Flood risk and Urban Development in Belize City, Belize

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Aim and objectives

• Look at the problems faced by Belize City especially in terms of flood risk and intense rainfall.
• Review projection models for future scenarios for Belize City
• Discuss implications to the Belize City area and populace and provide policy-relevant information
• Suggest issues to be addressed in planning and policy making and suggest areas of further research
Which tools were used? How & why?

- Rainfall provided some indication of changes in flood risk but no one-to-one, linear relationship was discovered.
- The weather generator (WG) provides daily time series at a point location in the City (PSWGIA weather station)
- Two Global Climate Models (aenwh from UK Hadley Centre Met Office; echam5 from MPI, Germany) were used
- Three different future scenario periods: 2020s (2011-2040), 2050s (2041-2070), and 2080s (2071-2099)
- Rainfall thresholds of 50mm, 80mm, and 150 mm
The findings

Shaded cells show where two different GCMs agree on the direction of change - orange for a decrease in rainfall and blue for an increase.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>June</th>
<th>July</th>
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<th>Sept</th>
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<td>Proportion of dry days</td>
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<td>Mean wet-day rainfall</td>
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<td>Inter-annual variability</td>
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<td>Days &gt;50mm</td>
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<td>Days &gt;80mm</td>
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<td>Days &gt;150mm</td>
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<td>Max 5 day rainfall</td>
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</table>

Left symbol = aanwh model; Right symbol = echam5 model
Max 5 day rainfall aenwh & Echam5 for the 2050s

- control
- (aenwh 2050s)
- (echam5 2050s)
- observed

Month

mm

0 1 2 3 4 5 6 7 8 9 10 11 12

Max 5 day rainfall aenwh & Echam5 for the 2050s

- control
- (aenwh 2050s)
- (echam5 2050s)
- observed

Month

mm

0 1 2 3 4 5 6 7 8 9 10 11 12
Warm Days (TX90) aenwh and Echam5 for the 2050s

Days vs Month

- Control
- aenwh 2050s
- Echam5 2050s
- Observed
Implications for policy & planning

• availability of tools will allow stakeholders to explore the implications of projected changes and aid in policy and planning for future development

• Increased number of warm days and night may cause a drought in the area

• Increased garbage and clogging of drains with dust

• Increased work for city council

• Future plans need to include more technical studies

• Need to revise building codes and integrate climate Change consideration into the engineering and design of infrastructure.
Feedback on the tools

• Considerable support needed from technical experts
• Availability of documents to help interpret data is very beneficial
• Raw data from outputs is a bit confusing and time and effort needed to interpret and understand it
• Interpreting and condensing data was a bit challenging but achievable
What more could be done?

• Need to collect sea level rise data on a country level
• Need to address absence of rain gauges on outer cayes and atolls
• Need to study the effect of storm surges on flooding in Belize City
• Need to explore and model the connection between upstream rainfall and flooding in the city
• Need to obtain outputs from more models and address uncertainty in models.
Thank you for your attention!!

Questions or comments?
Frequency rain GT 50mm for 2050s

- Control
- aenwh
- echam5
- Observed

Frequency vs. Month

- Month
- Frequency
Frequency rain GT 150mm for 2050s

- Control
- aenwh
- echam5
- Observed

**Month**

**Frequency**

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
Warm Nights (TN90) aenwh & Echam5 for the 2050s

Month

Days

control  (aenwh 2050s)  (echam5 2050s)  observed