, there is a high degree of uncertainty in the projections for small islands such as T&T. The INC recommended training in predictive computer modeling, interpretation of models for Global Change Scenarios and climate change impact assessment. Further to this it has been recognized that there is a need for statistical downscaling of global models so that climate change projections allow for a higher degree of certainty. This is necessary to ensure proper assessment of vulnerability level and adaptation options in the various sectors. While some work has already been initiated with respect to statistical downscaling of global models, this is an area that will be further addressed in the SNC.

A significant part of the INC addressed “concerns, obscurities and areas for capacity building and improvements in understanding the systems being impacted on” (INC of T&T under the UNFCCC, 2001). Many of the priorities identified in the INC do not vary greatly from those identified in the consultation process for this proposal. During the consultation process it was stated that the following priority needs, if undertaken, would contribute significantly to T&T’s obligations under the UNFCCC:

- Data generation, data collection and the required policy to ensure data availability and data sharing
- Vulnerability studies and adaptation assessments
- Training and Research
- Institutional arrangements to ensure efficient access/sharing of reliable data.

A review of the State of the Environment (SOE) Reports from 2000-2002 also indicate areas of concern. The SOE 2001 and 2002 Report presented T&T’s environmental vulnerability using an Environmental Vulnerability Index (EVI). Indicators were scored on a vulnerability scale of 1-7 where scores of 5-7 indicated above average vulnerability. Some of these indicators were relevant to climate change and can be used to not only emphasize but also justify the need to prioritise

assessments and studies in certain areas. Some of the indicators relevant to climate change can be highlighted as follows:

- Sea Surface Temperature – T&T scored a 5 on the EVI which suggested that the country had a slightly more than average vulnerability to environmental stress resulting from rising sea surface temperatures. This is of concern due to its impact on fisheries, the frequency of hurricanes and the rate of coral bleaching. This also highlights the need for the monitoring of sea surface temperatures.
- Lowlands (Percentage of land area less than 10m above sea level)- Trinidad and Tobago scored 3 and 2 respectively on the EVI suggesting that both islands are slightly vulnerable to such events as sea level rise and flooding. Such events could therefore affect areas less than 10m above sea level resulting in loss of habitats.
- Rate of Loss of Natural Cover (Net percentage of land area changed by removal of natural vegetation over the last 5 years)- T&T scored a 7 on the EVI scale for this indicator suggesting that the country is highly vulnerable to loss of naturally vegetated areas.
- Renewable Water (Mean percentage of water usage/year met from renewable and non declining sources)- The EVI score obtained for this indicator was 7 which suggests that both T&T have a very high demand on the water resources of the island. This highlights the need for careful management of watersheds and rivers.
- Vehicles (Number of vehicle per km<sup>2</sup> land area)- Trinidad scored a 7 on the EVI scale suggesting that the island is very vulnerable to air pollution from vehicles.
- Coastal Populations (Density of people living in coastal settlements i.e with a city centre within 20km of the coast) – T&T both scored 7 for this indicator. This suggested that coastal areas are very vulnerable to pollution and other negative impacts of highly developed areas. The possibility of sea level rise associated with climate change further increases the vulnerability of coastal populations and highlights the need for development control and adaptation assessments in these areas

It is very clear that many of the priorities identified in the INC have not changed. The SNC will therefore serve as a continuation of the areas of work and priorities identified in the INC. The SNC will now detail specific national programmes to deal with these priority areas. There is also a need for studies and assessments in these areas to be more quantitative and comprehensive. The SNC will therefore outline the efforts required to achieve this.

## 1.2 Programmes containing measures to mitigate climate change

T&T contributes only a miniscule fraction of global GHG emissions. As such, adaptation options were recognized as a priority compared to GHG emission abatement. Despite this it was stated in the 2000 SOE Report that T&T was the most industrialized country in the Commonwealth Caribbean region and one of the major contributors to GHG emissions among developing countries on a per capita basis. It was also found that T&T's transportation sector had a significant impact on air quality. The GHG inventory in the INC identified the transportation sector as a significant contributor to GHG emissions. It is expected that this situation is such that at present the transportation sector continues to be a significant source of air pollution. Furthermore since the 2000 SOE Report the energy sector of T&T has only continued to expand at an aggressive pace suggesting that T&T would still be a major contributor to GHG emissions in the developing world.

As T&T's industrial, manufacturing and transportation sector continue to expand at a rapid rate, the SNC will need to address the issue of GHG emission abatement, land use change and forest availability for carbon sequestration. In addition to air pollution regulations and sections dedicated to air pollution, motor vehicle emissions and GHGs in the National Environmental Policy, the SNC must also focus on mitigation studies. Work done by the EMA on continuous air monitoring and development of emission standards and limits should be detailed in the SNC.

### 1.3 Other information considered relevant to the achievement of the objective of the Convention

A report on the outcome of Phase II Enabling Activities should be included in the SNC. This report will provide information on the country's progress with respect to technology needs assessments, climate observing systems and capacity building. Specific recommendations will be outlined with respect to capacity building for participation in systematic observation. In the area of capacity building the SNC will report on the advances made in the area of education on climate change. The availability of a university course on climate change and plans for further courses, training and research will be documented. The recommendations for capacity building will also focus on the need for monitoring equipment in the areas of rainfall, air and sea surface temperatures and salinity indicators and also for training in the downscaling and interpretation of climate models. Recommendations and strategies will also be put forward to deal with current institutional barriers and shortcomings of the systems in place to deal with climate change.

### 1.4 Constraints and gaps, and related financial, technical and capacity needs

A section of the SNC will also be dedicated to addressing constraints and gaps encountered when preparing each section of the Communication. This will also include any related financial, technical and capacity needs. The constraints, gaps and needs highlighted in the INC will also be outlined with a view to determining whether they have been addressed and their current status. Problems with the overall implementation of the UNFCCC will also be highlighted.

## **Institutional Framework for Project Implementation**

It is expected that institutional arrangements which existed for the INC will remain in place for preparation of the SNC. The project will be executed by the Environmental Management Authority (EMA) and the Ministry of the Environment, under the supervision of a Climate Change Working Group appointed by Cabinet to determine the Implications of Global Warming, Climate Change and Sea Level Rise. There is one officer at the EMA assigned to Climate Change on a part-time basis. The officer chairs the Climate Change Working Group and also serves as the Secretariat. The Working Group has representation from relevant groups which include government ministries, NGOs and the private sector. Consultants will be hired as appropriate to undertake specific activities detailed in the work plan.

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