OUTLINE OF PRESENTATION

• What is climate change, and what is special about it today
• What the scientists are saying about the impact on the Caribbean
• Impacts on the economy and the society
• Strategies for Adaptations
  ¢ Government
  ¢ Private Sector
  ¢ Civil Society
The Greenhouse Effect

Solar radiation passes through the clear atmosphere. Some solar radiation is reflected by the Earth and the atmosphere.

Some of the infrared radiation passes through the atmosphere, and some is absorbed and re-emitted in all directions by greenhouse gas molecules. The effect of this is to warm the Earth's surface and the lower atmosphere.

Most radiation is absorbed by the Earth's surface and warms it.

Infrared radiation is emitted from the Earth's surface.
GREENHOUSE EFFECT - II

SUN

Carbon dioxide and other 'greenhouse' gases
PASTERZE GLACIER, AUSTRIA, 1875
PASTERZE GLACIER, AUSTRIA, 2004
The Melting Snows of Kilimanjaro

1912

2002

Glaciers

Ice

Estimated line

Total Area of Ice

Sources: Meeting of the American Association for the Advancement of Science (AAAS), February 2001; Earthobservatory.nasa.gov.
TUVALU, PACIFIC

Tuvaluan kids hang out as extra high tide floods neighborhood. © 2005 Gary Braasch/ World view of Global Warming
PALISADOES, JAMAICA, 2006
CORAL – BLEACHING I
THE AUTHORITATIVE STUDIES - I

- **Stern Review**
  - Economic cost of climate change, mitigation, adaptation

- **Convenient Truth** – Al Gore’s documentary

- Recent study from the University of East Anglia found that greenhouse gases are increasing faster than expected
THE AUTHORITATIVE STUDIES - II

- IPCC – 4th report
  - Certain that human activity is one of the main factors accounting for the rate of climate change through the discharge of greenhouse gases – carbon dioxide, methane, water, nitrous oxide.
  - Note five Caribbean persons on the IPCC – Agard from St. Augustine, Nurse from Cave Hill, Chen from Mona, plus 2 others
CHANGES IN CARIBBEAN CLIMATE

Caribbean will probably experience

- Temperatures increasing by 2-3 centigrade (3.6 to 5.4 degrees Fahrenheit) by 2080.
- Sea level rise by 0.2-0.5 metre (8 inches – 20 inches) by 2090.
- Decreased rainfall June to August, and perhaps more intense rainfall.
- Increased intensity of hurricanes, and possibly more frequent.
If the rate of discharge of Greenhouse gases into the atmosphere increases, the climate changes can become more dramatic:

- hotter temperatures
- higher sea levels
- more severe drought
- more intense hurricane activity

Note the “Tipping Point”
Warm temperatures will mean:
- Less severe winters => less demand for vacations in Jamaica by North Americans
- **Warmer seas** => coral bleaching => damage to reefs =>
  - less protection for beaches
  - Less fish and other marine life on the reefs => less attractiveness to divers and other tourists
- More intense hurricanes => greater risk of damage to hotels
- More prevalent diseases, like malaria and dengue

All of which will discourage tourists
LIVE CORAL

DEAD CORAL
IMPACT ON TOURISM - II

- **Higher sea level =>**
  - beach erosion
  - Damage to coastal structures, like hotels, airports and other infrastructure relevant to tourists
  - Salination of ground water and underground fresh water sources

- **Reduced rainfall =>** slow recharge of freshwater surface and underground supplies. This could become a major constraint on the supply guest services
EROSION IN MIAMI BEACH - 2006

Heavy beach erosion on Singer Island.
TOURISM – GREENHOUSE GASES

- Tourists are major users of fossil fuel for:
  - electricity for lighting and cooling
  - international air and sea transport
  - ground transport
  - recreational vehicles

- The carbon dioxide is emitted in the atmosphere
TOURISM – MITIGATION

The Tourist Industry needs to help to mitigate the rate of climate change by:

- switching to alternate and renewable energy sources, such as solar energy,
- minimising activities that use petroleum energy
- placing high priority on energy and water conservation
The Tourist Industry must pay attention to strategic adaptation measures:

- Locating facilities further from the sea
- Designing buildings to maximize natural lighting and cooling, and to cope with hurricanes and other extreme weather events
- Protecting the natural defences of the beach – reefs and wetlands
- Energy and water conservation
Agriculture will be impacted by:
- **Warmer temperatures** => reduced productivity of some crops
- **Longer periods of drought** alternating with flooding
- **Salination of water** supplies and soil => decline in soil fertility
- **Hurricanes** and other extreme wind events

Fishing will be impacted by:
- Damaged reefs
- Disappearance of species
Developing countries, whose economies often rely heavily on one or two agricultural products, are especially vulnerable to climate change. This graphic shows that with an increase of only 2 degrees Celsius, there would be a dramatic decrease in the amount of land suitable for growing Robusta coffee in Uganda.
The impact on agriculture threatens the domestic component of the national food supply.

Decline in food supply => price increases => major impact on inflation => impact on macroeconomic stability

Imported food prices are expected to rise as a result of:

- Declining productivity in the foreign sources in the temperate countries because of warmer temperatures
- Increased demand from poor countries because of the weakness of their domestic supplies as well
Some strategies to adapt to climate change are:

- Greenhouse technology for commercial agriculture
- Irrigation systems to cope with drought
- More careful land preparation to manage intense rains and minimize soil erosion and other forms of destruction
- New crop patterns that can cope with higher temperatures, more resilient to hurricanes, and recover quickly from damage
Avoid extending cultivation on lands that are vulnerable to flooding

Pull back from the cultivation of steep hillsides without proper terracing

There is likely to be renewed urgency for land reform to facilitate agriculture that has been losing land to housing and other commercial developments
FISHING - ADAPTATION

- Sustainable fishing practices:
  - Do not catch the young fish
  - Do not disrupt breeding
  - Cease destructive fishing practices such as dynamiting and the use of compressors to keep divers on reefs for long periods
- Cease reef destruction and allow fish stocks to recover and adapt to the increasing sea temperature
increased water supply problems during the dry seasons resulting from lower minimum streamflows and declining water levels.

more frequent flash flooding due to more intense short duration rainfall

drier average conditions affecting recharge of water sources

Saline intrusion => pollution of fresh water sources
Decreased water quality due to:
- very low flows
- lower water levels
- higher temperatures
resulting in increased levels of bacterial, nutrient and metal contamination
Increase in flooding could increase the flushing of urban and agricultural waste into source water systems.
Increasing water demands with higher temperatures and greater evaporation
WATER - ADAPTATION

- Improved management of water to cope with:
  - Drought; hence storage and irrigation systems
  - Flooding; proper drainage and catchment systems
  - Conservation, e.g. low-flush toilets, reduced water use for showers
  - Protection of surface and ground water sources from sea water intrusion
  - Protection of watersheds to maintain rainfall and catchment
IMPACT ON PHYSICAL INFRASTRUCTURE

Note the location of the following on the coast:

- Hotels and tourist attractions
- Airports
- Seaports, and particularly cruise ship piers
- Coastal highway
- Central Bank, Conference Centre in downtown Kingston
- Large sections of the Portmore Community in St. Catherine
COASTAL POPULATION

- 500,000 persons live within 1 kilometer of the coast
- Coastal towns –
  - Kingston
  - MoBay
  - Port Antonio
  - Black River
  - Port Maria
  - Ocho Rios
  - Negril
  - Annotto Bay
  - Savanna la Mar
  - Falmouth
POPOPULATION AT RISK

- **Poor**, who are most likely to live:
  - on marginal lands that are prone to flooding
  - on coastal lands that are vulnerable to the sea
  - in communities with substandard and inadequate supplies of fresh water, and waste disposal

- **Children and the Aged** who are particularly vulnerable to natural hazards. Some estimates are that 50% of the victims of natural disasters are children.
INUNDATION OF THE COAST LINE OF KINGSTON
SOME PEOPLE WILL RISK EVERYTHING
an increase in the incidence of vector-borne diseases such as dengue fever and malaria

an increased risk of diseases such as cholera, diarrhea and dengue fever due to shortages of fresh water, poor water quality during periods of drought and contamination of fresh water supplies during floods and storms
ADAPTING TO CLIMATE CHANGE
HEALTH - ADAPTATION

- Public Education
  - Government, private sector, civil society must run a continuous programme on health education in general and the impact of climate change in particular
  - Integrated within school curriculum

- Sanitation
  - School children as monitors of community health

- Supply of clean water
  - Monitoring community supplies – again a role for school children to collect samples and run simple tests

- Campaign against mosquitoes as permanent feature of community life
SECURITY

- Both the USA and the UK militaries have issued major studies giving top priority to climate change as a threat to national security due to:
  - Competition for resources, particularly water that may lead to conflict that they feel require their intervention
  - Relief efforts from natural disasters – e.g. Katrina in New Orleans
  - Illegal migrants fleeing disasters in their own countries
- Jamaica also has to pay attention to conflict arising from competition for scarce resources, disaster relief, and illegal migrants from neighbouring countries.
National strategy requires the partnership between the Government, Private Sector and Civil Society *over the course of the 21st century*

Government

- mainstream climate change in its development strategy, the policies to support the strategy, and the projects to implement the policies.
- All Ministries and government agencies have to take climate change into account in their plans
- Support international efforts to mitigate Greenhouse gas emissions
Government (continued):

- Regional cooperation to research regional impacts of global climate change, and to implement adaptation measures – e.g. joint management of the Caribbean sea, disaster prevention and response, funding for climate change projects
  - Climate Change Centre – regional response; mandated 2002, begun 2004
- Devise incentives to encourage adaptations to climate change
- Provide leadership and support to the efforts of the private sector and civil society
PRIVATE SECTOR

Private Sector

- Invest in adaptation measures for their businesses:
  - man-made defences against the intrusion of the sea, protection of natural defences against the sea
  - Alternative energy solutions
  - Energy and water conservation
  - Siting new investments away from the sea shore
  - Adopting designs for buildings that maximize natural lighting and cooling
- Support research and public education
- Participate in public policy making and implementation
CIVIL SOCIETY

- Public education
- Research at the community level
  - Documenting traditional knowledge of local climate
  - Integrating climate monitoring in school curriculum
  - Both of those should feed into a national database
- Mobilizing community action to manage water
- Mobilize coastal communities to protect themselves against rising sea levels – from building defences to relocation
- Mobilize communities for disaster preparedness and recovery
GoJ committed us to pursuing a sustainable development strategy since 1992 in UNCED at Rio, re-committed us in 1994 in the BPOA for SIDS, in the MDGs of 2000, and in many international agreements.

Sustainable development embraces:

- utilizing the Earth’s resources today without depriving succeeding generations
- Eliminating poverty and inequity
- Participation of all sectors of society in governance
Adaptation to climate change is yet another reason for implementing sustainable development strategies because it requires us to:

- have a more harmonious and respectful relationship with the environment in the interest of the generations to come
- switch to renewable energy solutions
- conserve natural resources, especially water
• address the vulnerability of the poor
• adopt a participatory approach to governance.

Sustainable Development is the strategy for reducing the emissions of greenhouse gases that are accelerating climate change, while adapting to the changes that are well underway and cannot be reversed.
THANK YOU