

Coastal Landscaping; Building Resilience Using Native Plants and Permaculture



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Introduction

Permaculture is a holistic design system utilized to create sustainable human settlements and food production systems. It is a movement concerned with sustainable, environmentally sound land use and the building of stable communities through the harmonious interrelationship of humans, plants, animals and the environment.

Resilience is the ability of s system, or in this case, ability of a plant to be able to withstand and recover from any challenge or adversity.



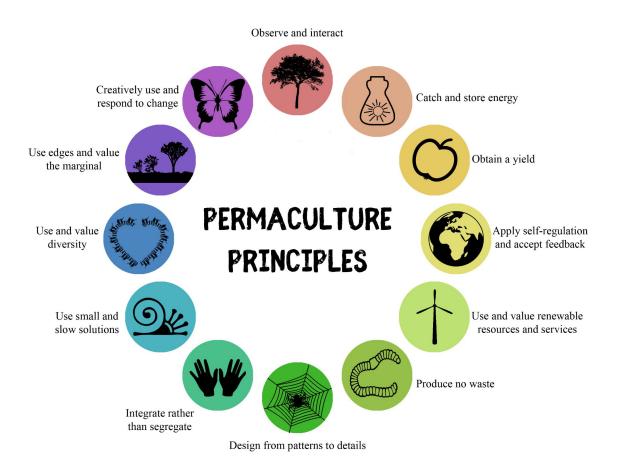


Fig. 1. Ethics of Permaculture

Fig 2. Principles of Permaculture

Research Question

The **objective** of the research was to investigate **what plants would be most resilient and suitable for use in the landscaping of the coastal zone** of the Island School Campus. The principles of permaculture were applied in the research. This included observing nature, mimicking nature and valuing diversity. The plants studied were noted for their climate resilience traits and their functional suitability to the landscape in question.

Methods

An initial rectangle plot of 100 x 30 feet was selected to be surveyed behind the **Dining Hall** area as a baseline to see what plant material was already growing here. It was seven feet from the high water mark and ran parallel with the high water mark. The plot was divided into 10 plots of 3x10ft for ease and accuracy of data capturing. To gather as much information as possible 4 more plots were selected on beaches within South Eleuthera. These were: **Kemps Creek; Deals Point; Cotton Bay** And **CEI** beach in front of the Octagon.

All plots were laid out in the same format as the first plot, 7 feet from the high water mark and running parallel with the high water mark. Plant material was identified, counted and classified.

The data was recorded in notebooks and photographs were taken to support the notes. The data was then captured on spreadsheets and cross referenced with field guides.

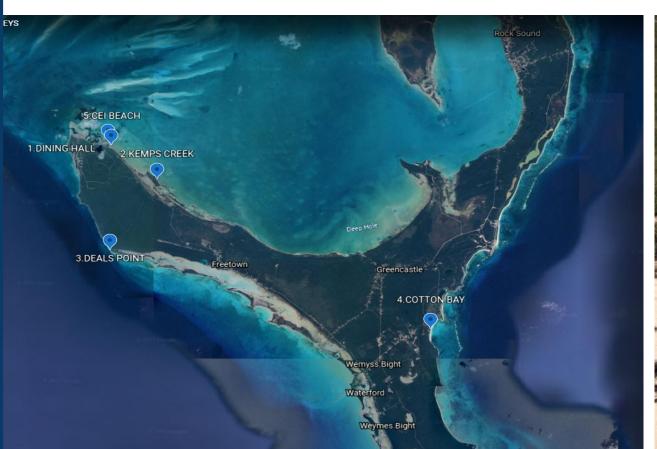
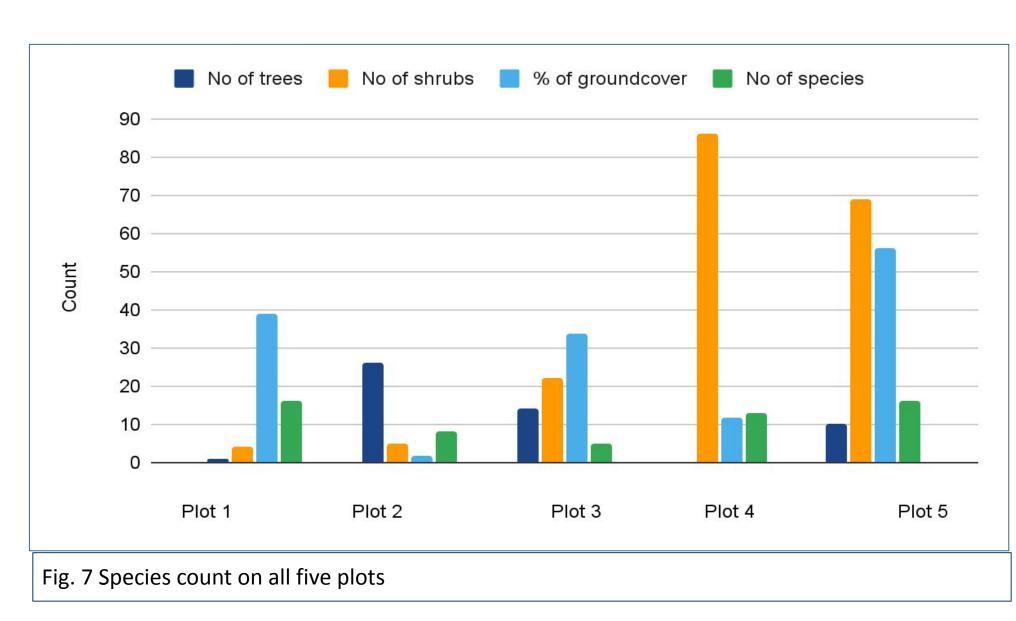




Fig 3. Map of plots

Fig 4. Measuring and placing stakes for grids

Results

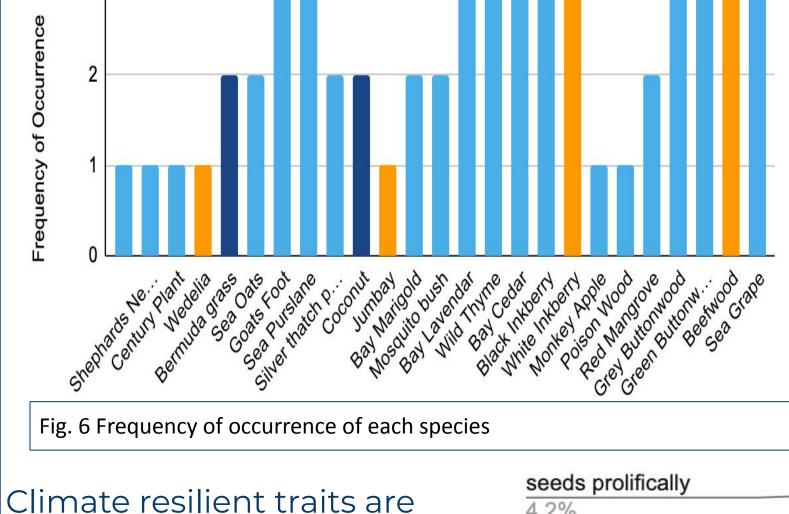


The results are based on an analysis of the data from all five plots. All plants were counted and categorised according to their habit, function, and climate resilient traits. A total of 51 trees and 186 shrubs were counted on the 5 plots. 25 different species were identified. 6 were exotic and 3 of the 6 were invasive species. This left a total of 19 native species. Of these 19 native species, 1 was a palm, 6 were trees, 6 were shrubs and 6 were groundcovers.

Across all plots, the most common native groundcovers were Sesuvium portulacastrum and Ipomea pes-caprae present on 3 of the 5 sites. The most common native shrubs were Scaevola plumieri occurring on 4 sites, as well as Tournefortia gnaphalodes, Rachicallis americana and Suriana maritima which all occurred on 3 of the 5 sites. The most common native tree was Sea Grape (Coccoloba uvifera) occurring on 4 of the 5 plots. Other native trees identified of particular interest were the Red Mangrove (Rhizophora mangle), the Monkey Apple (Clusia rosea) and the Poison Wood (Metopium toxiferum).

deep fibrous roots

Thick waxy leaves

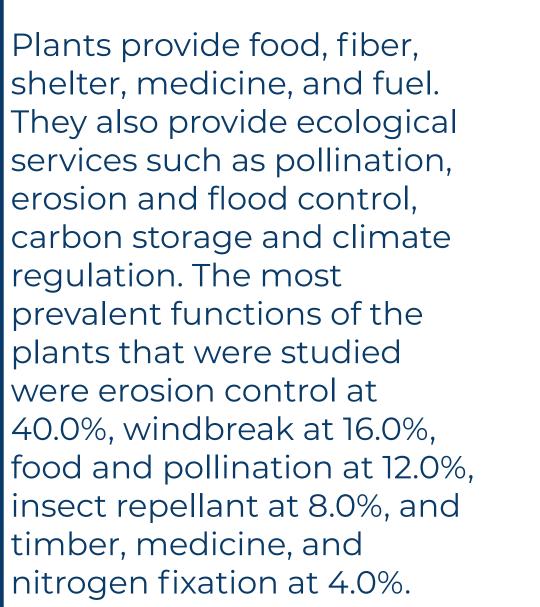


seeds prolifically
4.2%
needle-like leaves
8.3%

pubescent leaves
16.7%

flexible stems
8.3%

Primary climate resili...
4.2%



traits that render the plant

to climate impacts such as

Several traits can be found

drought, strong winds,

Because of the climatic

exposed to on beaches

these plants are better

impacts.

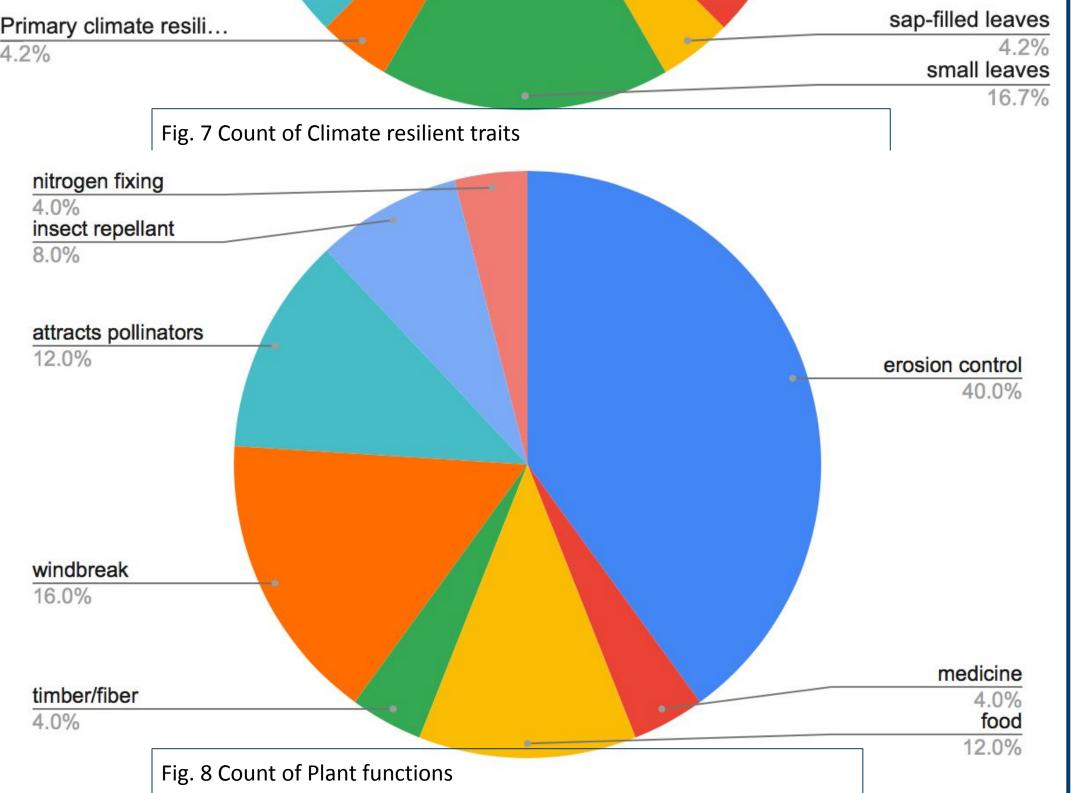
adapted to climate change

conditions plants are

salinity and flooding.

in one plant species.

more resistant and resilient



Discussion

The data collected indicates that native plants with climate resilient traits are the most beneficial for use in the landscaping of the coastal zone on the Island School Campus. **Beneficial Groundcovers:** All three of these groundcovers have long fibrous roots to hold together soil to prevent erosion.







Beneficial Shrubs and Trees: All these shrubs and trees have climate resilient traits. They are beneficial as windbreaks, erosion control and salt spray protection.











Fig.12 Scaevola Plumieri Fig.13 Tournefortia Fig.14 Rachicallis Americana Fig.15 Conocarpus Erectus Fig.16 Coccoloba Uvi

Plants to Avoid: Invasive species that have adapted to local climatic conditions also compete with native species for space, nutrients and water.



Fig.16 Scaevola Taccada



Invasive trees such as casuarinas have needle like leaves that create a thick layer over the ground. This prevents smaller plants from sprouting out from underneath.

Fig.16 Casuarina Equisetifolia

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