IPReM

Greater Caribbean 2023

IDENTIFICATION | PROTECTION | RESTORATION | MANAGEMENT

JUNE 28th-30th, PANAMA

Science and technology for sustainablebeaches in a climate change scenario

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Mangroves, Malaria and Migration

"We have 99 problems and climate change is but one!"

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- Mangroves
- Malaria
- Migration

What's the link?

Climate Change

Political Map of the Caribbean

https://www.nationsonline.org/oneworld/map/Caribbean-political-map.htm

Political Map of the Caribbean

- Trinidad and Tobago population at 2021 census: 1.4million
- Tobago, 60,000 people

https://www.nationsonline.org/oneworld/map/Caribbean-political-map.htm

Mangroves

- Mangroves form the major interface between marine and terrestrial ecosystems (Fig 1.)
- Brackish water habitat
- Wealth of biodiversity

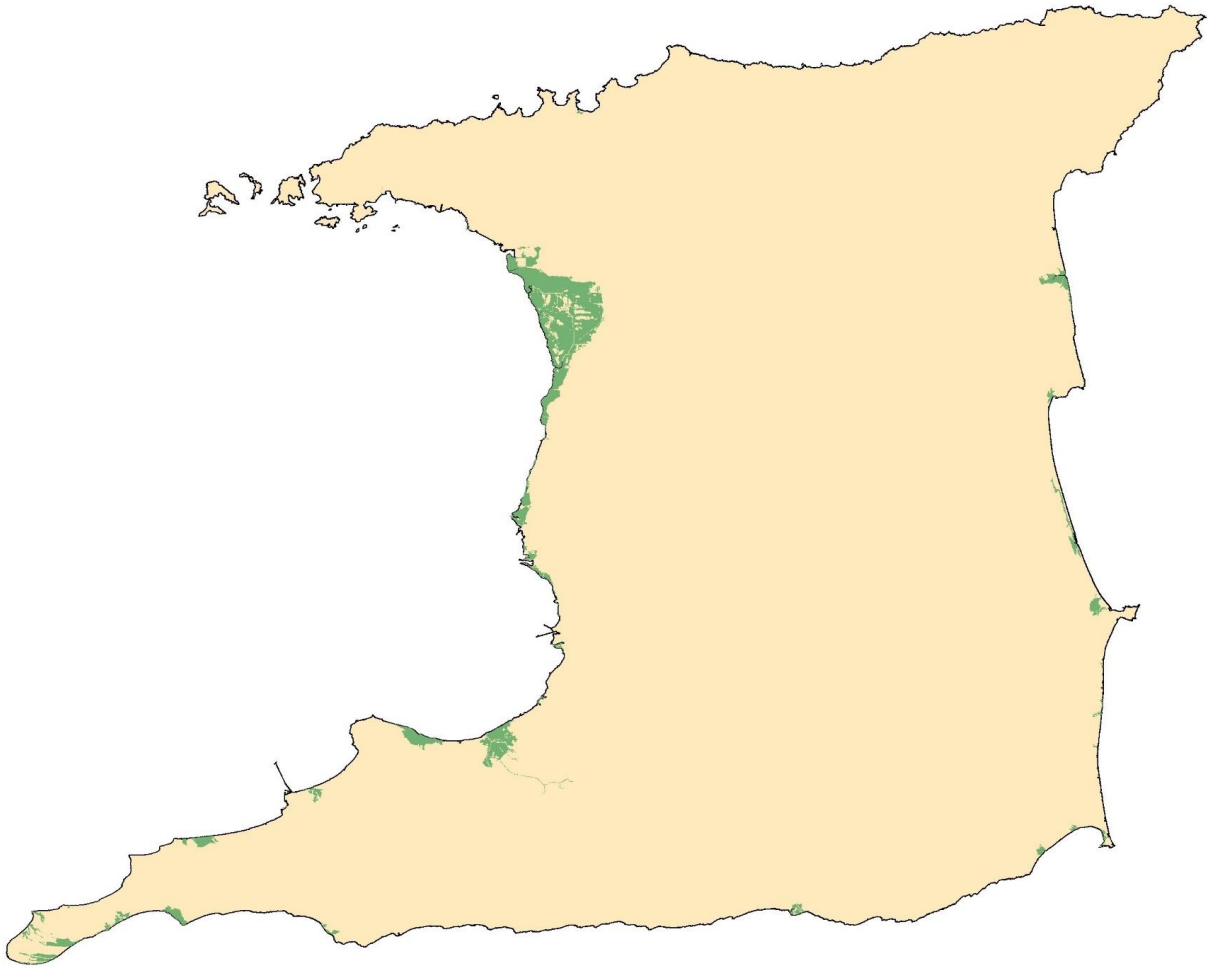

Figure 1. Mangrove forest distribution, Trinidad

Malaria

- Vector borne disease
- *Anopheles* mosquitoes
- 460 species are recognized
- Over 100 can transmit human malaria
- 30–40 commonly transmit parasites of the genus *Plasmodium*, which cause malaria
- Brackish water habitat

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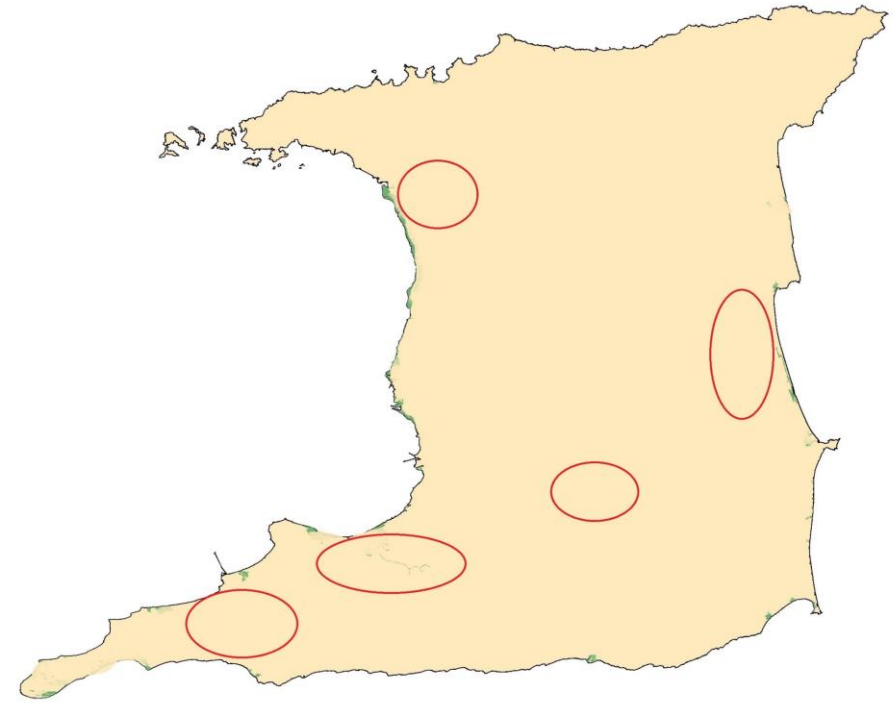
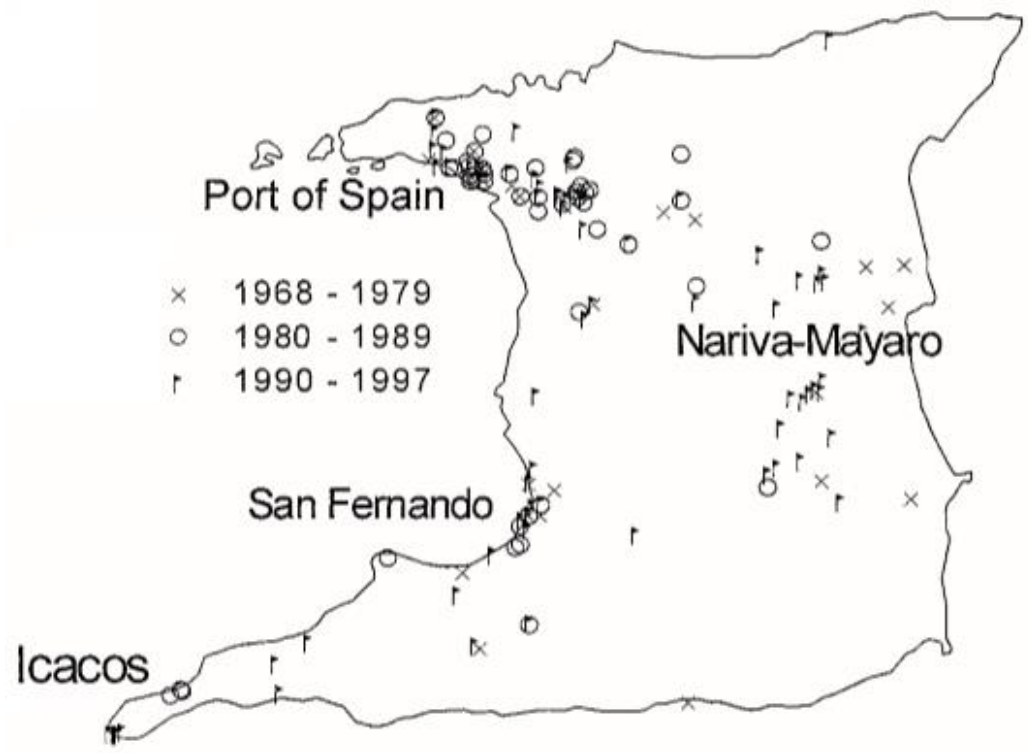
Malaria

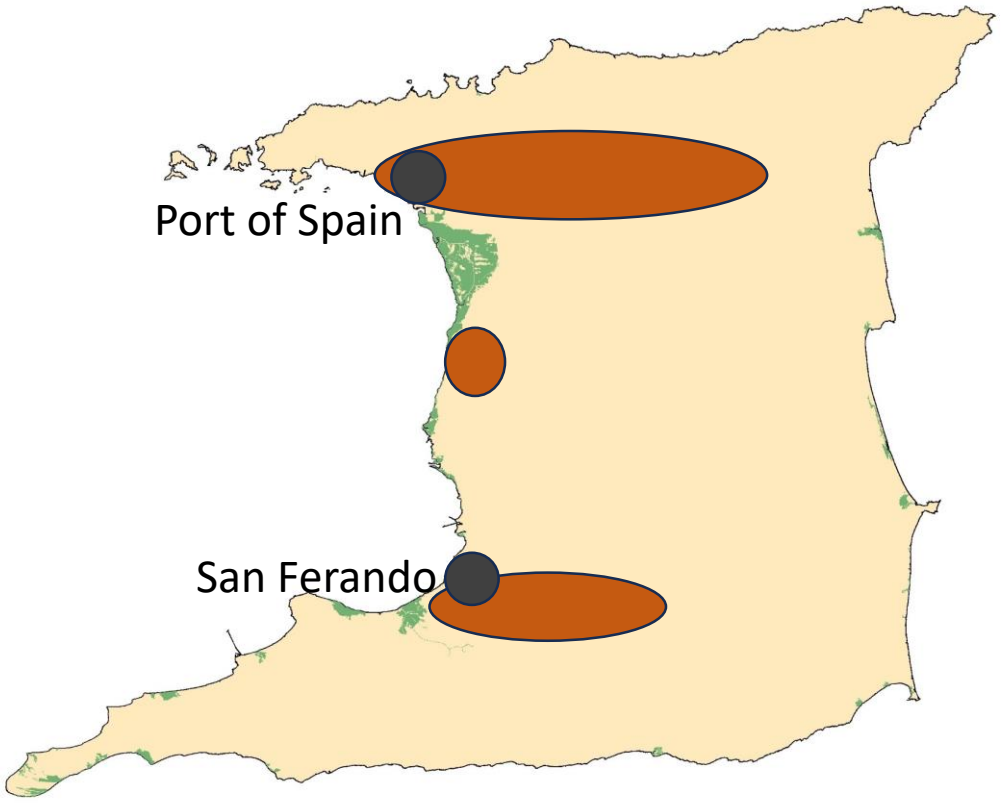




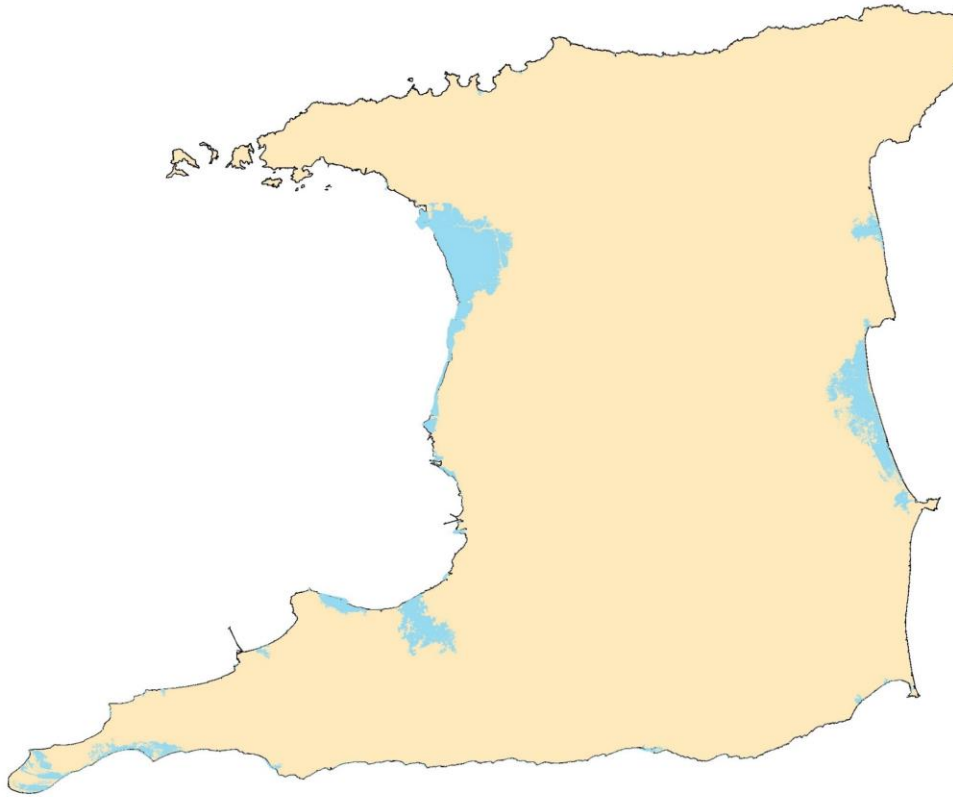
- Trinidad has multiple species of *Anopheles* mosquitoes
- Wide distribution (Fig 2) (Chadee, 2005; Rawlins et al, 2008; Mungrue 2017; UWIZM collections).

Low incidence of Malaria last 5 decades (Fig 3)

Now…. back to the mangroves and people



Mangrove distribution and human population



Brackish water distribution

Migration

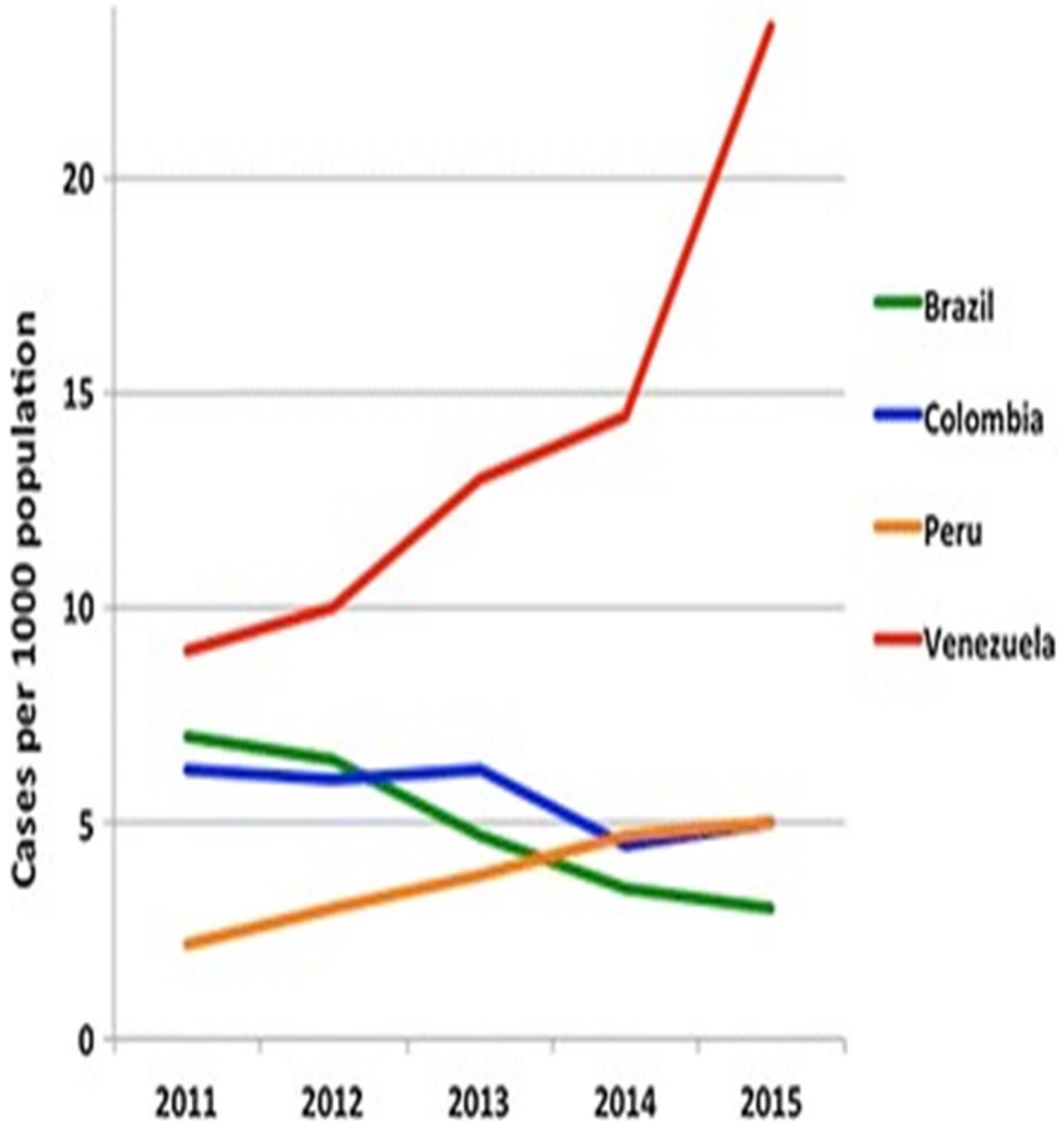
- Given the recent political unrest, Venezuela is experiencing a mass exodus with over 1 million people having already fled the country.

- More than 60,000 people have migrated to Trinidad and Tobago within the last five years

IOM UN Migration. 2018. https://www.iom.int/countries/venezuela

Malaria and Migration

- Trinidad's closest mainland neighbour, Venezuela
- Circa 0.2% of the population was infected by *Plasmodium vivax* in 2018 (Richt et al. 2017)
- Assumption: < 100 cases of Malaria have come to Trinidad within the last 5 years
- However, the WHO status says 0% prevalence



IOM UN Migration. 2018. https://www.iom.int/countries/venezuela

Coastal Mangrove die back

Coastal development → Mangrove die back → Inward/landward distribution of mangrove

- Increased mangrove distribution is not a bad situation…..if the distribution is not detrimental to other systems!

- Coastal mangroves provide
  - storm surge protection
  - sediment traps for seagrass beds and corals

- Inland mangrove spread indicates to saltwater intrusion
  - Increased salinity of water table
  - Agriculture production can be affected
  - Alters natural biodiversity…….here in lies our issue!

Coastal development → Mangrove die back → Inward/landward distribution of mangrove → Increased areas of brackish water → More habitat for *Anopheles* mosquito

Public Health,
Humanitarian,
Socio-economic
Nightmare

~20 annual Malaria carrier immigrants annually

Sea level rise

Increased storm intensities and frequencies

Flooding

CLIMATE CHANGE

- Mangroves

What's the link? **Climate Change**

- Malaria

What's the solution? **Mitigation and adaptation**

- Migration

- Additional pressures on the control of Emerging Infectious Diseases (EIDs), and Caribbean states may soon no longer be considered as completely malaria-free.

- Need of re-evaluation of EID's, increased investment.

- Humanities' health ⇔ well being of environment.

- E.g. the Mayaro arborvirus:
  - has its origins in South and Central America, can be a major epidemic in the future following Chikungunya and Zika viruses.
  - vector *Haeamogus sp* mosquito was typically found in tropical inland forest but now as coastal temperatures rise consistently, it is also found within mangrove ecosystems.

- We cannot:
  - change the political situation in Venezuela
  - or locally prevent climate change

- However, we can:
  - manage coastal ecosystems to avoid mangrove die back- mangroves forests are still one of the best carbon sequester
  - do our part to reduce carbon footprints.
  - put systems in place to identify, isolate and manage vector borne diseases

- Illegal and legal migration is a regional issue that has to be addressed at a larger scale …. if not…..

'we got 99 problems and climate change will be just one!'

Muchas Gracias!

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THE NATIONAL TRUST
OF TRINIDAD AND TOBAGO

COUNCIL OF PRESIDENTS OF THE ENVIRONMENT
TRINIDAD & TOBAGO

AUBURN
UNIVERSITY

https://blogs.bmj.com/bmj/2020/11/13/malaria-mangroves-and-migration-challenges-for-small-island-developing-states-in-the-caribbean/
Malaria, mangroves, and migration: challenges for small island developing states in the Caribbean: BMJ, November 13, 2020
RS Mohammed and C van Oosterhout