Potential for improvement with geosynthetics in the coastal setting: Adaptive environmental management consideration with geosynthetics

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Geosynthetics In Coastal Projects

- Tubes
- Mattresses
- Bags
- Containers
Definition of BAG

1: a usually flexible container that may be closed for holding, storing, or carrying something: as
   a: PURSE; especially: HANDBAG
   b: a bag for game
   c: SUITCASE

2: something resembling a bag: as
   a (1): a pouch or pendulous bodily part or organ; especially: UDDER (2): a puffy or sagging protuberance of flabby skin
   b: a puffed-out sag or bulge in cloth
   c: a square white stuffed canvas bag used to mark a base in baseball

3: the amount contained in a bag

4: a quantity of game taken; also: the maximum legal quantity of game
   b: an assortment or collection especially of nonmaterial things <a bag of tricks>

5: an unattractive woman

6: something one likes or does regularly or well; also: one's characteristic way of doing things
“Containers”
Merriam Webster
“Mattresses”
Merriam Webster

Definition of MATTRESS

1. a: a fabric case filled with resilient material (as cotton, hair, feathers, foam rubber, or an arrangement of coiled springs) used either alone as a bed or on a bedstead

2. b: an inflatable airtight sack for use as a mattress

2: a device (as of interwoven brush and poles) used to protect a shoreline, bank, or streambed from erosion
“Tube”
Merriam Webster

Definition of TUBE

1. any of various usually cylindrical structures or devices: as
   a. a hollow elongated cylinder; especially: one to convey fluids
   b. a soft tubular container whose contents (as toothpaste) can be removed by squeezing
   c. (1) TUNNEL (2) British: SUBWAY b
   d. the basically cylindrical section between the mouthpiece and bell that is the fundamental part of a wind instrument

2. a. a slender channel (as a fallopian tube or a pollen tube) within a plant or animal body: DUCT
   b. the narrow basal portion of a corolla with united petals or a calyx with united sepals

3. INNER TUBE

4. a. ELECTRON TUBE; especially: VACUUM TUBE
   b. CATHODE-RAY TUBE; especially: a television picture tube
   c. TELEVISION

5. an article of clothing shaped like a tube <a tube top> <tube socks>
Let's Talk Local First!

Problems and Solutions
Beach Erosion
Marsh
Dunes
Oyster Beds/Agriculture

Courtesy of Slate.com

NCSeaGrant
Infrastructure
Ecological Environments
Why Are they Problems?

- Encroaching Infrastructure
- Encroaching Natural Habitats/Environmental Amenity
- Catastrophes
- Encroaching Public Lands/Private Land
- Restoration is expensive & on going
- Access to Communities
- Loosing land
Major Considerations to Address Problems

• Designing for Catastrophic event?
• Truly a natural environment or maybe a bit of a built environment?
• How long is a long time? “Design Durations”
• Let nature take its course or guiding nature?
• Cause and effect?
• Predictability of success vs. cost expenditure?
Durations

Temporary          Lifetime        Permanent
30 Days    2 Years   10 years   40 years   100 years

Where do we sit?

Adaptation         Engineering
Geosynthetics in Local Coastal Design

Temporary ← Lifetime → Permanent

30 Days  2 Years  10 years  40 years  100 years
Geosynthetics in Other Fields

E.g. Roadway/Civil/ Hydraulic

Temporary <- Lifetime -> Permanent

30 Days    2 Years    10 years    40 years    100 years
Geosynthetics in Intl. Coastal Design

Temporary \[ \leftarrow \] Lifetime \[ \rightarrow \] Permanent

30 Days \hspace{1cm} 2 Years \hspace{1cm} 10 years \hspace{1cm} 40 years \hspace{1cm} 100 years
Short Term Solutions

Where we are NOW
Short Term Solutions
Longer Term Solutions
Maintenance
Amenity

No Diving or Jumping from the seawall or sandbags

WARNING! STRUCTURE NOT DESIGNED FOR PUBLIC ACCESS
Stockton Beach, Newcastle, Australia
Asplendale Australia
Cronulla Esplanade
Breakwater, Geelong AUS
Queensland Aus
Baldhead Island

Courtesy of C. Timpson, Tencate
Atlantic City NJ Coring
Improving Life

• Coatings

Courtesy of C. Timpson, Tencate
Abrasion Resistance
Protection Approach

Courtesy of C. Timpson, Tencate
UV Resistance
Diffused Shorelines

• Dissipating Energy/Environmentally Friendly

Diffused Shorelines w/ Geosynthetics?
Little Environments Thanks: