CLIMATE CHANGE: CHALLENGE OR OPPORTUNITY FOR INFRASTRUCTURE PLANNING

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Jamaica - Rainfall and Infrastructure

What are recent trends in rainfall regimes?

What are the implications for drainage infrastructure?

CLIMATE CHANGE – THE CARIBBEAN

ANALYSIS OF CLIMATE DATA 1950-2000

CLIMATE STUDIES GROUP

UWIMONA *et al*

RAINFALL ANALYSIS JAMAICA 1998 - 2009

Burgess 2011

Rainfall under Climate Change

Where model predicts a decrease, it is seen as reduced frequency of heavier events

Where model predicts an increase, it is seen as increased frequency of heavier events

This is consistent with the global outlook.

(Modelling by MCSG)

Rainfall

Hurricanes also relevant for rainfall

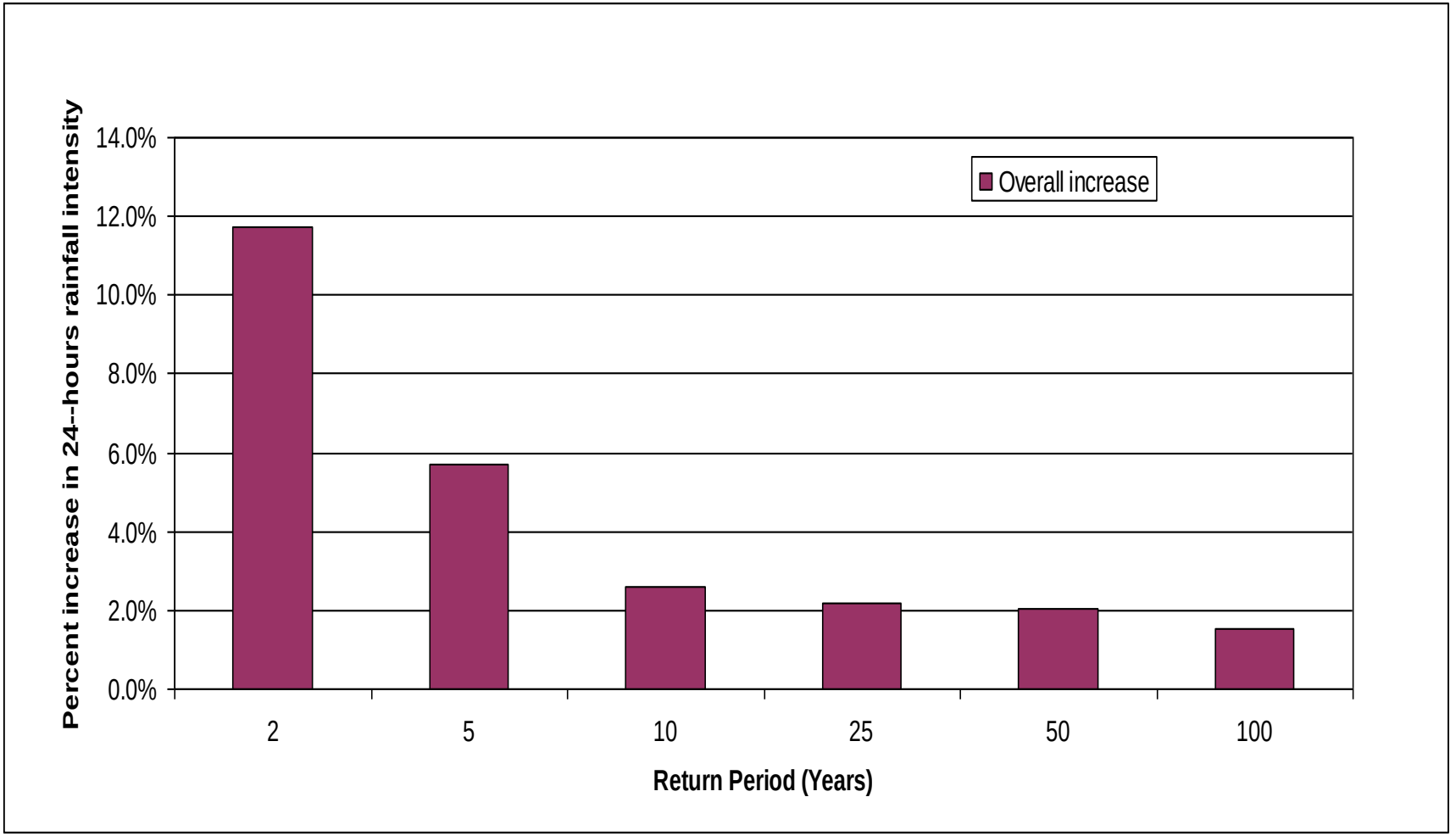
Frequency of storms may decrease but the number of intense storms is likely to increase – more Cat 4,5 with **up to 20% increase in precipitation rate within 100km of storm centre** (Taylor, pers. comm. 2011).

RAINFALL INTENSITY -Jamaica

Analysis of 1988 – 2009 data suggests

Rainfall intensity is increasing

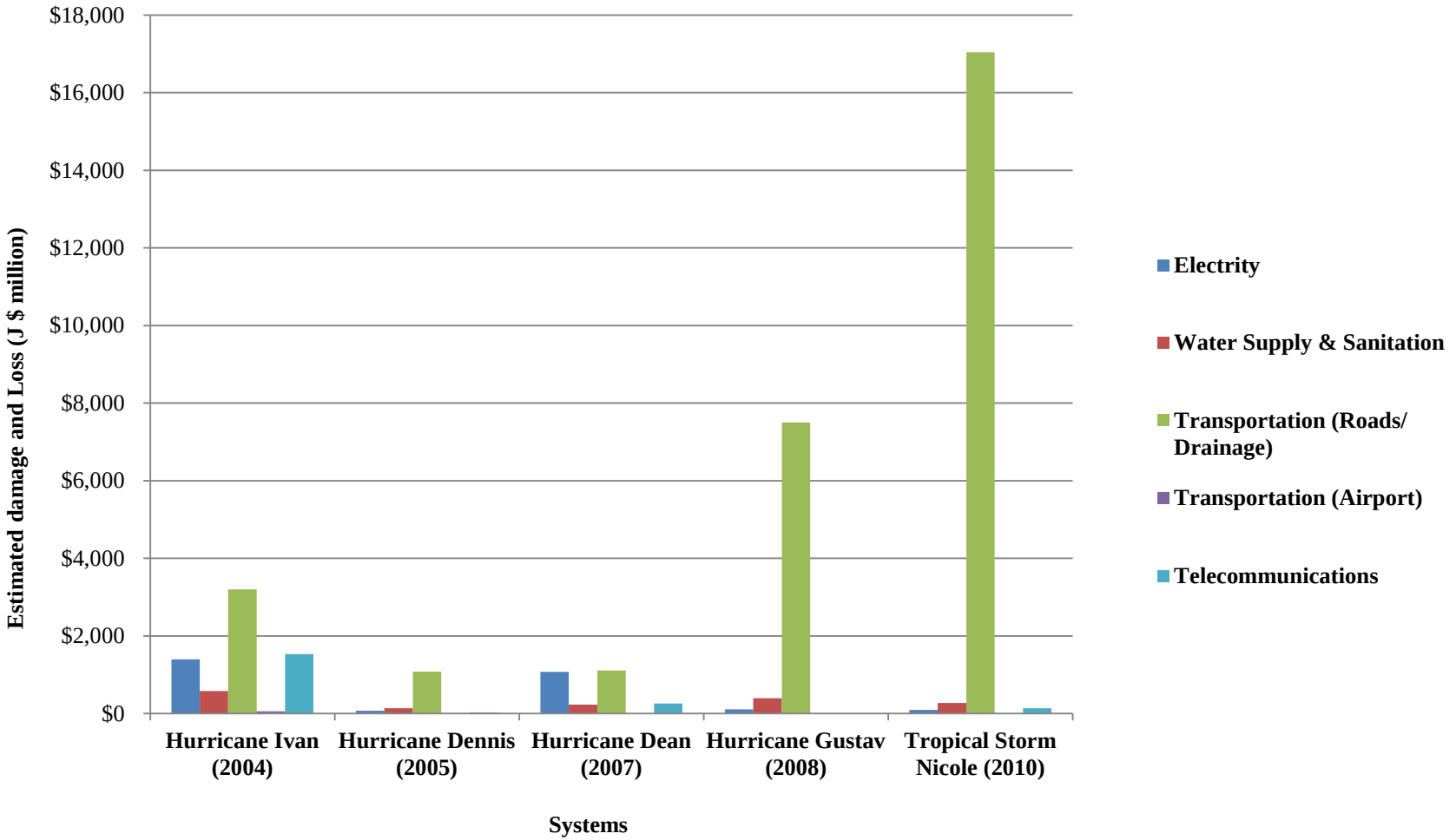
Overall increase in 24-hours rainfall intensity for the period between 1988 and 2009 (Burgess 2011)



IMPACT ON INFRASTRUCTURE – HYDROMET EVENTS

- 2004 – 2010 - J$ 28billion road and drain damage from hydrometeorological events

Impact of Selected Weather Systems on Infrastructure (DRRC from PIOJ 2012 data)



Potential Impact - Road and Drainage Infrastructure Jamaica

- Approximately:

  5,612 kilometers of main road (class A, B and C)

  10,700 kilometres of drains (both natural/unimproved and engineered)

Which would be impacted by hydromet events

(Burgess 2011)

CLIMATE CHANGE UNCERTAINTY

Historical climate records are not reliable for future conditions – the future cannot be based on the past because of high level of variability in climate

Future conditions : Increased variability in rainfall, greater extremes - more frequent intense rainfall, more frequent droughts, coupled with increased urbanisation -

CLIMATE CHANGE UNCERTAINTY

- Study in Washington State “drainage infrastructure designed using mid 20th C records may be subject to future rainfall regime that differs from current design standards.”

  (Rosenberg et al 2010)

CLIMATE CHANGE CERTAINTY

The future is now……..

It is happening, will continue to happen

CLIMATE CHANGE UNCERTAINTY & INFRASTRUCTURE

Questions:

In view of uncertainty, how can infrastructure, particularly drainage systems be designed to ensure future adequacy?

(How will SLR impact on drainage systems be managed?)

CLIMATE CHANGE UNCERTAINTY & INFRASTRUCTURE

Will require a radical change in thinking about how we currently manage runoff, including a change in attitudes of society – **this cannot be viewed solely as an engineering problem.**

CLIMATE CHANGE UNCERTAINTY & INFRASTRUCTURE

Current and future approaches must emphasise soft/green approaches which provide multiple benefits and are likely to be more sustainable.

Suggested Approach

1. Define priorities for adaptation within Climate Change Policy

2. Establish vulnerability – based on climate data and projections – use the science

3. Establish level of possible/probable impact

Suggested Approach

4.Consider phased retrofit where applicable as part of planned upgrades

5. Make Appropriate design changes based on modelling/analysis

6.Public discussion on climate change and need for adaptation measures, most suitable measures for communities

Design Options (Modified from Arisz and Burrell 2006)

Approach	Advantage	Disadvantage
Design systems to handle future flows. Capacity = Current + x%	Invest now to reduce possible future losses, but manage extreme flows better	Additional cost has to be borne now
Shorter design life and upgrade in future when it becomes necessary.	Forecasting will be better – uncertainty reduced.	Future cost of upgrading likely to be high. Land area may be limited.
Flexible major drainage schemes – designate space for overflow	Reduce current costs and maintain ability to adapt to future changes	In urban areas there is pressure for high density developments. Green space may be used.

Summary

Jamaica's infrastructure is being affected by climate variability and will be affected by climate change.

Any development planning must include adaptation measures to avoid unnecessary future loss.

Measures should be based on data/science.

Societal involvement is critical to success of adaptation measures – discussions must be done

Opportunity or Challenge ?

Uncertainty provides the challenge

Certainty provides the opportunity