Domestic Water Supply Vulnerability to Climate Change and the Role of Alternative Water Sources in Kingston, Jamaica

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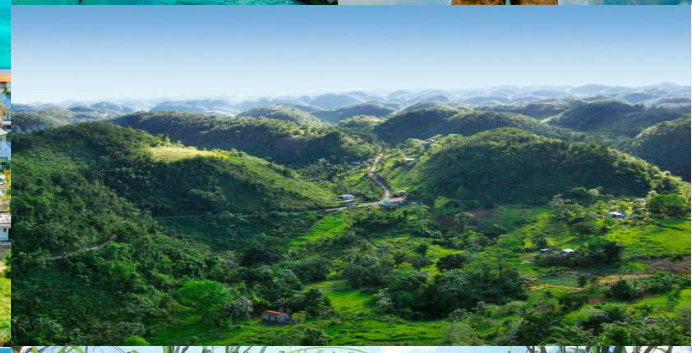
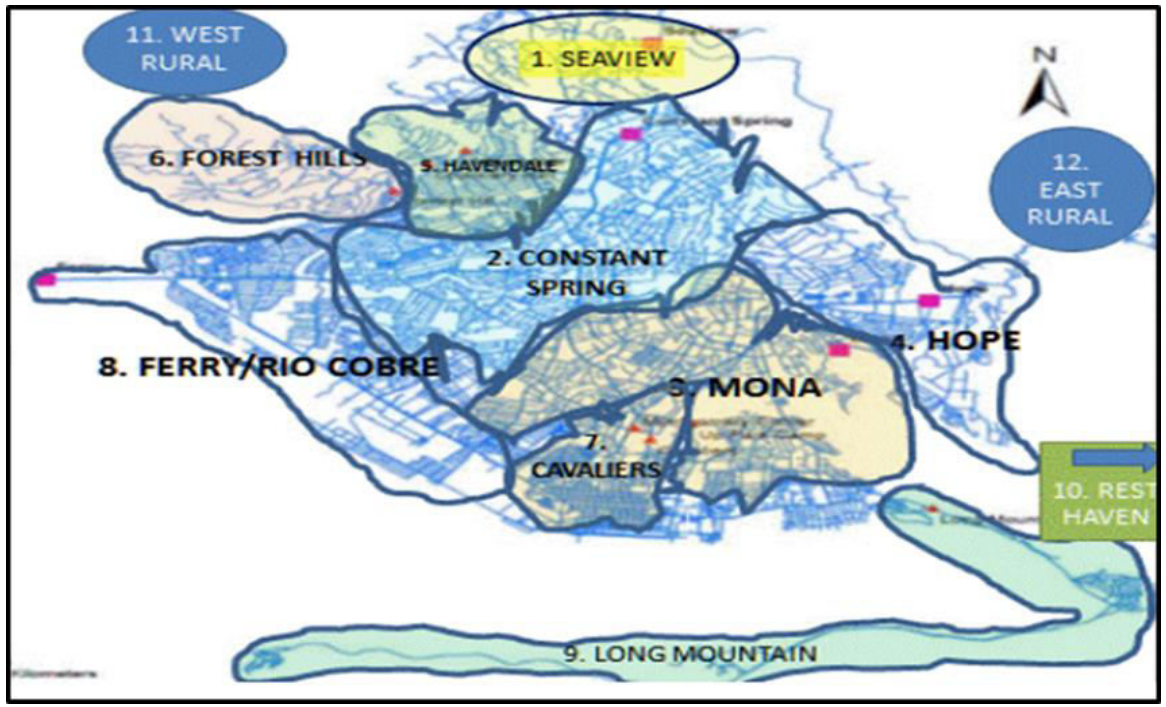
Jamaica



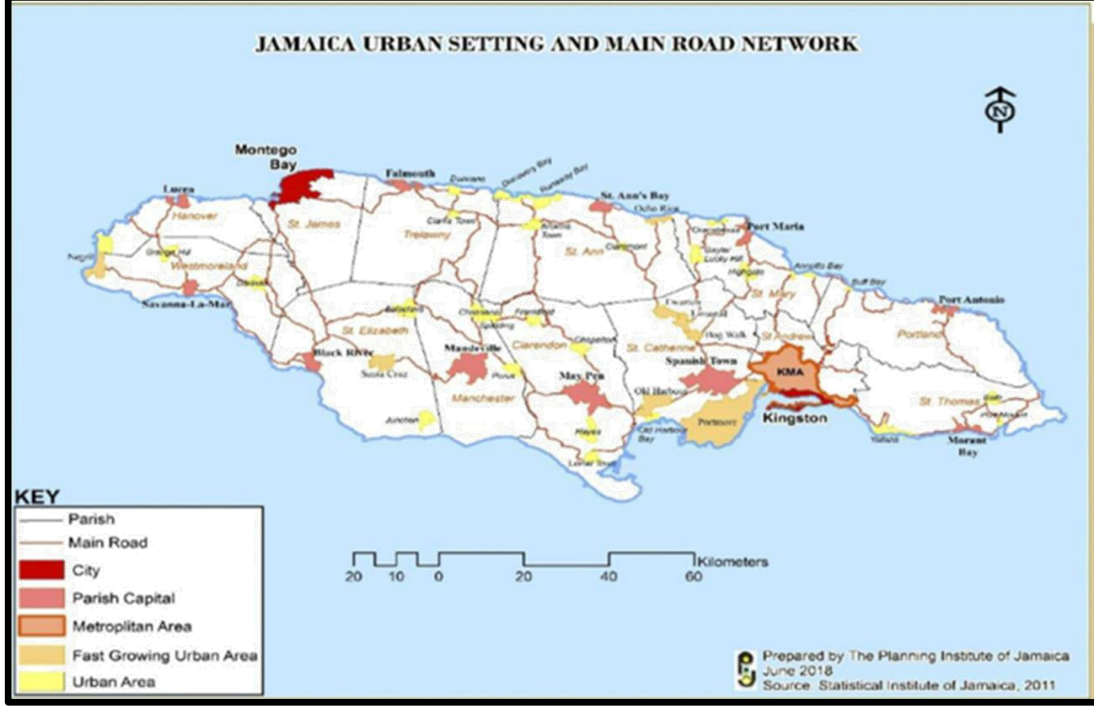
- ✓ **Location**: Jamaica is an island nation in the Caribbean Sea, located south of Cuba and west of Hispaniola. 3rd largest- 10,992 km^2
- ✓ **Population**: Approximately 2.9 million people.
- ✓ **Climate**: Tropical
- ✓ **Geological**: Known for its beautiful beaches, mountains, rainforests, and the Blue Mountain range, home to one of the world's best coffees.
- ✓ **Socio-economic**: The economy is heavily dependent on tourism, agriculture, and mining, with tourism being a major contributor to GDP.

Background – Kingston Case Study

- ✓ Bimodal Rainfall Pattern
- ✓ Jamaica Rainfall : 1981 – 2051 mm/yr
- ✓ Kingston Rainfall : as low as 762 mm/yr



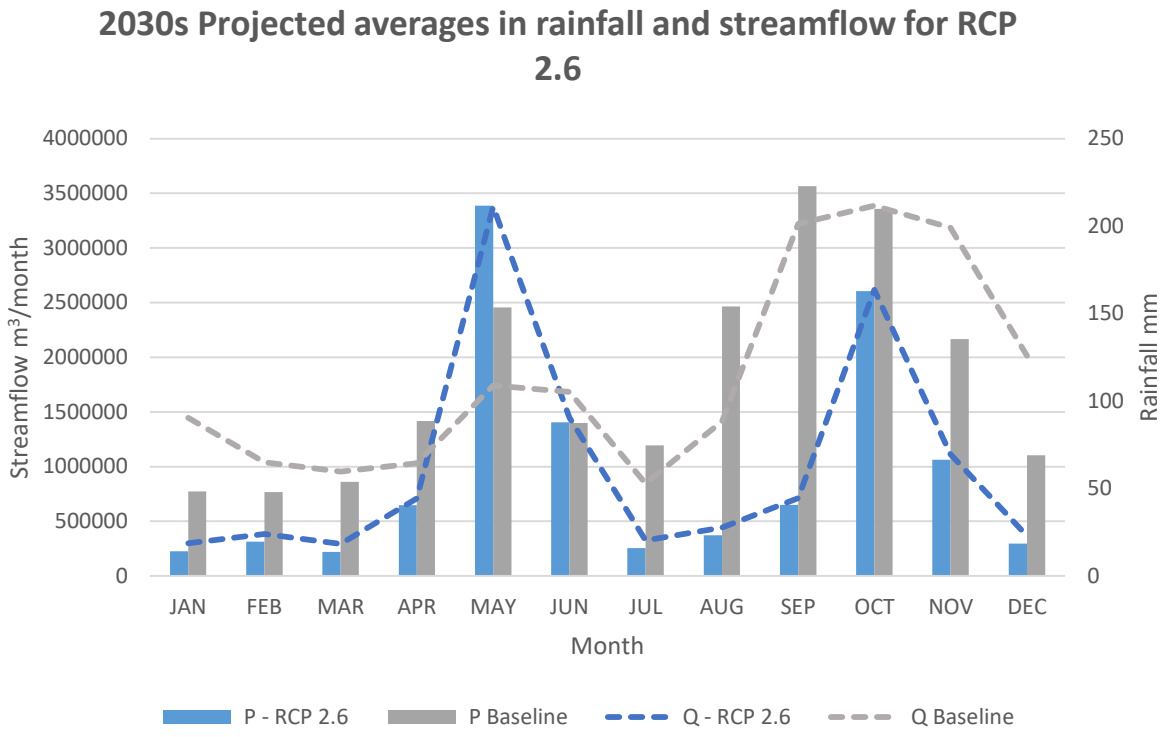
Source: NWC (2011)

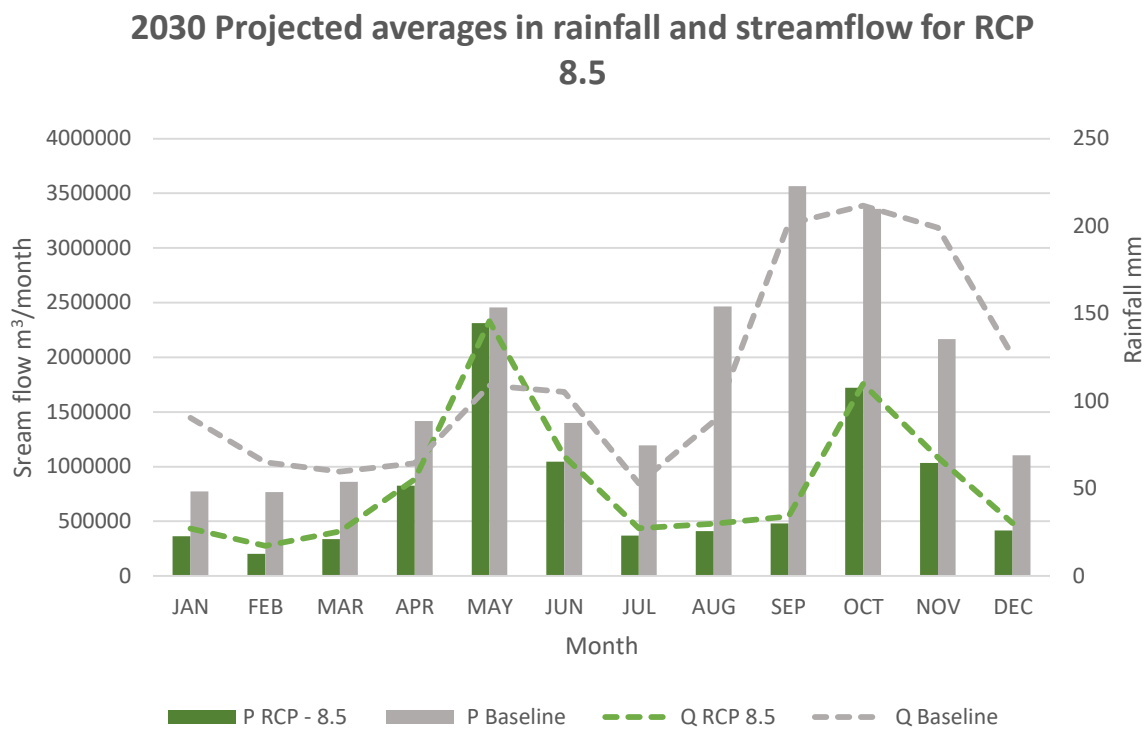


Source: PIOJ (2018)

- ✓ Kingston Population : 669, 773 (25%)
- ✓ Kingston Domestic Water Supply - 12 Demand Zones (served by surface and/or well sources)
- ✓ Augmented by supply sources outside the parish

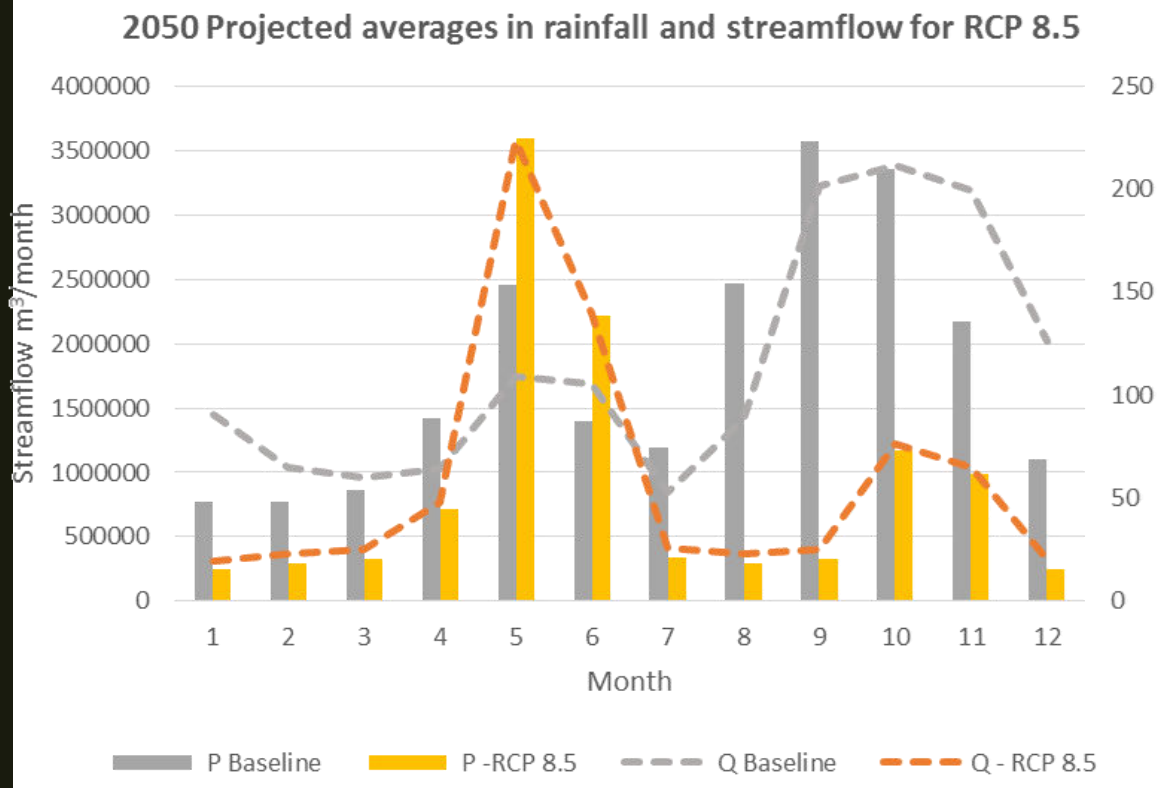
Climate Impacts - 2030

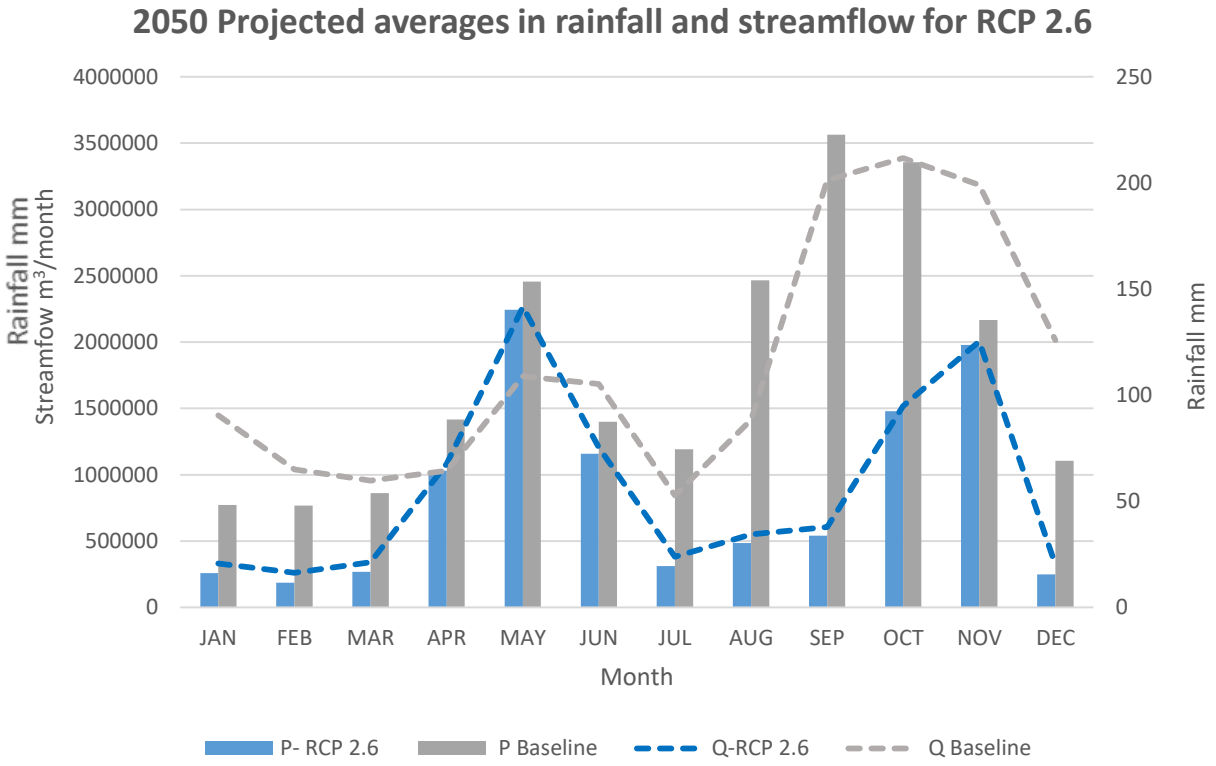




Decrease avg. monthly rainfall and streamflow by ~45%to 50%

Climate Impacts - 2050



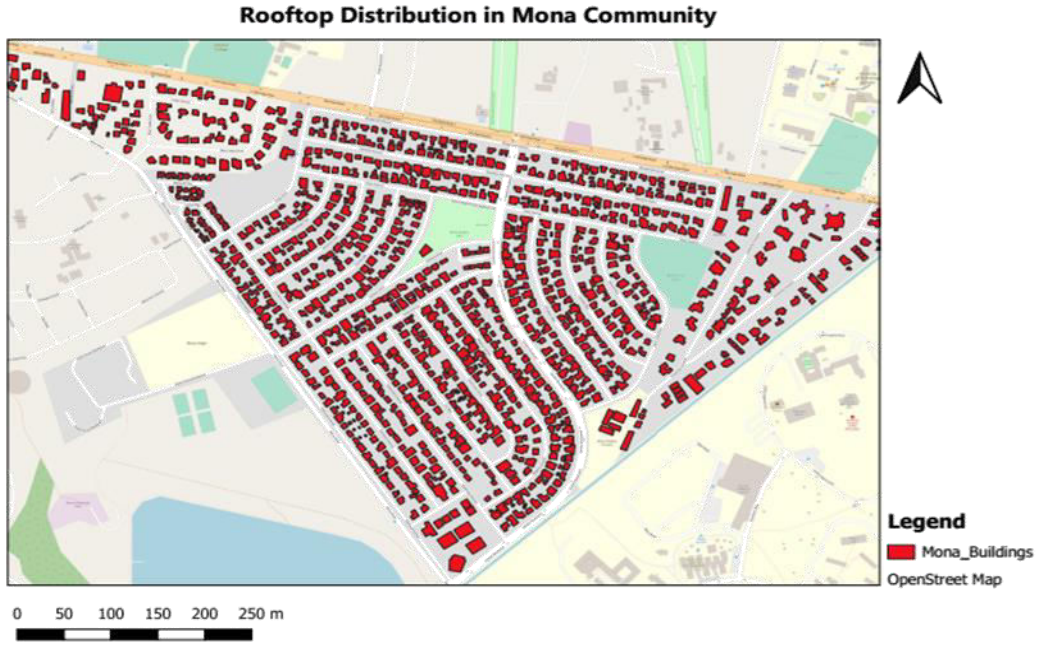


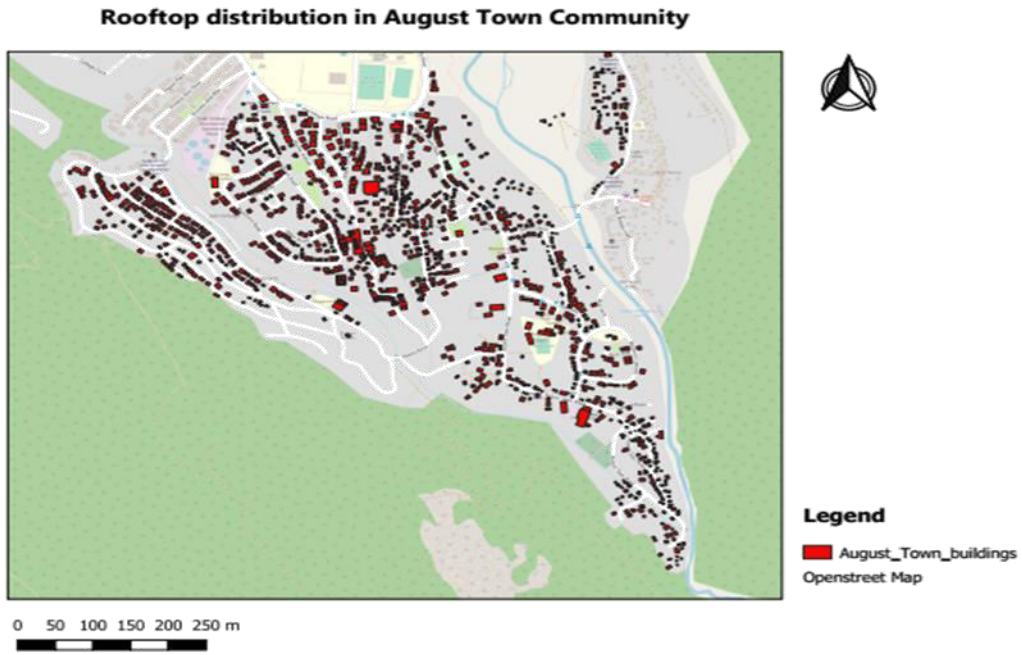
Potential Shifts in seasonality

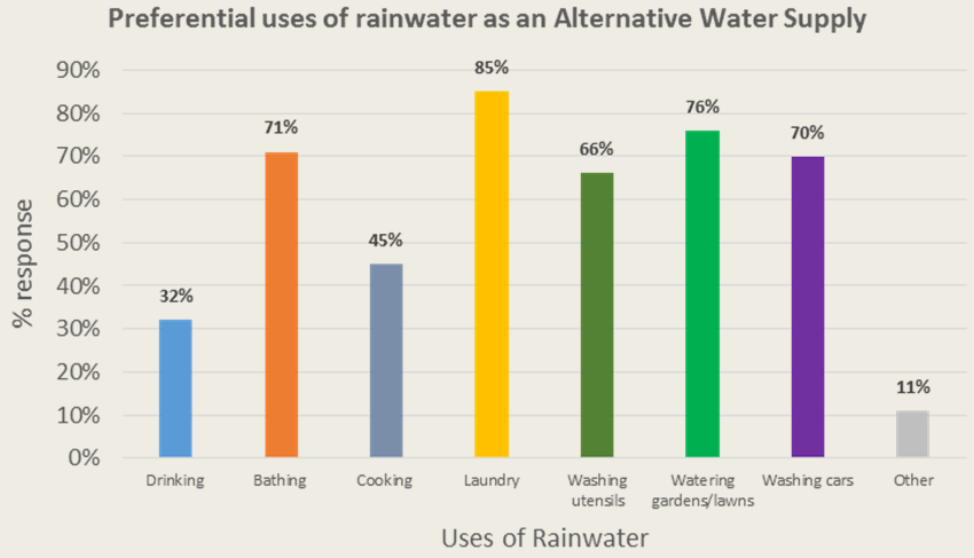
Quantification of AWS for Sustainability

- ✓ 85% willingness – uptake fraction
- ✓ Galvanized rooftops (0.90)
- ✓ **~380,000 m³** Potential contribution annually (4%)

Rainwater Harvesting Potentials from Communities		
	RCP 2.6	RCP 8.5
2030	~202,000 m^3	~ 168,000 m^3
2050	~180,000 m^3	~ 190,000 m^3







Barriers to Implementation
Time and cost of installation
Storage / space
Knowledge to set up and sustainable safe use of system (Treatment and Maintenance; prevention of Mosquito breeding)
Seasonality of rain
Health concern with interaction from pollution (rodent on roofs; acid rain)
Lack of will
Theft
Type of housing (e.g. apartment)

POTENTIALS AND BARRIERS TO RWH

For Non-Potable purposes – maximum storage per household would be ~ 1m3 daily

Conclusions

1. Climate Change and Poor Water Infrastructure will contribute significantly to Water Supply Vulnerability.

2. Alternative Water Supply (RWH) is an option to reduce demand on conventional supplies.

3. Decentralized rainwater harvesting can contribute to water production in water supply systems, but its potential will reduce with time.

4. Strategic Policy Planning and Implementation to be more proactive with measures that integrate improvement in centralized options and promote decentralized RWH.

5. Decentralized RWH to be considered with other alternative water supply sources for augmentation.

6. High Feasibility: Policy Integration, High Willingness and Achievable storage size for non-potable use.

Source: Author(2019)

Recommendations

To assess water supply vulnerability for other 9 basins in the island; to determine the scale of vulnerabilities existing and direct the attention of water planners to the areas that may require augmentation and/or water demand solutions to sustain water supply systems.

To encourage water planners/ Government to implement tax subsidies on new housing solutions that incorporate RWH and on existing households that retrofit the home.

To encourage water planners / NWC to integrate government investments in centralized system solutions as well as decentralized rainwater harvesting

To employ hydrological modelling methodologies that can incorporate factors such as land use, ground water interactions, evapotranspiration and other important elements to assess climate change impacts more robustly.