Jamaica Persistence of Seagrass restoration in Tropics.

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Jamaica 11,500 km²  (terrestrial)
Jamaica is a hotspots of Biodiversity (Meyers, 2001). The Antillean region.
Biodiversity of Plants in Jamaica

Most bio-endemic island in the Caribbean region (never attached to mainland in geologic history). 10 cacti, 7 palms, and 60 of the 240 species of orchids., 31 birds, 9 crabs, 505 species of 514 varieties land snails, and 33 of the 43 species of reptiles.

• Ranking **fifth amongst islands of the world** for the number of unique species.
• 8,000 recorded species of terrestrial plants and animals more than 3,500 marine species here.
JAMAICA’s leadership in protected ecological and marine resources –

Terrestrial plus marine protected

Marine Parks and Protected Areas
Our joint project: Jamaica Natural Resource Department (Beverly Miller) and Greater Caribbean Energy and Environment Foundation and created policies.

1. Jointly chose polluted sites

2.) Jointly planted and monitored at polluted sites
   - 19 sites. 16 still persisting
   - List of Pollutants
   - 4 species, 2 tech.
The large scale nature of restored seagrass beds.

- Persistence means that inter-yearly the restored area continues to have seagrass.
- Larger field on which edge effects, and landscape level ecology can be explored,
- The quantification is better assembled and statistically compared.
- This allows yearly variations to be studied.
- The chance that ambient environmental conditions cannot be tolerated creates a decline over the years.
Overview Kingston Harbor with sites, cement plant, Hellshire, Port Augusta, & old airport.
Port Augusta, Gallows Point Kingston in 2013. cover 70% from 10m outward Thal. (Length 28 cm ) density= 201 shts/m² nearshore mixed with some Hal. from 10m inward, band of Halodule (length 14.7 cm)= 26 shts/m² density.
Overview of Montego Bay with various sites.
Montego Bay at Public beach construction
Methods

• We planted at each site species by two methods (Thalassia testudinum sprig and seed, Halodule wrightii by sprig and plug, Syringodium filiforme by sprig and plug, Halophila decipiens by plug). At Carlyle Beach weights, no fertilizers. 19 sites with various pollutants around the Island from hi salinity, oil spills, sewerage, heavy metals, riverine inflow, to dredge and fill and mining plants.

• We planted several larger plots including with fisherfolk at Gallows Point and in Montego Bay at newly constructed Beach revetments. These have been followed over time from 1984.
Results for pollutants vs. success

• Seagrass can be restored and does persist in Jamaica
• **Thermal Pollution.** Best species choice *Halodule*
• **Dredge and fill:** good choice with Thal. Or Hal. w/ roots for sediment stabilization.
• **Sewerage:** excellent species choice is Hal or Thal
• **Post oil spill.** Responds well, esp Thal
• **Metals & mining.** OK with Thal or Hal.
• **Salinity alteration.** *Halodule and esp. Halophila.*
• Several situations to **avoid:** Hi energy, unstabilized sediment. Intertidal. Periodic very long, high turbidity
Gallows Point, Ft. Augusta, Kingston Harbor, Jamaica. 5000 plugs mixed *Halodule* & *Thalassia*. 1983 spring. Pollutants dredge and spill, sewage, general urban runoff...
Montego Bay. Plugs of *Halodule* and sprigs of *Thalassia*
Montego Bay planted 1984 over the last decade
What we learned about toleration of ongoing conditions by various species

**Halodule**
Tolerant to hi and low T, Sal, N, Not tolerant to hi energy or very low light.
Medium oil

**Syringodium**
Not tolerant to extremes
• T, Sal, N, P, hi energy or heavy metals, oil.

**Thalassia**
• Tolerant to many changes, but not hi T, low sal, heavy metals, sewage.
• Medium for energy once rooted, oil
• Not good with very low light
**Thalassia** in 2 tropical (Jamaica and Philippines) and 1 subtropical (Biscayne Bay, Fl.) site vs pollutant type to sustain growth

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**Halodule** in 2 tropical (Jam. & Phil.) and 2 subtropical (Fl. and TX.) sites vs. pollutant type.

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Conclusions
Persistence of restored sg occurs in tropics. These are oldest tropical restorations.

**Halodule and Syringodium**

- *Syringodium* is most sensitive to all except high energy and low light. For this, it is medium. For chemicals it is very sensitive. Also high and low temperature, salinity

**Thalassia**

- This tolerates medium high energy and changes in many factors such as heavy metals.
- Medium for nitrogen
- High for sewerage.
- Medium for salinity and temperature.