INNOVATIVE STORMWATER RETROFITS FOR BARRIER ISLAND APPLICATIONS: SEPTIC TANK CONVERSION IN HOLDEN BEACH, NC

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Economics On Coastal Tourism

• 180 million Americans vacation to coastal areas and the Great Lakes, spending ~ $44 billion/year
  ➔ 6.3 million tourists visit North Carolina’s barrier island beaches each year, spending $2.9 billion/year*
• Coastal tourism and recreation created 1.67 million jobs in the U.S., (44,800 in North Carolina) grossing $29.5 billion dollars**


Coastal Population Increase

• Coastal areas contain over 50% of the total U.S. population within only 17% of the nation’s land area*
• Coastal populations grew by 37 million people between 1970 and 2000, projected to increase by another 21 million by 2015*


Beach Closures and Advisories

Major Violation Sources: Leading Beaches with Chronic Violations in 2006

<table>
<thead>
<tr>
<th>Source</th>
<th>Frequency</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic waste disposal</td>
<td>12,885</td>
<td>24 days</td>
</tr>
<tr>
<td>Industrial waste disposal</td>
<td>2,220</td>
<td>2 days</td>
</tr>
<tr>
<td>Animal waste disposal</td>
<td>85</td>
<td>1 day</td>
</tr>
<tr>
<td>Stormwater outflow</td>
<td>79</td>
<td>1 day</td>
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http://www.portphillip.vic.gov.au


Holden Beach (Tier 1 beach)

Town Of Holden Beach
- 900 Full Time Residents
- 10,000 in the summer
- Approximately 3,150 parcels with 2,400 Homes
- Currently One Septic Tank for Each Parcel
- Installed Regional Sewer System
  - Was operational in early 2006
  - All Structures Must Connect to Sewer System within 1 year of operation

Project Scope
- Harvested Rain Water in Unused Septic Tanks
- Connected Down Spouts to Septic Tank
- Installed Sump Pump For Irrigation
- Allowed the Water to Infiltrate
  - Punched Hole in the Bottom of the Tank
Drainage Areas

- Tank 1
  - 845 ft²
- Tank 2
  - 370 ft²
- Tank 3
  - 790 ft²

Conversion Costs

- Connecting The Downspouts ~$65
- Plastic Corrugated Pipe
  - average of $38 for 100 ft
  - Connect 2 downspouts ~100 ft
  - ~5 fittings average of $3 each
- Other materials (PVC glue etc) ~ $10
- ¼ horse power pump for irrigation = $85
- Installation Time
  - 23 man hours for Tank 1
  - 16 man hours for Tank 2 and Tank 3
Monitoring Results

Water Level and Rainfall

Tank 1
Tank 2
Tank 3

Windfall (cm)

Rainfall (cm)
### Holden Beach Conclusions

- A basic spreadsheet based model was calibrated from the observed data
  - Tank 2 captured and infiltrated 78% of the rainfall
  - Tank 3 captured and infiltrated 87% of the rainfall
  - The remaining rainfall was assumed to have passed into the drain field
- Position in the landscape effects infiltration
- Irrigation did not utilize all harvested water
  - Recommend hybrid approach
- Further research will determine the island wide run off reduction associated with septic tank conversion

### Conclusions

- The Septic Tank Conversion project is an effective low impact solution to coastal stormwater management
- More research is needed to determine the effects of the systems on the watersheds where they are installed.
Questions