



*Using Adaptation Measures To
Mitigate The Effect Of
Climate Change On Food
Security In Belize*

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Learning Objectives

Objective: From the given information on climate change and food security in Belize, we will be able to:

- Develop adaptation measures for the direct and indirect affects of severe weather patterns
- Describe possible positives and negative outcomes associated with adaptation measures

Overview: Belize



- Sitting on the eastern coast of the Central American coastline facing the Caribbean Sea, Belize is the Caribbean gateway to Central America.

Belize is bounded on:

- -North by Mexico
 - -South and West by Guatemala
 - -East by the Caribbean Sea
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- Offering the best of both worlds – the majesty of lush tropical rainforest and mystery of the Ancient Maya coupled with white sand islands and a spectacular 174 mile long barrier reef – the options for adventure are endless.

Overview: Belize

- 8,800 square miles
- Population of 368,310
- Lowest population density in Central America
- Population growth rate of 1.87% per year
- English is official language



Overview: Crop Production

Traditional agricultural products

- ▶ Sugar, citrus, bananas

Non-traditional agricultural products

- ▶ Papayas, peanuts, peas, cocoa beans, honey, chicle, peppers



...or company that the authorities identify.



Overview: Crop Production

- ▶ Since the 1980s the performance of Belize's agriculture sector was the main source of growth in the Belizean economy;
 - ▶ **contributes to food security as locally grown fruit and vegetables are consumed domestically.**
- ▶ Natural disasters have contributed to a reduction in agriculture production/exports and to short-term increases in food imports.
 - ▶ **includes short-term shortages of domestic commodities such as rice, corn and beans**
 - ▶ **contributes to reduced exports of shrimp, lobster, papayas and bananas in the corresponding years, apart from damages caused to infrastructure.**
- ▶ Additionally, the presence of heat tolerant Huanglongbing (HLB) virus contributed to the reduction in Belizean citrus production

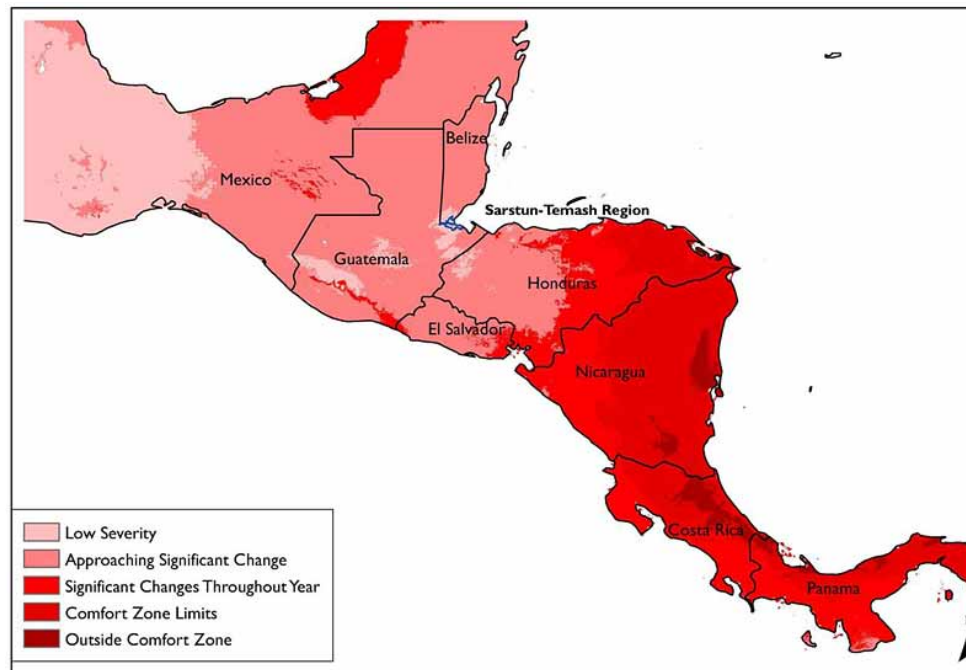
Critical Forces and Drivers:

Globalization

Fluctuation in prices received
for export commodities.

Climate change

Critical Forces and Drivers



Climate Change Severity Projections for 2020 in Mesoamerica

Sources: USAID, CATHALAC, NASA, SERVIR

High Impact/High Uncertainty Forces

Spread Of HLB
virus

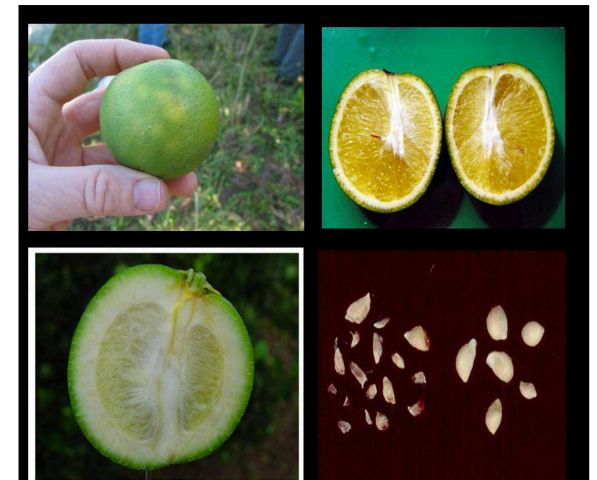
Hurricanes and
floods

Drastic changes
in rainfall

Wet dry
season, dry
wet season

Increased use
of insecticides
and
pesticides

High Impact/High Uncertainty Forces



High Impact/High Uncertainty Forces



Courtesy of Dr. Elica Moss



Adaptation Measures

- Action plan used to adjust and deal with impacts of climate change
 - *Anticipatory*: created before impacts occur
 - *Reactive*: created in response to changed conditions

Future Scenarios

- ▶ Unusual rainfall in dry season
- ▶ Significant 9 month drought





Scenario One:

- ▶ Belize experiences an unusual increase in rain during the dry season, causing substantial flooding and destroying 50% of the crop fields and citrus orchards.

Factors to consider:

- ▶ Agriculture food production
- ▶ Trade economy
- ▶ Rainfall and temperature
- ▶ Pests, diseases, and soil fertility



5 Anticipatory Actions That Respond To Flooding

- **Apply Green Infrastructure Strategies**
- **Consider Storm water Management Logistics**
- **Repair and Retrofit Facilities; Implement policies and procedures for post-flood and/or post-fire repairs**
- **Construct new infrastructure; Build flood barriers to protect infrastructure**
- **Plan for Climate Change; Adopt insurance mechanisms and other financial instruments)**



5 Reactive Measures That Respond To Flooding

- **Maintain Water Quality & Availability; Design new coastal drainage system**
- **Construct new infrastructure; Build flood barriers to protect infrastructure**
- **Plan for Climate Change; Adopt (crop) insurance mechanisms and other financial instruments**
- **Construct new infrastructure; Build flood barriers to protect infrastructure. Flood barriers to protect critical infrastructure include levees, dikes and seawalls.**
- **Increase System Efficiency; Finance and facilitate systems to recycle water**



Example:

- Blue roof systems are an effective practice for controlling runoff from buildings with flat roof surfaces.
- Blue roofs also aid to the impact of drought by providing a discharging point for storm-water to be reused or infiltrated into the groundwater.



Scenario Two:

- ▶ Belize experiences an increase in citrus and common domestic food production, which increases exports and financial sustainability. However, soon after Belize encounters a nine-month drought.

Factors to consider:

- ▶ Agriculture food production
- ▶ Trade economy
- ▶ Rainfall and temperature
- ▶ Pests, diseases, and soil fertility



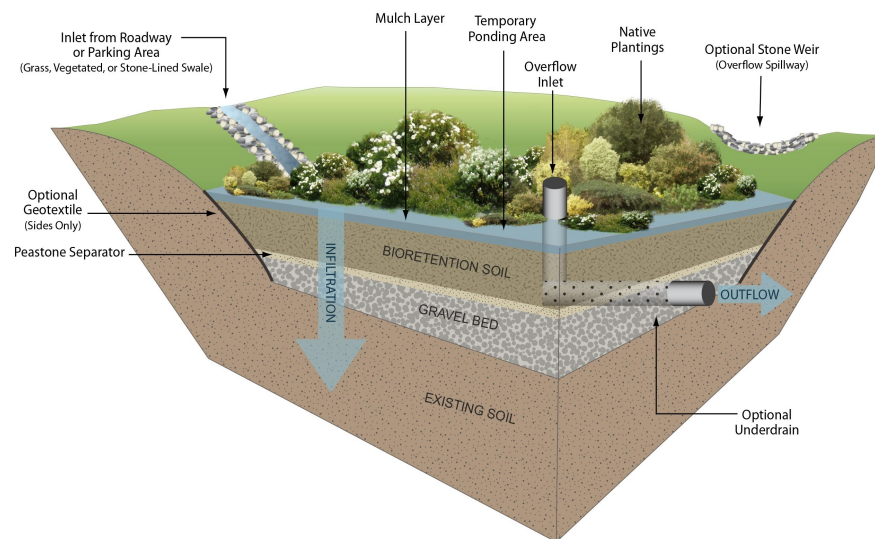
5 Anticipatory Actions That Respond To Drought

- **Use Bioretention to collect storm water runoff**
- **Manage reservoir water quality**
- **Model and reduce agricultural and irrigation water demand**
- **Adopt insurance mechanisms and other financial instruments**
- **Use Blue Roof to hold precipitation after a storm event and discharge it at a controlled rate**

Example: Water Utility Protection: Model and reduce agricultural and irrigation water demand



Storm Water Management and Water Quality: Use Bioretention to collect storm water runoff





5 Reactive Measures That Respond To Drought

- **Encourage and support practices to reduce water use at local power plants.**
- **Use Blue Roof to hold precipitation after a storm event and discharge it at a controlled rate**
- **Increase System Efficiency; Manage reservoir water quality**
- **Model Climate Risk i.e., Conduct extreme precipitation events analyses**
- **Finance and facilitate systems to recycle water**

Water Utility Protection: Model Climate Risk



- **This EPA Measure helps conduct extreme precipitation events analyses.**
- **The purpose of the measure is so that individuals would be equipped to deal with the circumstances and risks of a drought**
- **Monitoring the climate change and aquifer water levels will help predict future supply of water.**



Scenario Summary

- ▶ Extreme climate events such as extended periods of high temperatures, intense storms, and droughts can disrupt crop production or reduce yields and thus have many seriously adverse effects that will threaten food security around the world.
- ▶ Studies have shown that the vulnerability of agriculture is systematically greater for developing countries, particularly those in lower latitudes, like Belize.
 - ▶ Some crops in Belize such as maize, which are already grown near their limits of temperature tolerance, may be increasingly vulnerable to warming and drought.



Scenario Summary

- ▶ In order to improve and prevent future damage from flooding, new and natural strategies need to form to help improve Belize overtime.
- ▶ With advance technology there are ways to help Belize have plans that flow with ease. With the knowledge explained here, i.e., *the anticipatory and reactive adaptation measures*, it can be industrialized and changed as more research can be observed.
- ▶ These strategies show the cost effective and natural abilities that can protect the people, the property, and environment and overall threats to food security of Belize.



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