

**GLOBALIZATION, CLIMATE CHANGES  
AND RURAL RESILIENCE  
MAY 2012**

**THE SUGAR INDUSTRY AND  
CLIMATIC CHANGES**

# BACKGROUND

- Mankind in their quest for a better life has largely ignored the need for sustainability.
- This notion of bringing prosperity has also brought GLOBAL WARMING which has become detrimental to our existence.
- This process has effects on the environment, on culture, on political systems, on economic development and prosperity, and on human physical well-being in societies around the world.

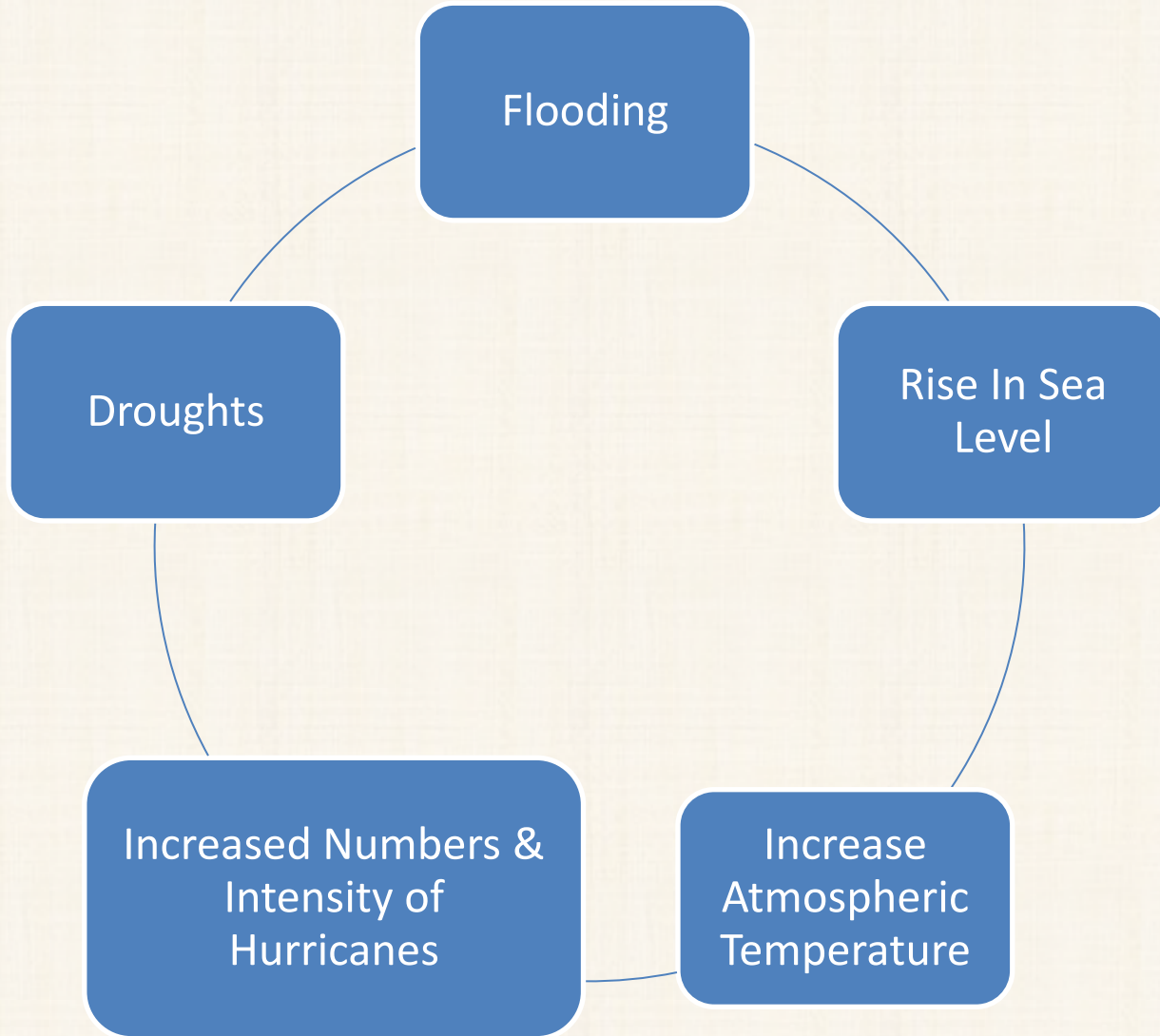
# Global Warming

- Global Warming is a negative environmental outcome that results from the increasing emission of Green House Gases (GHG). GHG includes:

- ✓ Carbon dioxide (CO<sub>2</sub>)
- ✓ Methane (CH<sub>4</sub>)
- ✓ Nitrogen Oxide (NO<sub>3</sub>)
- ✓ Ozone (O<sub>3</sub>)

Some consequences of Global Warming have been accelerated resulting in detrimental climatic changes.

# ENVIRONMENTAL IMPACTS



# Global Warming

- The Marshall Islands as we speak are at risk of being submerged due to rising sea levels.
- Jamaica as an island state may not be experiencing such drastic changes as the Marshall Islands but sooner or later we could.
- Hence, it is in our interest as a nation to take the necessary precautions to help slow down the process of global warming.

# OBJECTIVES

- Lets explore the activities surrounding the sugar cane production in Jamaica and its contribution to global warming.
- Consider the following:
  - How sugar cane production contributes to global warming and climatic changes?
  - The effects of global warming and climatic changes on the sugar industry?
  - What can be done to either stop or reduce its emission of carbons to the environment?
  - What are the environmental and economical benefits with the implementation of these recommendations that will either stop or reduce the emission of Carbon in the atmosphere?

# SUGARCANE PLANT

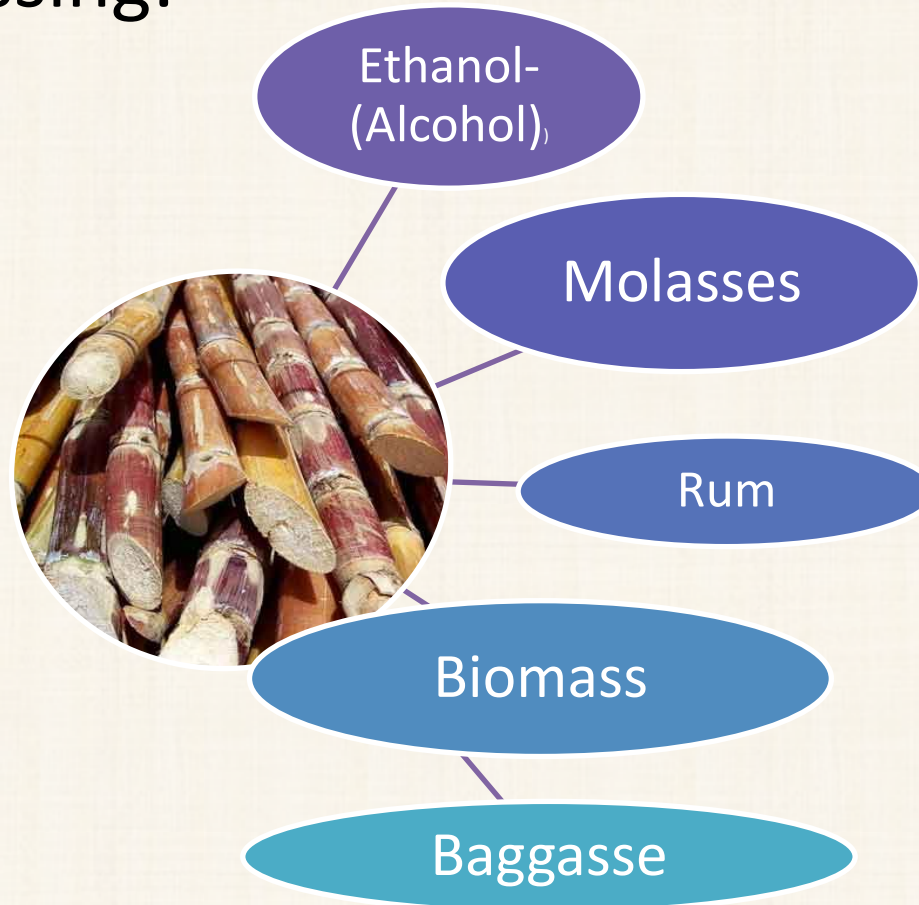
SUGARCANE belongs to a group called C<sub>4</sub> plants . This group represents about 5% of Earth's plant biomass and 3% of its known plant species yet they account for about 30% of terrestrial carbon fixation.

C<sub>4</sub> plants are amongst the most efficient converters of carbon to energy.

Increasing the proportion of C<sub>4</sub> plants on earth could assist biosequestration of CO<sub>2</sub> and represent an important climate change reduction strategy.

# SUGAR CANE PRODUCTION

- Apart from producing sugar, sugar cane produce a number of by products from its processing:





# SUGAR CANE PRODUCTION

- Burning of sugarcane fields is carried out before harvesting.
- About 80% of the “trash,” including straw, the tops, and green and dry leaves, are burned off.
- These components constitute about 25% of the entire sugar cane biomass.
- The burning kills microorganisms and burns the trash, both of which keep the soil rich when left in the fields.
- The gases released from the burning activity contribute to global warming.

# ENVIRONMENTAL IMPACTS

- ❑ A study done in Brazil found that 2406 kg of carbon dioxide equivalent was emitted per cultivated hectare of sugarcane, and 26.5 kg of carbon dioxide equivalent found per a ton of sugarcane processed.
- ❑ The major part of the total emission (44%) resulted from residues burning; about 20% resulted from the use of synthetic fertilizers, and about 18% from fossil fuel combustion in machinery.

# ECONOMICAL & ENVIRONMENTAL OPPORTUNITIES

Options sugar cane to reduce emissions of carbons to the atmosphere are:

Harvesting Green: This process will reduce the carbon emission.

The Biomass and Baggasse can be used to generate power and thus reduce our import of oil.

Ethanol from sugarcane can reduce not only the amount of oil imported BUT also the carbon emission.

# ECONOMICAL & ENVIRONMENTAL OPPORTUNITIES

With the decrease of oil import, in addition to making our own electricity will create employment for our people and stimulate the economy.

A United Nations, based report , found that ethanol from sugar cane as produced in Brazil "*in some circumstances does better than just "zero emission."* If grown and processed correctly, it has negative emission, pulling CO<sub>2</sub> out of the atmosphere, rather than adding it.

# **CURRENT FEATURES OF JAMAICAN**

## **SUGAR INDUSTRY**

- Single product – sugar provides 90% of revenue.
- Labour intensive, utilizing predominantly low skill labour.
- Contributing to Global warming.
- Low returns on investment.
- Primarily Rural Base Business
- Old Plants and machineries.

# CURRENT FEATURES OF JAMAICAN SUGAR INDUSTRY

76 % of production are from coast line estates.

95 % of fields are burnt before harvest.

Directly employs over 20,000 persons.

Burning of Bagasse to produce power is under very inefficient conditions.

Molasses is used in the manufacturing of bulk and branded rums.

# SUGAR CANE PRODUCTION

The Sugar Industry is the oldest continually operating industry in Jamaica, it is the largest foreign exchange earner and employer of labour in the Agriculture sector.

The table 1: Numbers of Sugar Factories 1832-2012.

PARISH	1832	1852	1897	1966	1998	2012
ST. ANDREW	17	7	1	-	-	-
ST. THOMAS	82	47	7	2	1	1
ST. MARY	60	41	2	1	-	-
PORTLAND	46	17	-	-	-	-
ST. ANN	32	22	7	-	-	-
TRELAWNY	84	62	33	2	2	1
ST. JAMES	89	56	21	1	-	-
HANOVER	59	41	15	-	-	-
WESTMORELAND	48	40	22	1	1	1
ST. ELIZABETH	27	13	3	2	1	1
CLARENDON	70	49	18	3	1	1
ST. CATHERINE	56	32	5	5	2	1
<b>JAMAICA</b>	<b>670</b>	<b>427</b>	<b>134</b>	<b>18</b>	<b>8</b>	<b>6</b>

# CURRENT SUGAR FACTORIES

GOLDEN GROVE,  
ST. THOMAS

WORTHY PARK,  
ST. CATHERINE

MONYMUSK,  
CLARENDON

APPLETON, ST.  
ELIZABETH

LONG POND &  
HAMPDEN,  
TRELAWNY

FROME,  
WESTMORELAND



# Locations of Sugar Factories in Jamaica



# Table Showing: Cane & Sugar Production 2009- 2011

	2009	2010	2011	Potential
<b>Available Cane Hectares</b>	50,000	47,000	47,000	47,000
Area in Cane (ha)	33 654	35 560	35 210	46,000
Area harvested (ha)	26,296	29,890	29,044	44,000
Tonnes Cane	1 351 281	1 710 334	1,515,340	3,100,000
Sugar Produced (t)	126 381	141 576	141 576	300,000
Tc/Ts	10.61	11.99	11.99	10.33

## **GREENING OF THE JAMAICAN SUGAR INDUSTRY**

- A net increase of 2500 jobs.
- A paradigm shift in the skill set employed with high skills replacing low skills.
- Opportunities for new revenue stream such as carbon credit.
- Reduction in Green House Gas emission with spin-offs to sectors such as tourism and health.

## GREENING OF THE JAMAICAN SUGAR INDUSTRY

Research also showed that biomass-gasifier/gas turbine (BIG/GT) technology, with trash supplementing bagasse, could increase the production of electricity by a sugarcane mill by 500%.

Electricity production could increase from 55 kWh/ton cane processed to 250 Wh/ton of cane processed using both bagasse and trash.

If Jamaica's current 1.6 million-ton sugar cane industry converted its bagasse and field waste into power, the use of nearly 2.9 million barrels of oil could be avoided every year.

Converting Jamaica's sugar cane crop of around 1.6 million tons/year by using cane residues as fuel has the potential to achieve reductions in CO<sub>2</sub> emissions in the range of 130 to 200 thousand tons of CO<sub>2</sub> equiv./year, depending on the degree of technology penetration assumed.

## GREENING OF THE JAMAICAN SUGAR INDUSTRY

- One of the main feature of bioethanol production is the energy balance, ie. amount of energy input into the process compared to the energy released by burning the resulting ethanol fuel. This balance considers the full cycle of producing the fuel, as cultivation, transportation and production require energy, including the use of oil and fertilizers.
- Ethanol has a favorable energy balance, varying from 8.3 for average conditions to 10.2 for best practice production. This means that for average conditions one unit of fossil-fuel energy is required to create 8.3 energy units from the resulting ethanol.

## GREENING OF THE JAMAICAN SUGAR INDUSTRY

- Another benefit of bioethanol is the reduction of greenhouse gas emissions as compared to gasoline, because as much carbon dioxide is taken up by the growing plants as is produced when the bioethanol is burnt, with a zero theoretical net contribution.
- Several studies have shown that sugarcane based ethanol reduces greenhouse gases up to 80% , and ethanol from sugarcane is regarded as the most efficient biofuel currently under commercial production in terms of GHG emission reduction.
- The widespread use of ethanol brought several environmental benefits to urban centers examples:
  - Reduced air pollution through lower total carbon monoxide (CO),hydrocarbons, sulfur emissions.

# YOUNG SUGAR CANE FIELD



# OPPORTUNITIES

- Technology for converting sugarcane based material to power are mature and commercially viable.
- Extensive local knowledge of sugarcane production.
- Jamaica's natural environment is ideally suited to produce sugarcane.
- New and emerging technologies can be easily adopted into the local industry.



# OPPORTUNITIES

Strong and growing demand for current and potential products:

- Sugar
- Rum
- Ethanol
- Heat & electrical energy
- Pharmaceuticals

# CONSTRAINTS

## **Pricing Mechanism**

- Equitable
- Implementable
- Enforceable

# GOVERNMENT'S ROLE

- Clear and implementable policy on renewable energy source.
- Pricing mechanism.
- Promote carbon credit market.
- Support research in cellulose based fuel source.

THE JAMAICAN SUGAR INDUSTRY  
A DIAMOND STILL WAITING TO BE POLISHED

- The Jamaican Sugarcane Industry can:

Contribute to Job creation opportunities for both rural and urban workers.

Contribute to reduction in electricity cost

Reduce trade deficit

Contribute to improvements in tourism products

REDUCE GLOBAL WARMING.



THANK YOU