CLIMATE CHANGE COUNCIL
PUERTO RICO

Climate Change and Forests in Puerto Rico – Karst Ecosystems

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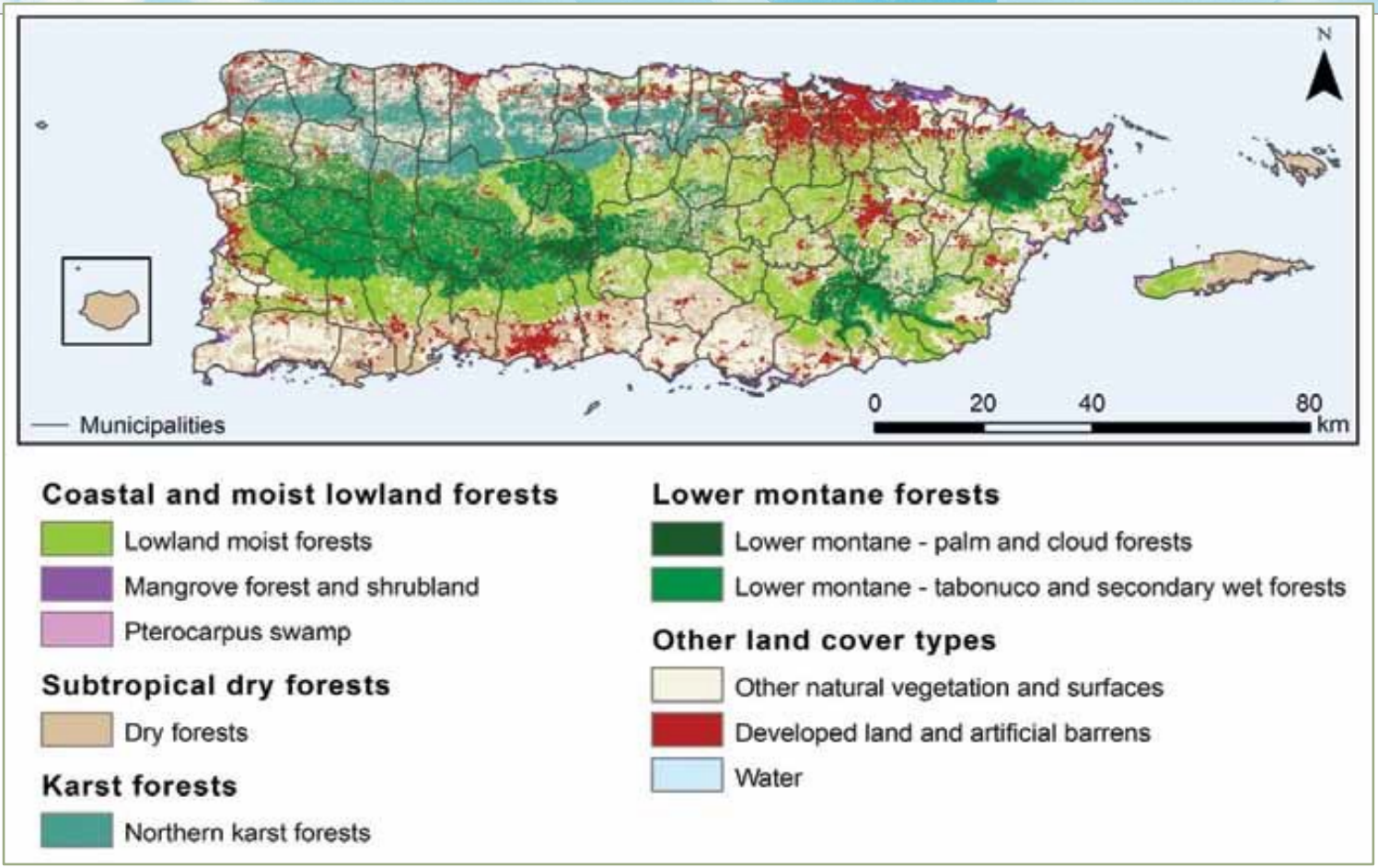
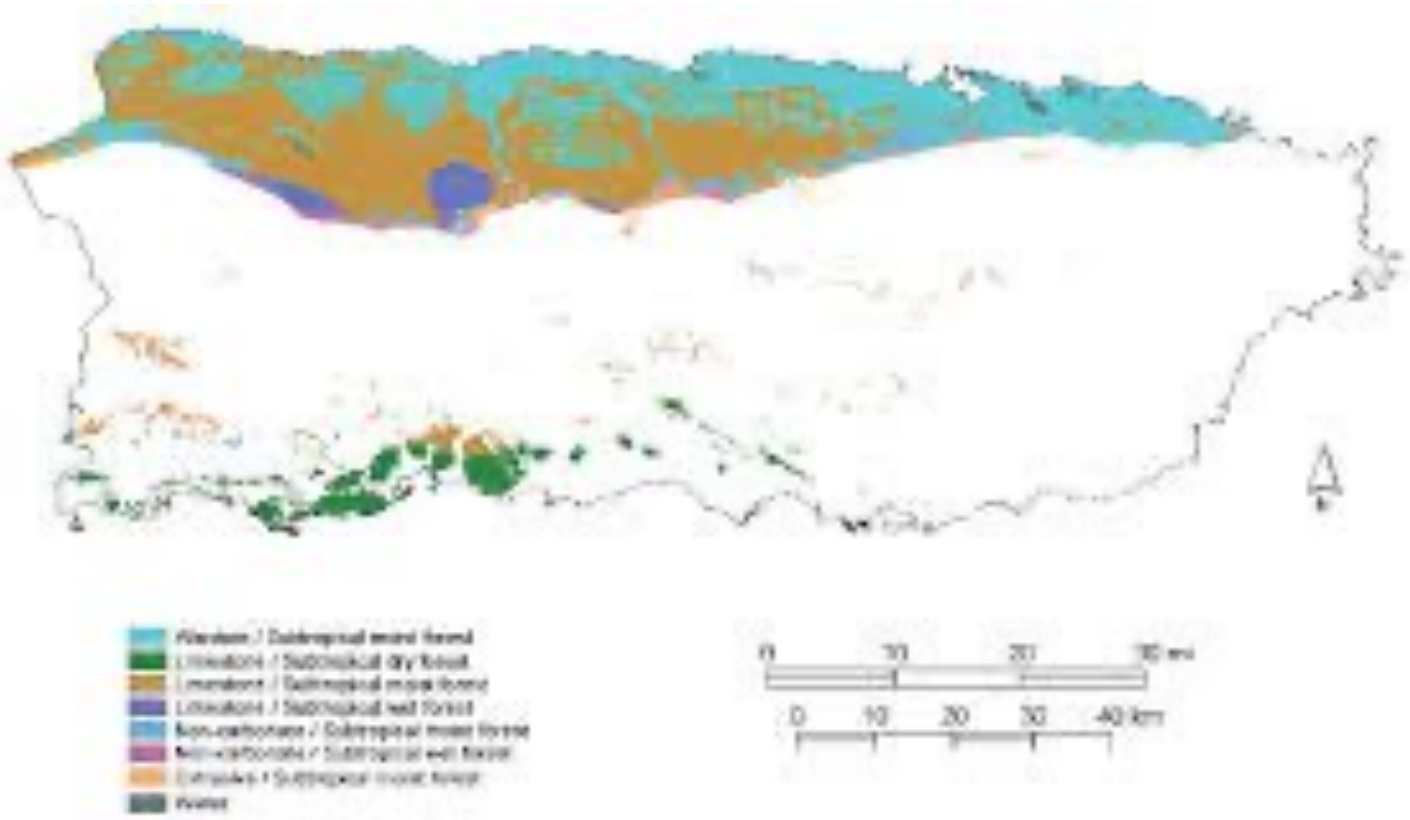
Karst Forest Ecosystems



Forest composition and structure are strongly tied to climate at both a large and local scale – climate governs seasonality, temperature, and precipitation. Dominant forest types identified and discussed in the PRCCC State of the Climate included: lowland moist forests; dry forests (including karst); northern karst forests; and montane forests..

Karst Forest Ecosystems



- Karst – distinct topography created by dissolution of carbonate rocks
- In Puerto Rico karst covers about 28% of the island or 244,258 hectares
- 218,692 ha are located in the north and 21,022 ha in the south
- Approximately 64,700 ha in north “protected” and about 4000 ha in the south

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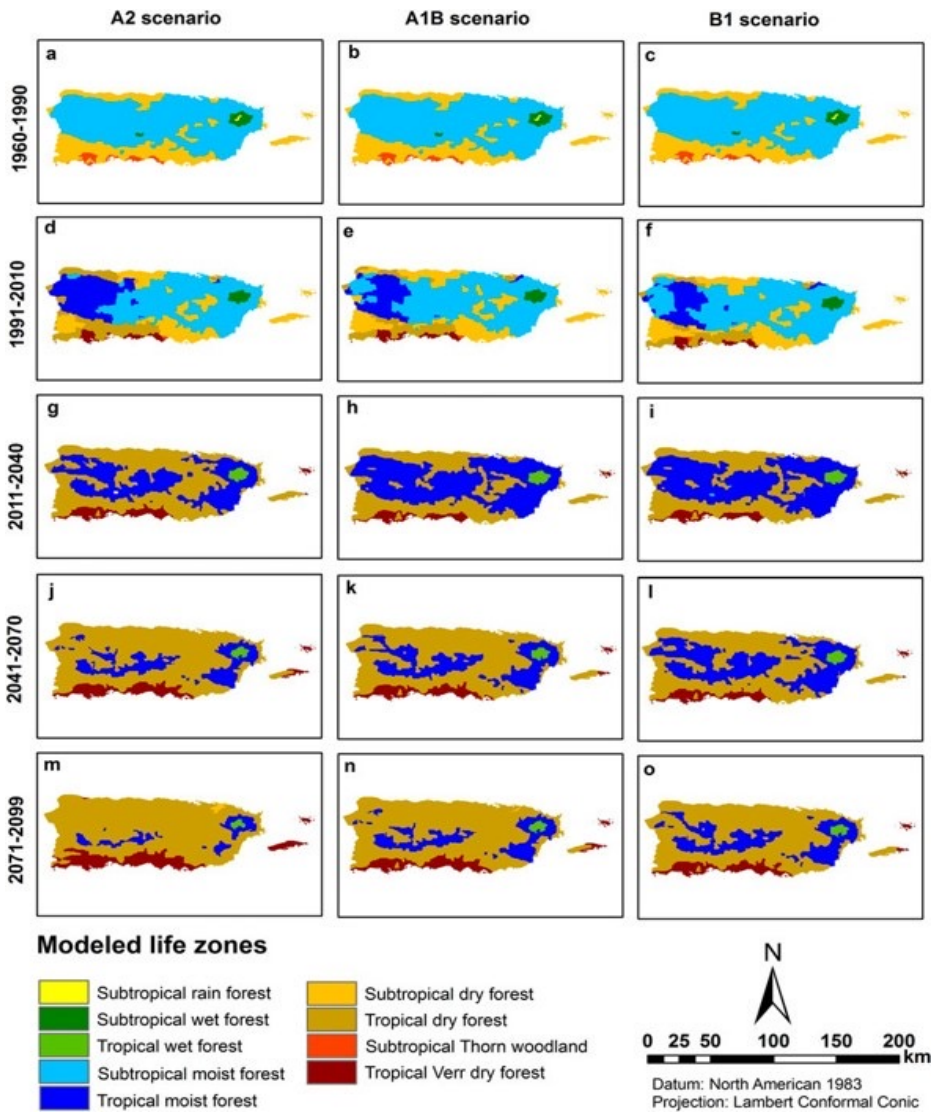
Downscaling of climate data indicates that Holdridge life zones will shift to drier types, eliminating rain forest and subtropical dry forest becoming tropical very dry forest in some places. What does this mean for structure and function of the forests?

From Henareh-Khalyani et al, 2016



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Major stressors on forests from climate change:

- Sea level rise
- Increased severity/frequency of tropical storms
- Decreased precipitation/increased drought/increased seasonality
- Increased irradiation/increased mean temperature and extremes.

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Sea level rise

- Frequently associate sea level rise with impacts to infrastructure and coastal wetlands
- But sea level rise may also affect coastal “non-wetland” forests in a variety of ways, one of which is the encroachment/migration of development into uplands as coastal areas are lost

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Storms and hurricanes

- Some modelling indicates that dry forests will be resilient to increased intensity of hurricanes but increased frequency will lead to sustained decrease in biomass (Holm et al, 2017)
- Such events, however, may favor species that resprout easily. This in combination with increasing drought period and the resulting reduction in recruitment of some species may result in changes in species composition.

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Temperature variability

- Increased temperature will result in increased severity and extension of the dry season –may affect phenology and the establishment/survival of seedlings.
- Seeds from dry forest species are dispersed at beginning of the wetter season, e.g., “guayacan blanco”.
- May result in a shift in species composition, favoring species that have the ability to resprout, eliminating the more drought sensitive.
- Reported declines in neotropical migrants, abundance and number of species, over the past 45 years (Faaborg et al 2013).

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Changes in precipitation patterns

- Human caused fires are a problem in subtropical and tropical dry forests, will increase with increased temperature and declining precipitation.
- Some invasive species are drought and fire resistant, therefore persisting and making natural regeneration and reforestation efforts difficult and costly.

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Management strategies and recommendations

- Important to not promote compensation for deforestation that occurs during development projects – as reforestation may become more difficult and more costly.
- Protection strategies should take into consideration east-west and north-south gradients within mogotes – to preserve biodiversity that may be lost as a result of climate change but also development.
- Additional focus on prevention of human caused fires that make way for invasive, fire resistant species and reduce the ability to restore.
- Need for buffers/corridors around and between natural areas to allow for migration and expansion.
- Management plans for natural areas that are developed, funded, and implemented.
- Additional research on climate impacts in karst – both north and south. Most has focused elsewhere.

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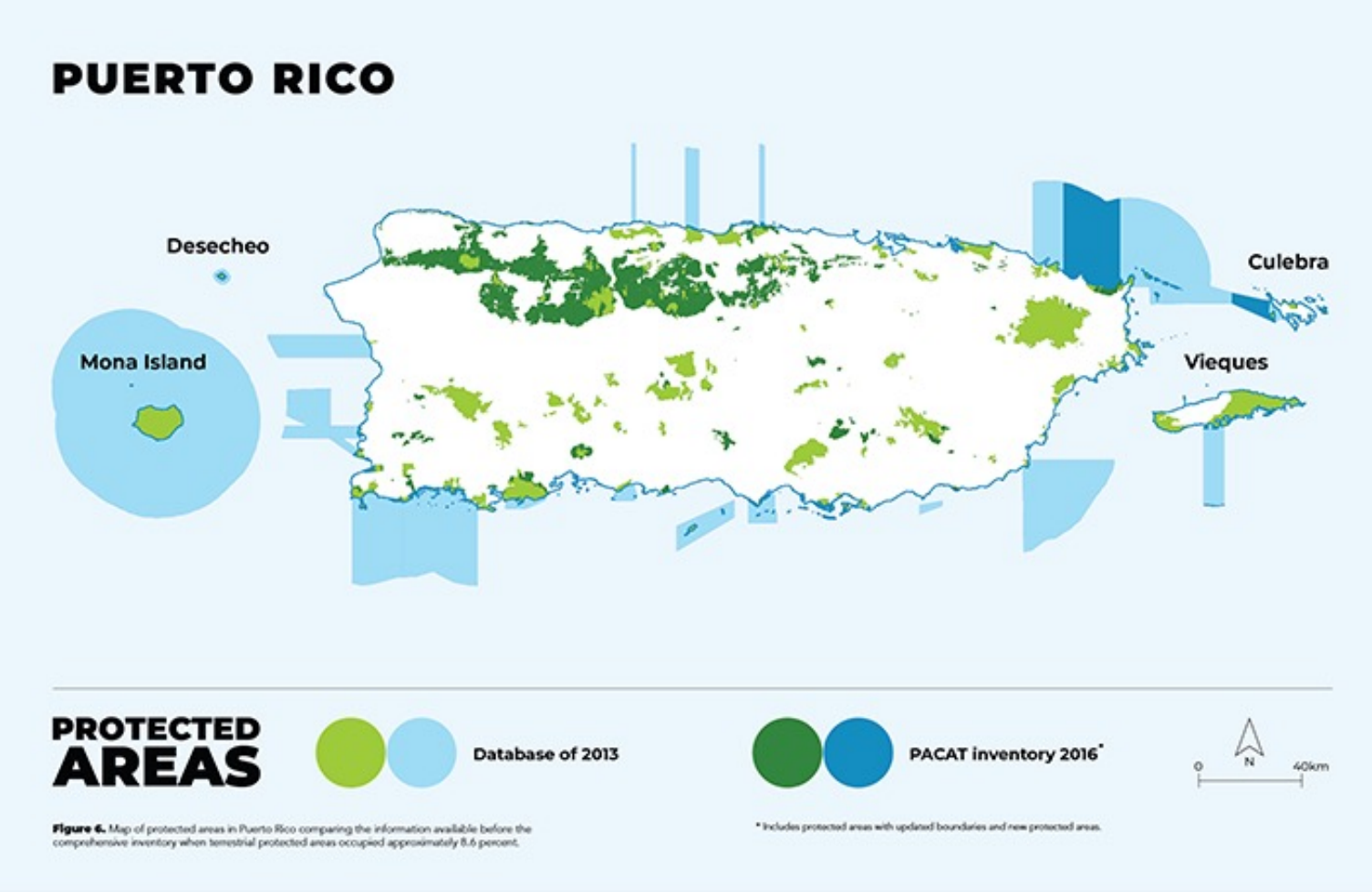

From IITF-GTR-50 "A Comprehensive Inventory of Protected Areas and other Land Conservation Mechanisms in Puerto Rico" 2019

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¡MUCHAS GRACIAS!

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