Beach Nourishment Provides a Legacy for Future Generations

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Legacy Beaches

- Critics claim beach nourishment performs poorly and is not worth the cost
- We believe beach nourishment provides a legacy for future generations by maintaining the important benefits of natural beaches
- Case studies of “legacy” beaches
  - Nourished beaches that successfully provide key benefits (esthetic, recreational, environmental, storm-damage reduction, and economic)
  - Lessons learned from these nourishments
Santa Monica Bay Beaches

- Santa Monica Bay beaches are icons of the Southern California lifestyle

- Most assume these beaches are naturally wide, but river diversions/dams made many, “... too badly eroded to be of value as bathing beaches”. - Johnson (1935)

Venice Boardwalk

The Beach Boys

Beach volleyball

Almost 90 years later Venice Beach is 500 - 700 ft wide

Venice Beach 1925
100 ft beach

2013
Santa Monica Bay – Sand as Resource

- Construction sand disposed on Venice/Dockweiler Beaches
  - 1938 – 1947, Hyperion Sewage Facility: 15.9 m/yd$^3$
  - 1960 – 1963, Marina Del Rey: 10.1 m/yd$^3$
  - 1988 – 1989, Hyperion: 1.2 m/yd$^3$

- Result - Venice Beach is the most visited beach in the U.S. and 400 - 600 feet wider than it was almost 90 years ago.

- The disposals dramatically increased beach width a dozen miles downdrift.
Coronado/Silver Stand – San Diego

- Beaches were sand starved because of river damming

1905 with Hotel del Coronado in background

View northwest from Hotel del Coronado

- Over 100 years later, beaches are 500 - 700 feet wide
Coronado/Silver Stand – Sand a Resource

- Beaches received 28.2 m/yd$^3$ sand from 1941 - 1946, as the Navy “disposed” of sand dredged from San Diego Harbor.

- Coronado/Silver Strand has had wide beaches for ~70 yrs.

- San Diego was California’s leading tourist destination in 2012 with “the beach the marquee attraction” (San Diego Business Journal, U.S. News Travel, 2012).

America’s Best Beach 2012 – Dr Beach

Beach ~ 500 ft at end of Silver Strand
Delray Beach, FL, Consistent Program

Emergency protection for coastal road

Interlocking revetment tried and failed

Revetment covered by beach nourishment (first nourishment early 1970s)
Delray Beach, Consistent Program

- Series of beach nourishments with predictable responses

Produced wide inviting beaches for over the past 40 years

- Rand McNally/USA Today named Delray Beach the 2012 Most Fun Small Town in America
- ASBPA gave it a 2013 Best Restored Beach Award
Florida Beaches – Consistent Program

- A consistently funded State-led program of beach nourishment has transformed eroded Florida beaches into world-class recreational beaches that have had a significant economic impact.
Florida Beaches – Consistent Program

- Florida has more beach tourist visits (810 million) annually than any other state or country and more than visits to all theme parks and National Parks combined (Houston, 2013)

![Bar chart showing comparison between Florida Beach Tourists, National Parks, and Theme Parks in terms of number of day visits (in millions)].

- Florida beaches have an estimated annual recreational value of $50 billion (Houston, 2013)
Florida Beaches - Environmental Benefits

- Beach nourishment has benefited sea turtle nesting throughout Florida and the Southeast

- “Loggerhead sea turtle nesting in Georgia hit a new high for the fourth straight year” (Savannah Morning News, 2013)
The President of the American Littoral Society said the 21-mile long beach nourishment in 1995 at Sea Bright, NJ, would last 1 year. Orrin Pilkey said 2 years.

Pre-Sandy

November 1995

November 2011

16 years

Post-Sandy

30 - 40 ft average initial beach loss in NJ
New Jersey - Storm Damage Reduction

• Mayor Mancini estimated that had beach nourishment been in place at Long Beach, NJ, as it was 6 miles away at Brant Beach, damage would have been reduced by ~ $500 million

• On the 18-mile Long Beach island, only Brant Beach had a Corps beach nourishment (1-mile long) placed just before Hurricane Sandy

Long Beach
“Complete destruction - it’s like a war zone”

Pre-Sandy

Brant Beach
“No overwash or wave damage”

Post-Sandy

Same Bench
Storm-Damage Reduction

Restored beaches protect – e.g., Hurricane Sandy in NJ

With Nourished Protective Beach
Atlantic City, NJ, was up and serving tourists 4 days after Sandy

Without Nourished Protective Beach
Ortley Beach, NJ, was still a disaster 6 Months after Sandy
Miami Beach, FL, Economic Benefits

- In the 50s and 60s, hotel owners constructed bulkheads up to 75 ft seaward of Mean High Water
- By early 1970s beaches at many locations were completely gone
- By 1977, Time Magazine wrote, “So rapidly has the seven-mile-long island degenerated that it can be fairly described as a seedy backwater of debt-ridden hotels.”
- In 1977, Miami Beach Mayor, Neisen Kasdin, said, “Business was so bad in Miami Beach I was happy just to see prostitutes.”
Miami Beach, Economic Benefits

- Beach nourishment completely rejuvenated Miami Beach
- It is the 2nd most visited U.S. beach with more than twice as many visits as Yellowstone, Yosemite, and the Grand Canyon combined
- Miami Beach tourists contribute $5.7 billion to the economy
- For every $1 in annual capitalized cost of the nourishment, the U.S. receives $1800 annually just from international tourists at Miami Beach (Houston, 2013)

1978 1983
Cost $51 million

Miami Beach today
Harrison County, MS, Economic Benefits

- 26-mile sea wall was built at various times from 1926 to 1950 and damaged multiple times

- In 1951 a 6 m/yd³ beach fill was placed along the 26 miles to protect the sea wall from being undermined by waves
Harrison County, Economic Benefits

Little beach change

Beaches have lasted for over 60 years and made tourism Harrison County’s #1 business

The fill withstood Hurricanes Camille and Katrina

1989
Oldest Google image

2013

Pre-Katrina

Post-Katrina

2013
Some Lessons Learned

• Sand is a valuable resource
  - Dams, river diversions, and sand mining stop sand from naturally reaching the coast
  - But for “waste” sand disposals, Southern California beaches would not be the world’s most iconic beaches
  - Dean et al (1988) showed that 80 - 85% of erosion on east coast of Florida caused by navigation channels
  - “Beach nourishment is the only engineered shore protection alternative that directly addresses the problem of a sand budget deficit”
  - National Research Council, 1995
Lessons Learned

• Beach fill length important for longevity
  - Dean and Dalrymple (2002) show longevity of a beach fill depends on its length squared
  - The 124 New Jersey beach fills cited by Pilkey as having an average “life” of 2 years had an average length of only ~ 1 mile
    * 21-mile Seabright, NJ, fill 18+ years and going strong
    * 26-mile Harrison County, MS, fill 60+ years
  - Small communities should try to partner with adjacent communities
Lessons Learned

• Wide beaches and high dunes provide substantial storm protection

- “It really, really works. Where there was a federal beach fill in place, there was no major damage - no homes destroyed, no sand piles in the streets”

- Dr. Stewart Farrell, Director, Coastal Research Center, New Jersey
Lessons Learned

- Restored beaches attract tourists, growing the economy

- Florida beaches have been consistently nourished and have the most visitors in the world (810 million) that annually spend $36 billion and generate $6.5 billion in taxes
Conclusion

• Restored beaches provide remarkable legacies for future generations by providing:

Esthetic Benefits

Restored beaches consistently win awards such as "America’s Best Beach" (e.g., 2012 Coronado/Silver Strand)

Recreational Benefits

Consistently nourished Florida legacy beaches have more tourists than any beaches in the world and an estimated recreational value of $50 billion annually
Environmental Benefits
No beaches, no sea turtles

Storm-Damage Reduction Benefits
The protective power of nourished beaches was proven during Hurricane Sandy
Economic Benefits

Miami Beach’s experience of returned prosperity after beach restoration is repeated as beach tourists contribute $225 billion to the Nation’s economy (Houston, 2013)

Coney Island, NY

Ocean City, MD

Myrtle Beach, SC

South Padre Island, TX

Newport Beach, CA
The #1 Benefit of Legacy Beaches

- Esthetic
- Recreational
- Storm-Damage Reduction
- Environmental
- Economic