



U.S. Army Corps
of Engineers®

ADDRESSING ECONOMIC CONSIDERATIONS IN SHORELINE PROTECTION

*Proceedings of a Workshop for the
National Shoreline Management Study*



NATIONAL SHORELINE MANAGEMENT STUDY

The National Shoreline Management Study, authorized in the Water Resources Development Act of 1999 under Section 215c, presents an opportunity to examine the status of the Nation's shoreline for the first time in 30 years. Results from the study will provide a basis for Federal actions regarding shoreline management for the foreseeable future. The study will provide a technical basis and analytical information useful in developing recommendations regarding shoreline management, including a systems approach to sand management, and roles for Federal and non-Federal participation in shoreline management.

The study will:

- summarize information about shoreline changes (erosion and accretion) available from existing data sources and examine the causes and economic and environmental effects;
- identify and describe Federal, state and local government programs and resources related to shore restoration and nourishment; and,
- explore ideas concerning a systems approach to sand management.

The assessment of the nation's shorelines will take into account the regional diversity of geology, geomorphology, oceanography, ecology, commerce, and development patterns

The study will be undertaken through collaborative efforts with other agencies. Information and products will be scoped, developed, and reviewed by national technical and policy committees involving multiple agencies. The National Study team will also solicit input from other interested parties and in developing study recommendations.

The U.S. Army Corps of Engineers' Institute for Water Resources (IWR) is managing the study working closely with the Engineer Research and Development Center Coastal and Hydraulics Laboratory and Corps field experts. National technical and policy committees, which include other agency experts, will be assembled as integral components of the study.

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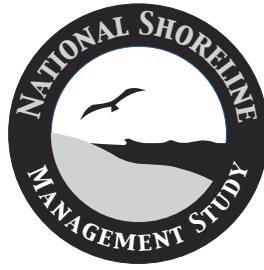
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Or go to the study website at: <http://www.iwr.usace.army.mil/NSMS>. The website provides reports to date and study progress along with topical links to other related studies and relevant agency programs.

A limited number of reports are available and may be ordered by writing Arlene Nurthen, IWR Publications, at the above Institute for Water Resources address, by e-mail at: Arlene.nurthen@usace.army.mil, or by fax 703-488-8171.



ADDRESSING ECONOMIC CONSIDERATIONS IN SHORELINE PROTECTION

Proceedings of a Workshop for the National Shoreline Management Study

July 23-24, 2002

The George Washington University, Washington D.C.

Workshop sponsored by
U.S. Army Corps of Engineers
Institute for Water Resources
and
The Center for Economic Research, The George Washington University (GWU)

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PREFACE

This report is a product of the National Shoreline Management Study (NSMS). The NSMS was authorized by Section 215(c) of the Water Resources Development Act of 1999.

ACKNOWLEDGEMENTS

This document was prepared by Laura Zepp of the Planning and Policy Studies Division of the Institute for Water Resources, US Army Corps of Engineers (IWR USACE). Chief of the Division is Eugene Stakhiv. The Director of IWR is Robert Pietrowsky. Direct supervision and support for this effort was provided by Robert Brumbaugh of IWR, the Project Manager of the NSMS. USACE Headquarters (HQ) comments were provided by Harry Shoudy of the Planning and Policy Division, Directorate of Civil Works. Mr. Shoudy provided not only supportive comments but also HQ oversight and direction.

Additional review comments were provided by Hal Cardwell, IWR and Dennis Robinson, Institute for Economic Advancement, University of Arkansas at Little Rock. Dennis Robinson also organized and led the workshop. Hal Cardwell moderated the question and answer sessions following each speaker presentation.

Special recognition is also given to the Center for Economic Research, The George Washington University (GWU) for its joint sponsorship of the workshop, coordinated by Drs. Anthony Yezer and Joseph Cordes of the GWU, Department of Economics.

EXECUTIVE SUMMARY

In July 2002, the U.S. Army Corps of Engineers (Corps) Institute for Water Resources (IWR) jointly sponsored a workshop with the Center for Economic Research, The George Washington University (GWU), to identify and discuss economic and financial considerations associated with shoreline protection.

The workshop, held July 23-24 at GWU in Washington, DC, was a first step towards identifying key issues and questions that should be addressed as part of an assessment of the nation's shorelines included in the National Shoreline Management Study (NSMS). The National Shoreline Management Study is an interagency effort to determine the extent and cause of shoreline erosion along the nation's coasts and to assess the economic and environmental impacts of that erosion. The Corps' Institute for Water Resources (IWR) is managing the study, which was authorized by the Water Resources Development Act of 1999.

On the first day of the workshop, researchers from academia and the public and private sector presented their work and shared their ideas on the economic consequences of shoreline erosion and other considerations involved in shoreline protection activities. On the second day, moderated working groups provided all workshop participants an opportunity to discuss the information presented and identify key

issues and questions that might be addressed in the National Shoreline Management Study.

These proceedings provide a record of the workshop activities, including an overview of each speaker's presentation, copies of any slides or overheads used, and references to related readings or papers provided by the speakers.

The questions and ideas raised in the presentations and subsequent workgroup discussions suggest five key issues that should be addressed in the NSMS.

1. Identifying shoreline management goals.
2. Identifying appropriate analytical approaches and criteria for evaluating the economic and environmental consequences of shoreline erosion and shoreline management measures.
3. Understanding how existing federal, state and local policies affect private and public shoreline use decisions.
4. Addressing empirical issues.
5. Addressing financial feasibility issues.

These workshop discussions and proceedings will be used to inform the NSMS as it develops an economic assessment methodology. For the current status of the NSMS, please see the NSMS website:

<http://www.iwr.usace.army.mil/NSMS>

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INTRODUCTION

In July 2002, the U.S. Army Corps of Engineers' (Corps) Institute for Water Resources (IWR) jointly sponsored a workshop with the Center for Economic Research, The George Washington University (GWU), to identify and discuss economic and financial considerations associated with shoreline protection.

The workshop, held July 23-24 at GWU in Washington, DC, was a first step towards identifying key issues and questions that should be addressed as part of an assessment of the nation's shorelines included in the National Shoreline Management Study (NSMS). The National Shoreline Management Study is an interagency effort to determine the extent and cause of shoreline erosion along the nation's coasts and to assess the economic and environmental impacts of that erosion. The Corps' Institute for Water Resources (IWR) is managing the study, which was authorized by the Water Resources Development Act of 1999.

At the workshop, researchers from academia and the public and private sector presented their work and shared their ideas on the economic consequences of shoreline erosion and other considerations involved in shoreline protection activities. Issues addressed in the presentations included:

1. criteria used to evaluate the economic effects of Corps shoreline protection projects,
2. contributions of historical measures to manage coastal and inland waters to current day shoreline management challenges,
3. information currently available on characteristics of beach tourists,

4. how shore protection activities and the National Flood Insurance Program (NFIP) individually and jointly affect development in coastal communities,
5. division of tax revenues from beach-related recreation and tourism between the local beach community and federal and state government,
6. determining whether or not local beach communities receive a large enough share of the tax revenues generated by beach-related spending to cover the costs of a beach nourishment project,
7. effects of beach nourishment, shoreline stabilization and beach retreat on property values in coastal communities,
8. maintenance, management and emergency costs associated with beaches and beach nourishment projects, and
9. costs of beach erosion to the national economy in terms of beach tourism lost to alternative, international destinations.

In addition to speaker presentations, moderated working groups provided all workshop participants an opportunity to discuss the information presented and identify key issues and questions that might be addressed in the National Shoreline Management Study.

These proceedings include an overview of each speaker's presentation, copies of any slides or overheads used, and references to related readings or papers provided by the speakers.

WORKSHOP PRESENTATIONS

Background to the National Shoreline Management Study

Robert Brumbaugh, Institute for Water Resources

What are the national and regional economic benefits of shore protection projects?

Dennis Robinson, Institute for Water Resources

Demography, Geology and Coastal Projects Technology Present and Future

Charles Chesnutt, Corps Headquarters

Where do tourists come from and where do they go? What information do we need to answer these questions?

Alan Mills, Virginia Commonwealth University

Do shore protection projects induce local development? Can they prevent the decline of beach economies?

Anthony Yezer, George Washington University

The Fiscal Impacts of Beaches at Two Beach Towns: San Clemente and Carpinteria

Philip King, San Francisco State University

Financing Beach Improvements and the Implications of Economic Externalities for Coastal Policy

Warren Kriesel, University of Georgia

What are the maintenance, management and emergency costs associated with beach nourishment projects?

Linda Lent, Consulting Economist

How do damages prevented by shore protection projects affect housing values?

William Stronge, Florida Atlantic University



PRESENTATION SYNOPSES

BACKGROUND TO THE NATIONAL SHORELINE MANAGEMENT STUDY

Robert Brumbaugh, PhD. Institute for Water Resources (IWR)

SUMMARY: In his presentation, Dr. Brumbaugh described the purpose and scope of the National Shoreline Management Study.

PRESENTATION:

The Corps of Engineers has initiated the National Shoreline Management Study (NSMS) authorized in the Water Resources Development Act of 1999 under Section 215c.

The National Shoreline Management Study presents an opportunity to examine the status of the Nation's shoreline for the first time in 30 years, in order to provide a basis for Federal actions regarding shoreline management for the foreseeable future. The study will provide a technical basis and analytical information useful in developing recommendations regarding shoreline management, including a systems approach to sand management, and roles for Federal and non-Federal participation in shoreline management.

The study will summarize information about the shoreline changes (erosion and accretion) available from existing data sources and examine the causes and economic and environmental effects. The study will also identify and describe the Federal, state and local government programs and resources related to shore restoration and nourishment, and explore ideas concerning a systems approach to sand management. The assessment of the nation's shorelines will take into account the regional diversity of geology,

geomorphology, oceanography, ecology, commerce, and development patterns.

IWR will manage the study working closely with the Engineer Research and Development Center Coastal Hydraulics Laboratory and Corps field experts on the study team. National Technical and Policy Committees, which include other agency experts, will be assembled as integral components of the study.

The study received \$300,000 in Fiscal Year 2002, primarily for initial scoping and study plan development. Several interim reports are expected to be prepared this year. The Administration has proposed \$500,000 more to continue the study in Fiscal Year 2003. The initial estimate to complete the study is \$7 million total. The pace of the study will depend on the rate of study funding.

The study team will work with other Federal agencies regarding shoreline data collection and will coordinate and collaborate with these agencies to assess the state of the nation's shorelines. The National Study team will also solicit input from other interested parties.

CITATIONS AND RELATED PAPERS:

The site <http://www.iwr.usace.army.mil/NSMS/nsmshomeframeset.html> provides a copy of the study authorization and access to NSMS products as they are completed.

WHAT ARE THE NATIONAL AND REGIONAL ECONOMIC BENEFITS OF SHORE PROTECTION PROJECTS?

Dennis Robinson, PhD., Institute for Water Resources

SUMMARY: Dr. Robinson discussed the differences between two criteria used to evaluate the economic effects of Corps shoreline protection projects: “national economic development” (NED) and “regional economic development” (RED).

PRESENTATION:

Dr. Robinson began his presentation by explaining the Corps uses two type of criteria to evaluate the economic effects of Corps shoreline protection projects: “national economic development” (NED) and “regional economic development” (RED). The differences between these two criteria are not always clearly understood. The purpose of the presentation was to clarify the definitions and underlying assumptions of these two economic criteria.

National Economic Development

National economic development (NED) is a criterion for evaluating public expenditure projects that measures their net effects on the national economy as a whole, regardless of where the benefits accrue within the nation. Project benefits include any increases in the net value of the national output of goods and services stemming from the project. Project costs include the opportunity costs of all resources employed to construct the project. If the value of the project benefits exceeds the project costs, the project has a positive NED effect and is viewed as being a worthwhile investment from the perspective of the national economy. NED is the primary criterion that the Corps uses to evaluate its projects, as required by Corps planning guidelines (Watt, 1983).

National economic development, however, does not provide a complete measure of the project benefits to local economies, Robinson pointed out. For example, consider a beach protected by a Corps project that lures additional vacationers away from other beach communities. From the perspective of the local economy where the beach is protected, the revenues generated by the resulting increase in spending for food, lodging and

recreational activities would be considered a benefit. These types of local benefits, however, would not be included in the calculation of NED. From a national perspective, the additional spending by the new beach visitors has merely been transferred from one beach community to another, and does not represent a net increase in value to the nation as a whole.

Regional Economic Development

Regional economic development (RED) criterion provides a measure of the extent to which a project stimulates the economy within a particular region (e.g. a state or locality). RED effects include both the direct economic impacts of a Corps beach project, such as increased tourism spending in the region, as well as secondary impacts such as the new rounds of expenditures generated by the initial tourists’ spending. An analysis of RED effects is not a required part of the project selection process; however, it provides information about the local income and employment effects of a project that is often sought by local sponsors.

Because the NED and RED criteria evaluate the economic effects of Corps projects from two different perspectives, some of their underlying assumptions differ. For example, an analysis of the NED effects of a beach protection project assumes full employment of the nation’s resources. Full employment of the nation’s resources means that any new economic activity within a beach community can only occur at the cost of economic activity elsewhere in the nation. Under the assumption of full employment, the NED analysis accounts for the opportunity cost of all resources used in project construction, that is the value of those resources in their next, best alternative use.

RED analysis, by comparison, assumes that some of the nation’s resources can be made available locally whether or not they are currently employed elsewhere. An assumption that unemployment is greater than zero allows the positive regional economic effects of beach

activities within a locality to be counted as a benefit, without having to also estimate the corresponding negative economic effects in the rest of the nation.

The scale of NED and RED estimates for certain types of benefits can differ greatly. For example, estimates of recreation RED benefits are usually much greater than NED estimates of recreation benefits. This occurs because the NED benefits from recreation are evaluated using a measure of individuals' willingness to pay (WTP) for the improved recreational experiences created by a nourished beach. Estimates of individuals' WTP for beach improvements are not measures of how much money people actually will spend when visiting the beach. The recreation expenditures that determine the RED benefits of recreation on a beach can be many times greater than the NED estimates based on measures of WTP.

Finally, consideration of changes in consumer spending both with- and without- the project is necessary to understand the meaning of NED and RED benefits. From the perspective of the region, a beach

nourishment project may bring in a significant amount of new spending that would not have otherwise occurred in the absence of the project. While this spending is new to the region, and thus considered an RED benefit, it is not necessarily new spending to the nation as a whole. Robinson argued that much of new recreation spending in the region would have likely still occurred elsewhere in the nation had the beach nourishment project not been constructed. Nationally, the ratio of consumer spending to income has remained fairly constant since World War II, suggesting that consumers will continue to spend approximately the same proportion of their income on recreational activities. The presence of a beach project might attract more of that spending into the region, thus contributing to RED, but still not produce an overall increase in recreation spending nationwide.

CITATIONS AND RELATED PAPERS:

Watt, James G. Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies. Washington, DC: U.S. Water Resources Council (1983).

DEMOGRAPHY, GEOLOGY AND COASTAL PROJECTS TECHNOLOGY PRESENT AND FUTURE Charles Chesnutt, U.S. Army Corps of Engineers, Headquarters

SUMMARY: In his presentation, Mr. Chesnutt described how historical measures taken to manage coastal and inland water resources in different regions of the nation have contributed to current day shoreline management challenges. He discussed the implications of these regional challenges for the Corps' future approach to shoreline management. Based on this discussion, Chesnutt suggested questions that should be addressed in the National Shoreline Management Study.

PRESENTATION:

Providing a backdrop to his presentation, Chesnutt explained that the National Shoreline Management Study (NSMS) will provide a follow-up to a 1971 inventory of the nation's shorelines included in the National Shoreline Study Regional Inventory reports. The 1971 inventory identified both "significant erosion

areas" and "critical erosion areas" along the nation's shoreline. Those areas classified as "significantly eroding" were subject to erosion, but did not incur significant erosion-related damages to economic or environmental resources. "Critical erosion areas" included areas subject to high rates of erosion that threatened economic development and / or crucial environmental resources.

According to Chesnutt, 76% of the nation's shoreline was classified as having no significant erosion at the time the inventory was completed and only a small amount of critical erosion was found. Yet, according to Chesnutt, "...people could see development coming." He explained that increasing shoreline development since the 1971 study is resulting in higher levels of critical erosion, even though the nation's shorelines are not experiencing greater rates of erosion.

Regional Shoreline Management Challenges

Chesnutt continued his presentation by describing historical approaches to managing water resources in different regions of the nation that have affected the shoreline, both prior to and since the 1971 study.

East Coast

Chesnutt presented a slide mapping out the locations of all Corps coastal navigation projects. He explained that, historically, structures were used to stabilize the shoreline and protect upland areas from storm damages. However, these shoreline structures often created additional problems by interrupting the natural flow of sediment along the coastline.

Chesnutt pointed out that a predominance of these structures can be found in the east coast of the U.S., where early industries first sprung up. “We have a lot of old structures out there.” Chesnutt stated, adding that within the next 10 to 15 years, the Corps will be faced with the responsibility of reconstructing a lot of these structures. Chesnutt advised that these near-term requirements should be looked at as an opportunity to fix some of the problems with sediment transport created by the older projects. He added that a proactive approach should be taken to addressing problems created by these older, shoreline stabilization structures.

Gulf Coast

Chesnutt then turned to the Gulf Coast region of the U.S., explaining that a significant future challenge for the Gulf Coast states is the management of large quantities of dredge materials. He reported that more than one half of dredging in the US occurs in the Gulf Coast states and districts due to dredging of materials in navigation channels, bays and estuaries.

West Coast

The West Coast also faces the problem of sediment management. Already today, significant amounts of dredging in Southern California are creating sediment management problems. Additionally, Chesnutt added that the many dams in the west are creating a “problem delayed”. He explains that these large dams are holding back vast quantities of sediments that will have to be

dealt with if the dams are ever removed. Furthermore, he points out that, because these dams are blocking the natural flow of sediments, they are actually contributing to coastal erosion by stopping up the supply of beach quality sand. Dams also stop flood flows, which means that, even where there is a sediment supply, the materials are not making it to the coastline because river flows are diminished.

Future Approaches to Shoreline Management: Ideas to be considered in the NSMS

Having provided an overview of shoreline management challenges in different regions of the US, Chesnutt next suggested ideas for future approaches to shoreline management and raised questions to be considered in the NSMS.

Evaluating the effectiveness of the Federal government in preventing erosion in significantly eroding areas

Chesnutt pointed out that most shoreline erosion projects are located along the east coast, a region of the U.S. that has experienced the largest amount of coastal development over the past 30 years. He suggests that one question that should be asked in the National Shoreline Management Study is how effective the federal government has been in preventing development in coastal areas identified as significantly eroding in the 1971 inventory. Chesnutt argues that the federal agenda for coastal zone management should not necessarily be the retreat of development from the coastline. He argues that, despite the fact that coastline retreat has been an objective adopted by many federal agencies over the past 30 years, coastal development has continued to increase. Chesnutt states that, with increases in personal wealth, citizens will and are building along the coastline, regardless of federal shore protection policies and activities.

Examining the effects of CBRA on Coastal Development

Another question posed by Chesnutt is whether or not designation of Coastal Barrier Resource Act (CBRA) Areas has made a difference in the amount of development occurring in these same areas. CBRA areas are environmentally significant stretches

of barrier islands on which all forms of federal assistance that might encourage development, (such as funding for a highway or federally subsidized flood insurance) are prohibited. Chesnutt suggested that CBRA restrictions may prove to have had little effect on coastal development. He added that the federal government has had no success at reducing federal disaster assistance payments to coastal area, resulting in additional incentive for development in coastal areas.

Chesnutt then presented expenditure data for some of the Corps larger shore protection projects. He argued that the future challenge for Corps engineers is determining how to better design shore protection projects in order to reduce costs at existing projects, rather than for the purpose of constructing new projects.

Conceptualizing the consequences of sand and sediment movement as “sand rights”

Chesnutt explained that shoreline management has shifted over time from the use of structures to protect development, to the use of beach restoration and nourishment projects that replenish sand reserves. At the same time, we are engaging in activities that create sand deficiencies, such as the use of dams in the West. Chesnutt suggested that the question of managing complex systems of sand and sediment movement through rivers and across the shoreline can be conceptualized as a matter of sand rights, much in the same way that a system of water rights emerged to address conflicts arising from water shortages in the West.

Considering the future federal role in shoreline management

Chesnutt suggested that the National Shoreline Management study provides an opportunity to answer the questions of where federal shoreline protection activities should occur and how federal dollars should be allocated. Chesnutt described two examples of federal activities that have had some success in reducing damages to coastal properties. He first pointed to the Federal Emergency Management Agency’s flood insurance program, which has compelled participating homeowners to elevate their houses above the flood level in the coastal zone. Additionally, he pointed out that, in areas where the Corps has constructed

a shoreline erosion project, the project has stopped erosion. As an example, he pointed to the performance of Corps shoreline projects in Wrightsville Beach, North Carolina, reporting that no houses were lost to erosion when Hurricane Fran struck the North Carolina coast.

Chesnutt displayed a map illustrating the 1971 critical erosion shoreline areas. For the future, he predicted an increase in critical erosion shoreline areas in the Pacific Northwest, California, Hawaii and the Gulf states. He predicted that more Corps projects will be built in the area if development is not slowed. He pointed out that engineering solutions that have historically been used along the east coast may not be suitable for Gulf Coast and Pacific shores. He argued that engineering guidelines should be tailored to the particular requirements of the different regions of the United States.

CONCLUSION

Chesnutt concluded his presentation by stating that the Corps needs to look not only at the effects of shoreline projects on the National Economic Development (NED) criteria conventionally used in project planning, but also at regional, environmental and social effects. “The challenge is,” said Chesnutt, “to develop a comprehensive rationale that allows us to take a balanced look at all the values as expressed in the Corps’ Principles and Standards, as a means for determining what is in the nation’s interest.”

CITATIONS AND RELATED PAPERS:

Department of the Army, Corps of Engineers; *Report on the National Shoreline Study*, Washington DC, 1971.

Chesnutt, Charles B. and Morang, Andrew; “The Influence of Geology, Demographics, and History on U.S. Army Corps of Engineers Coastal Projects”; *Proceedings of the 69th Meeting of the Coastal Engineering Research Board (Honolulu, HI) (Includes Proceedings of the 68th Meeting of the CERB)*, 14-16 April 1999, pg 74. (for updated information see "Historical Origins and Demographic and Geological Influences on Corps of Engineers Coastal Missions", IWR Report 04-NSMS-4, January 2004)

VISITORS TO BEACHES: WHAT WE KNOW AND HOW TO COLLECT THE INFORMATION WE NEED

Allan Mills, PhD., (Virginia Commonwealth University)

SUMMARY: In his presentation, Dr. Mills provided an overview of currently available information on characteristics of beach tourists, including where they come from, their ages and genders, the types of groups they travel in and the types of recreational activities they seek out at the beach. He also identified several available sources of information on attributes of beach tourists.

For these proceedings, Dr. Mills included several slides in the second half of his slideshow describing effective survey methods for collecting information about beach tourists. Time limitations prevented Dr. Mills from discussing this information as part of his presentation at the workshop. Instead, he referred the audience to an Institute for Water Resources report (Mills et al., 1993), which he coauthored, that provides a detailed discussion of survey methods.

PRESENTATION:

Existing Knowledge About Beach Tourist Attributes and Activities

Mills began his presentation by describing what is already known about attributes and behaviors of beach tourists, using currently available sources of information. He first described the Outdoor Recreation Resources Review Commission (ORRRC) Study Report #4, 1962 which contains a chapter describing recreation-related wants and needs of U.S. citizens, including projections to 1976 and 2000. The report also contains a chapter documenting shoreline recreation resources currently available (at the time of report publication in 1962) and providing projections of future resource development through to 2000. A third chapter describes policies and programs to meet present and future recreation needs.

Other parts of the report that Mills identified included two appendices,

Appendix A: which includes summaries of surveys of state's coastal resources, back to 1962,

Appendix B: which contains a glossary that defines terms. For example, the glossary would clarify the

meaning of the term "beach recreation" by pointing out that it could include recreational uses of coastal bluffs, in addition to recreation on sandy beaches.

Next, Dr. Mills described a NOAA Sea Grant report, "Factors Related to Beach Use", (Spaulding, 1973). This report contains an on site survey of beach users at Sandy Beach, a beach site in Rhode Island. Mills pointed out that the sampling process used for the survey was subjective and did not use a probability based sample design. Survey respondents filled out a one page questionnaire including questions about how far they traveled, number of people they traveled with and why they have come to the beach.

Drawing on the data collected through the 400 interviews obtained, a descriptive report was produced. Although the report was descriptive, and contained no economic information, it provided information on the types of beach user groups visiting Sandy Beach. The survey results indicated that 52.8% of groups using the beach were Family Groups. Of the family groups visiting, 41% included children and the remaining 59% consisted of adults only.

The remaining 47.2% of groups using the beach were non-family groups. Of the non-family groups, 54% were groups of friends of both sexes, 19% were groups of all female friends, 8% were groups of all male friends, 11% were males on their own, 8% were females on their own and 2% were church or school groups.

The Sea Grant report also includes findings indicating beach users' reasons for visiting Sandy Beach. 72% of beach users gave only one reason for visiting the beach. Of this 72%, the reasons given included: weather conditions (20%), personal feelings (15%), miscellaneous other reasons (14%), attending a planned event (9%), break in work (6%), interpersonal influences (3%), routine activity (3%), repeated activity (2%), close proximity of beach (1%). The report also identified factors that limited individuals' use of the

beach, including: work and available time (24%), distance to the beach and work (7%), weather and time (7%), transportation, traffic, work and time.

A third study described by Mills is the 1987 study, “Economic Impacts of Texan’s Recreational Trips to the Texas Gulf Coast”. In describing this study, Mills pointed out that surveys of beach users can be conducted in a variety of different ways. Whereas the Rhode Island survey was conducted on-site at Sandy Beach, the Texas study first did a screening telephone survey just to identify a sample of the population that uses the Texas Gulf Coast beaches. This sample set then received a mailed questionnaire.

The results of the survey of Texan’s visiting the Gulf Coast indicated that 10.3 M visits were made to the Texas Gulf coast in 1986. Visitors spent a total of approximately \$586.6M.

Mills also described two surveys conducted during preparation of the Virginia Outdoors Plan (the “SCORP” report) by the Virginia Department of Conservation and Recreation. The surveys were designed to evaluate the number of people participating in outdoor recreation in Virginia. Some of the survey questions were designed to determine whether and where Virginians sunbathe and relax on beaches. The results indicated that 44.3% of individuals surveyed did choose to sunbathe and relax on beaches. Of that 44%, 58.8% did it mostly in Virginia. The average number of days spent sunbathing was 16.9, with a median of 10.

Another example of beach related recreation that is accounted for in the SCORP report is saltwater fishing activities. The surveys conducted included a question asking individuals that saltwater fish whether they fish from the water, or from the beach.

Finally, the SCORP report contains information on factors limiting participation in outdoor recreation activities. Factors identified included time, money, overcrowding, distance, information, facility availability, accessibility, and facility quality.

Existing Sources of Tourism Data

Mills concluded his presentation by identifying several existing sources of data on domestic and international tourism. The US Travel Data Center is a key source of domestic tourism data. A tourist is defined by the Travel Data Center as an individual that is “...100 miles or more away from home or a traveling a lesser distance, but staying at the destination overnight.” The US Travel Data Center collects domestic tourism data by contracting out with individual states to conduct surveys. The data they compiled is then used to produce annual reports.

A source of international tourism data described by Dr. Mills is a publication, “Tourism Industries”, produced by the U.S. Department of Commerce. One survey technique used to collect international tourism data is in-flight surveys of international visitors. These surveys would include questions concerning participation in water sports and sunbathing as well as visiting national parks, some of which include beaches. CIC Research Inc. is a tourism research consulting company that conducts these types of surveys, taking random samples from airports around the country. CIC’s reports are for sale and their data can be purchased. For example, Dr. Mills has purchased data on international travel to Virginia, Washington DC and Maryland from CIC.

Dr. Mills also noted that license plate surveys are one survey technique that is useful for collecting information on beach visitors. With a license plate survey, researchers record the license plate numbers of vehicles parked at the beach. They can then contact and survey the owners at a later time.

As a final note, Dr. Mill recommended that, when designing studies of beach recreation and tourism, the Corps should seek assistance from university researchers who have expertise in sampling and survey research. He noted the importance of using a probability sample and appropriate data collection methods to represent all of the different types of coastal beaches and their users in the continental US and Hawaii. Specifically, he suggested the use of a stratified

sample design based on geographic location (East Coast, West Coast, Gulf, Hawaiian Islands), as well as other differences in beaches, such as sand colors and textures, beach vegetation differences, or the presence or absence of high banks.

CITATIONS AND RELATED PAPERS:

For further reading, Dr. Mills recommended the work of Dr. Guilherme G. Santana, a researcher and lecturer at the Center for Technology, Earth and Marine Sciences at the University of the Valley of Itajai, Santa Catarina Brazil. Dr. Santana has a PhD. from the International Center for Tourism and Hospitality Research at Bournemouth University in England. He was one of 9 editors of the following published proceedings of a symposium on Sand Beaches held at his university in Santa Catarina, September 3-6, 2000.

The proceedings are titled:

Proceedings: Brazilian Symposium on Sand Beaches, Morphology, Ecology, Use, Risks, and Management; City of Itajai, Santa Catarina, Brazil; September, 2000.

Mills, Allan S., Davis, Stuart A., Peterson, Linda K., and William J. Hansen, "Use and Adaptation of Office of Management and Budget Approved Survey Questionnaire Items for the Collection of Corps of Engineers Planning Data."; *National Economic Development Procedures Manual – Public Surveys, Volume I*, January 1993. IWR Report 93-R-2.

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DO SHORE PROTECTION PROJECTS INDUCE LOCAL DEVELOPMENT?

CAN THEY PREVENT THE DECLINE OF BEACH ECONOMIES?

Anthony Yezer, PhD., The George Washington University

SUMMARY: In his presentation, Dr. Yezer described the findings of three studies examining how shore protection activities and the National Flood Insurance Program (NFIP) individually and jointly affect development in coastal communities.

PRESENTATION:

Yezer began his presentation by pointing out that both shoreline protection activities and the availability of flood insurance create incentives that affect development decisions in coastal communities. He contended that there are interactions between the incentives created by shore protection and flood insurance and that the combined effects of both factors on local development should be examined.

Yezer then provided two, opening observations about the role played by flood insurance and shore protection in coastal residents' development decisions. He described the findings of a survey conducted to determine how much coastal residents knew about flood insurance and shore protection projects in

their vicinity. The results of the survey indicated that property owners in coastal areas knew a lot about FEMA's National Flood Insurance Program (NFIP) policies, however, they know little or nothing about Corps shore protection policies and projects. Yezer also observed that coastal property owners must be compelled to purchase flood insurance, despite the fact that flood insurance policies may be subsidized.

In his presentation, Yezer described the results of three studies he conducted to examine how shore protection activities and the National Flood Insurance Program (NFIP) separately and jointly affect development in coastal communities.

Following are the three findings Yezer reported, along with a description of the studies from which the findings were drawn.

Finding One: The effects of shoreline protection projects on beachfront development are small compared to the effects of flood insurance and the Coastal Barrier Resource Area Act (CBRA).

Yezer based this finding on the results of two studies. One study used regression analysis to examine the effects of shoreline protection and flood insurance (along with other factors) on economic development in beachfront communities (Cordes and Yezer, 1998). In this study, economic development was measured by the number of new building permits issued annually. The number of new building permits issued was evaluated as a function of :

1. the current level of shore protection activity (i.e. whether or not shore protection projects are present and the scale of any existing projects),
2. the availability of flood insurance through the NFIP (including a measure of whether or not the community participates in the NFIP and whether or not community receives subsidized policies),
3. the existing level of economic activity in the community, and
4. other relevant factors including exposure to storm activity, the location of the community and time trends.

The results of the regression analysis indicated that Corps shore protection projects had little or no statistically significant effect on beachfront community development. In contrast, the availability of flood insurance through the NFIP did have a statistically significant, positive effect on beachfront development (although premium subsidies did not). Increased economic activity in the community resulting from a increase in demand for recreation services also proved to have a statistically significant effect on beachfront development.

Yezer explained that these results suggest that both economic growth in areas adjacent to shorelines and the availability of flood insurance encourage shoreline development. Shoreline protection projects, on the other hand, have little or no effect on development

In a second study, Cordes et. al. (2001) Yezer explain that they compared the annual percentage change in estimated housing prices in Pinellas County, FL for 1) housing along the coast line vs. 2) housing inland but close to the coast. They found that the rate of price appreciation for housing in beach areas was

higher and more variable than price appreciation for inland housing.

In Cordes et. al., (2001), the authors hypothesized that the high rate of appreciation and variability in housing prices along the coast might be attributable to the presence of Corps shore protection projects. To evaluate this possibility, they regressed the annual percentage change in estimated housing prices along the shoreline against several explanatory variables, including two variables representing Corps shoreline protection activities. One variable indicated the presence of an active Corps project in the area. The second variable measured the annual dollar expenditure for any existing active Corps project.

Based on the results of this regression analysis, Cordes et al. (2001a) could not conclude that Corps shore protection activities have a statistically significant effect on the annual percentage change in estimated house prices along the shoreline. Yezer pointed out that these results further suggest that Corps shore protection projects have little effect on housing prices at the “water’s edge”.

Finding Two: Flood insurance has important effects on beachfront development.

Specifically, Yezer explained that flood insurance tends to tilt development towards the shoreline, rather than simply inducing development. He based this observation on the results of a housing density study Cordes et al. (2001b). In this study, Cordes et al. examined the rates of appreciation in development density, measured as a ratio of capital (or square feet of internal space constructed) to land area, from 1963 - 1997 for houses at varying distances from the shoreline. From this analysis, they found that the availability of flood insurance tended to tilt development towards the shoreline, rather than simply inducing development. Yezer argued that this tilting effect occurs because flood insurance accelerates development on the 1st row (closest to the water), while people further back from the water’s edge (the “3rd row”) have little incentive to purchase flood insurance. Yezer explains that 3rd row property owners stand to gain in the event of a storm

that destroys the 1st row of beachfront properties. After the 1st row of properties is wiped out, 3rd row properties are one row closer to the beach and will increase in value as a result. Yezer contends that even if the 3rd row properties incur some damage as a result of the storm, the subsequent increase in property value more than offsets the cost of repairs, making the purchase of flood insurance a perverse decision for 3rd row property owners.

Finding Three: There are interactions between shore protection and flood insurance

Yezer explained that shore protection measures act to lower flood insurance losses. This interaction between shore protection and flood insurance occurs because shore protection protects coastal properties from damages that would have otherwise occurred, hence lowering insurance fund losses. The flood insurance program, however, does not price its policies based on the shoreline enhancement policy of the area. This means that, other things equal, losses would be higher in areas that do not permit beach enhancement. As an example, Dr. Yezer explained that

a ban on shoreline enhancements in North Carolina means that substantial losses to the insurance fund are virtually inevitable. By comparison, a policy of shoreline enhancement in Maryland may postpone flood insurance losses for some time.

CITATIONS AND RELATED PAPERS:

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Cordes, Joseph J., Yezer, Anthony M. and Asadurian, Alis (2001b) "Using a Cross Section to Create Panel Data: The Case of Flood Insurance, Coastal Erosion, and Beachfront Development," Department of Economics Working Paper, January 2001.

THE FISCAL IMPACTS OF BEACHES AT TWO BEACH TOWNS: SAN CLEMENTE AND CARPINTERIA

Philip King, PhD., San Francisco State University

SUMMARY: Dr. King presented the results of a study evaluating how tax revenues generated by beach-related recreation and tourism are divided between the local beach community and the federal and state levels of government. He also addressed the question of whether or not local beach communities receive a large enough share of the tax revenues generated by beach-related spending to cover the costs of a beach nourishment project.

PRESENTATION:

Dr. King began his presentation with evidence that California's beaches are valued for the recreational and tourism opportunities they offer. Statistical records of household spending from the 2000 Statistical Abstract

of the United States (U.S. Census Bureau, 2000) indicate that spending on recreation as a percentage of the total household budget has steadily increased through the 20th century. At the same time, California's population has grown at a faster rate than that of the U.S. population. King stated that, with 63.8% of Californians visiting the beach annually, it is clear that substantial demand exists for California's beaches.

Additionally, Dr. King pointed out that tax revenues generated by beach-related recreation and tourism spending are an important source of revenues at the local, state and federal levels of government. In 2000, California's beaches generated a total of \$15B in tax revenues.¹ Of the total tax revenues generated, the

¹This amount excludes taxes for social insurance programs

federal government received 53.4%, the California state government received 30.5%, county governments received 8.1% and city governments received 8.1%.

While it is clear that all levels of government benefit from beach-related spending, King indicated that little work has been done to determine how the fiscal impacts of a beach are divided among the local, state and federal levels of government. According to King, it is commonly believed that most of the economic benefits of a beach improvement project accrue to the local government. This belief serves as a basis for the argument that localities should be able to extract enough revenues from the economic benefits created by a beach project to pay for most or all of the project costs. King explained that the purpose of the study described in his presentation was to empirically test this argument.

The study presented by King examined the fiscal impacts of beaches in two California beach communities, Carpinteria and San Clemente. Written surveys were distributed to beach users in both communities to collect information on beach attendance and spending patterns. Additionally, the study used beach attendance estimates provided by the cities and other estimates of beach visitation from private sources.

In his presentation, King first provided a profile of the two beach communities of San Clemente and Carpinteria. He then described the study methods and results. He explained how beach attendance and spending survey data were used to provide an estimate of the city, state and federal tax revenues generated by beach-related activities in each community. He also described the study's assessment of whether or not either of the two communities earned enough beach-related tax revenues to cover the costs of a beach nourishment project.

San Clemente

King described San Clemente as an affluent, predominantly Republican community with a population of approximately 50,000 people. The beach in San Clemente has a pier and housing mainly for year-round residents. Although there are not many

houses near the beach, beach erosion is becoming critical, threatening existing waterfront structures and a railroad line. The beach is slated for a U.S. Army Corps of Engineers (USACE) beach nourishment project.

Over 2M people visit the beach in San Clemente annually and the high season is from Memorial Day to Labor Day. Eighty percent of the people going to the beach in San Clemente are "day-trippers". King pointed out that this percentage is consistent with the entire state of California, where ninety percent of beach visitors are day-trippers. The beach at San Clemente is crowded, but beach crowding is limited by a scarcity of parking. The city of San Clemente faces beach related expenses of approximately \$1 per person per year.

From the data collected from beach users in San Clemente, King reported that one third of the beach related spending is done by day-trippers outside of the city limits. A significant part of the money raised by the city of San Clemente comes through parking fees and fines. Occupancy taxes are also a large source of revenues for the city. 60% of occupancy tax revenues are beach-related. Sales taxes are a less significant revenue source because, 1) food products are not taxed and 2) most of the sales taxes go to the state and not the city.

For the year of 2001, King found that the City of San Clemente spent approximately \$1.5M on maintaining its beach and raised approximately \$1.6M from beach-related tax revenues. King noted that property taxes were not included in the estimates of tax revenues. He acknowledged that the presence of a beach influences property values in the community, however, he suggests that the effects on property values are not that large because most residents of the city do not live close to the beach.

The study found that San Clemente roughly breaks even, earning just enough revenues to cover its beach maintenance costs, with little money left over to invest in a beach improvement project. After subtracting out beach maintenance costs, the city gains \$92,776 in net revenues, equivalent to about 5 cents per visitor, per day. By comparison, the study estimates that the beach at San Clemente provides the State of California approximately

\$4 of revenues per visitor per day and provides the federal government \$10.32 per visitor per day.

Carpinteria

According to King, Carpinteria is a less affluent community than San Clemente, with a population of approximately 14,000. Half of the beach area in Carpinteria is maintained by the city, while the other half is run by the state.

Annually, there are fewer beach visitors to Carpinteria than to San Clemente. A total of 1.4 visitors came to Carpinteria in 2001, with 1.3 M visiting in the high season. The City of Carpinteria gains approximately \$1.3M per year in beach related sales taxes and occupancy revenues. While Carpinteria also earns revenues from parking fines, the costs of collecting the fines exceeds the total amount of the fines. The City spends approximately \$525,000 annually on beach maintenance costs, including providing lifeguards and police services.

After subtracting out the beach maintenance costs, King found that the City of Carpinteria nets approximately \$745 thousand from its beaches, equivalent to approximately 57 cents per visitor per day. By comparison, the study estimates that the Carpinteria's beaches provide the state of California approximately \$6.90 in tax revenues per visitor per day and generates approximately \$17.07 of federal tax revenue per visitor per day.

CONCLUSION

Based on the study results, King found that neither Carpinteria nor San Clemente earn enough beach-related tax revenues to cover the costs of a beach nourishment project. He pointed out that the federal government receives much larger net tax revenue from the beaches in Carpinteria and San Clemente than

either of the two cities or the state. Direct beach-related spending generates over \$13 M per year in federal tax revenues in San Clemente and over \$22 M per year in Carpinteria.

King concluded his presentation by stating that California's beaches are public goods, available to all. As such, they generate substantial benefits. However, he pointed out that beach crowding and erosion are significant problems that will diminish recreational opportunities. He reiterated that the survey results for Carpinteria and San Clemente indicate that the federal government earns the greatest amount of net tax revenues from beach-related activities in the two communities. The city governments do not earn enough beach-related tax revenues to pay for the beach improvement projects needed to protect beach quality.

CITATIONS AND RELATED PAPERS:

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- King, Philip (2001). "Economic Analysis of Beach Spending and the Recreational Benefits of Beaches in the City of San Clemente." San Francisco State University.
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FINANCING BEACH IMPROVEMENTS AND THE IMPLICATIONS OF ECONOMIC EXTERNALITIES FOR COASTAL POLICY

Warren Kriesel, PhD., University of Georgia

SUMMARY: In his presentation, Dr. Kriesel described the results and findings of two studies. The first study, “Financing Beach Improvements: Comparing Two Approaches on the Georgia Coast”, compared the benefits and financial feasibility of beach nourishment and beach retreat as two alternative approaches to reducing storm damages on Jekyll Island, Georgia. The second study presented by Kriesel, “Coastal Hazards and Economic Externality: Implications for Beach Management Policies in the American Southeast”, examined the effects of two different beach management options, shoreline stabilization and beach nourishment, on property values for beachfront properties as well as properties several rows inland.

PRESENTATION:

Dr. Kriesel began his presentation with slides showing two, shorefront sites along Georgia’s barrier islands. The first, taken at St. Simons Island Georgia, showed shorefront properties protected by stabilization structures. Because the stabilization structures interrupt the natural transfer of sand along the shoreline, virtually no beach area suitable for recreation remains between the protected properties and the water’s edge. A second slide showed a beachfront location in Sea Island, Georgia. Here, beachfront properties are protected by a beach nourishment project. A beach nourishment project replenishes sand reserves to increase the area and volume of sand available to absorb and dissipate wave energy. This means that, unlike the use of stabilization structures, beach nourishment preserves the shoreline while still providing protection from storm damages. The slide of the renourished shoreline at Sea Island showed an expansive beach area, providing aesthetic amenities and opportunities for recreation.

Pointing to the sharp contrast in recreational opportunities and aesthetic qualities between the renourished beach of Sea Island and the eroded shoreline of St. Simons, Kriesel described beach

nourishment and beach retreat as two storm damage reduction alternatives that can preserve the aesthetic and recreational amenities of a beach while still reducing storm damages. Both measures, however, require sufficient financing.

A nourishment project requires ongoing expenditures for periodic renourishment to maintain the beach. A shoreline retreat policy can be politically difficult to accomplish without the revenues needed to sufficiently compensate affected landowners.

Study One: Evaluating the Benefits and Financial Feasibility of Beach Nourishment and Relocation as Options for Jekyll Island, Georgia

The first study presented by Kriesel considered the feasibility of a beach nourishment project and a relocation project as two possible beach improvement options for Jekyll Island, Georgia. Both options were evaluated using a benefit costs analysis. Also, the financial feasibility of both options was assessed using estimates of revenues earned from parking fees paid by beach users.

Evaluating the Benefits of Beach Improvements

In the study presented by Kriesel, the benefits of the beach nourishment and retreat options were evaluated for two different financing alternatives. The measure of project “benefits” differed, depending upon which financing alternative was used.

One alternative, general revenue financing, assumed that project costs will be paid for out some combination of local, state and federal general tax revenues. Kriesel pointed out that the standard for justifying a project paid for by general tax revenue requires demonstrating that the project provides a net benefit to society. Beach users’ willingness-to-pay (WTP) for beach improvements was used as a measure of the societal benefits of a beach nourishment project or retreat policy.

The second alternative evaluated was user fee financing, where project costs would be paid for by raising the parking fees charged to beach users. In order to justify a beach improvement project supported by user fees, it must be established that the newly improved beach will attract a sufficient number of additional beach users to generate enough revenues from parking fees to pay for the improvement project. Therefore, under the user fee financing alternative, the benefits of the beach nourishment and beach retreat options were measured by estimating the additional revenues that would be raised from higher parking fees charged to beach users.

Estimating Willingness-to-Pay for Beach Improvements

Kriesel explained that the benefits of a beach improvement project for Jekyll Island were estimated using contingent valuation method (CVM). The data needed for the benefit analysis was collected by a survey of beach users on Jekyll Island.

In order to determine beach visitors' willingness to pay (WTP) for beach improvements, survey subjects were asked to view maps that used color coding to illustrate the difference between beach width under current conditions and the increase in beach width that would occur with an improvement project. After viewing the maps, survey subjects were asked whether or not they would be willing to pay a particular increase in parking fees (specified by the interviewer) above the current \$2/day level in order to enjoy the illustrated beach improvement. The amount of the parking fee increase differed from one respondent to the next and was randomly selected by the interviewer from one of eleven increments ranging from a 5 cent increase to a \$23 increase above the current day level of \$2/ day.²

Kriesel described other survey questions that were asked to collect data on factors hypothesized to contribute to beach user's WTP for beach improvements. Factors considered included: whether or not the beach user was a local resident or a visitor, the beach user's age, household income, travel time to reach the beach, attitude towards government (ie. pro-gov'n't, individuals that are supportive of government financed public works projects are hypothesized to be more supportive of a beach improvement project), and the availability of a substitute beach.

Also, Kriesel noted that in order to test for differences in the characteristics of individuals using the beach in different seasons, the survey was administered to beach visitors in the spring, summer and winter. Finally, to address the possibility that the type of beach improvement project (i.e. nourishment vs. retreat) might affect individuals WTP for beach improvements, three different surveys were administered. One version of the survey specified beach nourishment as the type of beach improvement project proposed for Jekyll Island. A second version specified that beach retreat would be used. The third version described both beach retreat and beach nourishment as examples of a beach improvement project, but did not specify which type would be used for Jekyll Island.

The survey data collected was then used in a logit regression analysis to estimate coefficients for each of the factors hypothesized to contribute to beach users' WTP for beach improvements. The estimated coefficients were used to calculate the average WTP for beach improvements, based on the survey data collected.³

²In his presentation, Dr. Kriesel explained the use of CVM is commonly criticized because survey respondents have difficulty accurately assessing their WTP for a hypothetical market situation. to avoid this problem, Dr. Kriesel points out that the questions in this survey designed to elicit WTP were framed in terms of individuals' willingness to pay a specified increase in existing parking fees. Since survey respondents are already paying parking fees to visit the beach, a suggested parking fee increase provides a familiar, real pricing mechanism they can use to assess their WTP for beach improvements.

³The transformations required to use the results of a logit model to determine the average annual WTP for beach improvements are described in Kriesel, Keeler and Landry, 2002.

The estimated median respondent's WTP was found to be \$5.57/ day. Multiplying the average WTP per day by the number of visits a year made by the average household, 5.48, yields an annual estimated WTP for beach improvements of \$30.53 per household. Finally, the total annual WTP for beach improvements was calculated by multiplying the average annual WTP per household (\$30.53) by 140,000, the total number of households visiting Jekyll Island every year. The annual WTP for beach improvements on Jekyll Island was calculated as approximately \$4,274,000.

Estimating Parking Fee Revenues Generated by Beach Improvement

Kriesel explained that a question was included in the survey to determine how beach visitation would change with a beach improvement project financed by an increase in parking fees. Survey participants were asked whether and how they would change the number of times they visited the beach annually in response to the color-coded beach improvement illustrated in the survey and the parking fee increase specified by the interviewer. It was hypothesized that the beach improvement should have a positive effect on beach visitation, while the increase in parking fees should have a negative effect on beach visitation.

The visitation data collected was used (along with the other survey data described in the preceding section) in a Tobit regression analysis to estimate the number of days a year people will come to the beach with a given parking fee increase. These visitation estimates were then used to calculate the total parking revenues that could be earned for different parking fee increases. It was found that the parking fee increase that maximized revenues equaled \$14.50 per day. Adding this fee increase of \$14.50 to the existing \$2.00 fee yields a total, daily fee of \$16.50. At \$16.50, the total annual parking fee revenues earned were estimated to be \$2.8M.

Evaluating the Costs of Beach Improvements

Calculating the Costs of Beach Nourishment

In Kriesel's study, the estimated costs of a beach nourishment project for Jekyll Island were based on the costs of a comparable project implemented at a nearby island, Sea Island, Georgia. Assuming that the 2.9 mile project for Jekyll Island was undertaken in 1998 and maintained for ten years, the present value⁴ of total project costs was estimated to be \$8.8M.

Calculating the Costs of Retreat

Kriesel explained that the costs of a beach retreat policy for Jekyll Island fell into three categories, capital losses, transition costs and land loss costs. Capital losses include the value of all structures adjacent to the shoreline that would be removed with a retreat policy. A total of 38 buildings would be affected by a retreat policy, resulting in capital losses of \$21.9M. Transition costs include an estimated \$6.2 M in costs associated with the demolition of structures and rock revetments required under the retreat policy.

The third cost category, "land loss" costs, typically includes the costs of compensating beachfront property owners for the value of the land they lose under a retreat policy. In the case of Jekyll Island, however, all of the land on the island is owned by the State of Georgia and leased to homeowners. This means that the land loss costs are calculated differently for each of the two different financing alternatives.

In the case of a beach retreat policy paid for by user fees, the decision criteria used is a revenue cost ratio to establish that revenues generated by the project exceed the project costs. Land loss costs do not need to be included in this ratio of revenues to costs because homeowners do not have to be compensated for the lost land. In the case of a retreat policy financed through general revenues, however, the criteria used to justify the policy requires that the societal benefits of the policy outweigh the costs to society. In this case, the

⁴Present value calculated at a 6% discount rate

value of land loss is a societal cost and so is included in the estimate of the total costs of a beach retreat policy.

When determining the land value lost with a retreat policy, any land price premium associated with proximity to the beach should not be included in the calculation. With a retreat policy, beachfront structures are abandoned and demolished. This means buildings that were previously two rows back from the shore now become the first row of buildings closest to the beach. Any land price premium attributed to proximity to the beach is passed on to this newest row of beachfront properties. Likewise, buildings that were three rows back prior to the retreat policy will now earn a price “proximity premium” attributed to being only two rows back from the beach. Any remaining land price “proximity premium” continues to be passed back through each subsequent row of properties until it entirely dissipates. As a result, the land value premium created by proximity to the beach is not lost under a retreat policy. Instead it is passed back through the rows of properties that remain. Therefore, the cost to society of land lost with a retreat policy equals the value of land furthest away from the beach, including no proximity premium. Total land loss costs estimated for Jekyll Island were \$1.7 M.

Study One: Results and Findings

Kriesel presented a table summarizing the results of the benefit-cost and revenue-cost analyses of a beach improvement project for Jekyll Island. The summary table reports the results for the four possible combinations of the two beach improvement options (beach retreat and beach nourishment) and the two financing alternatives (general revenues and user fees). Kriesel reported that all four combinations produced positive benefit-cost or revenue cost ratios. Based on the results of this study, he made the following observations:

1. It would not be necessary for Jekyll Island to charge the revenue maximizing parking fee (\$16.50) in order to cover the costs of a beach improvement project. The break-even fee of approximately \$8/day would raise sufficient revenues to finance either the retreat policy or beach nourishment project for Jekyll Island.

2. In order for any locality to raise enough revenues to finance a beach improvement project by increasing user fees, there must be sufficient demand for the beach services. This means that there must be a large enough “customer base” of beach users with few, competing beaches nearby. Also, if a beach can differentiate itself from other beaches by offering unique opportunities or amenities, its chances of raising sufficient revenues are improved. As an example, Kriesel pointed to the beach in Clearwater, Florida, where parking fees are quite high at \$10 / day (\$1.50/ hour). Kriesel explained that Clearwater can still attract sufficient demand at these high fees because it offers many unique advantages over other beaches in the Tampa area. Not only does Clearwater offer shopping opportunities and other attractions, but it is closer to the Tampa area population than are other beaches.
3. Although the retreat policy was found to be financially feasible for Jekyll Island, beach retreat is less likely to be financially feasible in other locations. This is the case because additional financing would be needed in order to compensate landowners for the value of the land abandoned under the retreat policy. As was pointed out earlier, on Jekyll Island all of the land is owned by the states, so the locality does not need to compensate homeowners for the land lost. Additionally, Kriesel pointed out that the housing on Jekyll Island tends to be lower value and lower density than development in other beachfront locations. For example, they found that the financial feasibility of a retreat policy on Tybee Island, Ga., is borderline.
4. Kriesel concluded that, while the results of the benefit-cost analysis show that both the beach retreat and beach nourishment alternatives would generate benefit to society in excess of costs, it is unlikely that a beach locality could pay the all the costs of either type of project from its own general revenues. He explained that, in order for general revenue financing to work, a beach locality would likely require cost-sharing support

from the state and/or federal government. Yet, obtaining cost-sharing from higher levels of government for beach nourishment projects is often difficult.

Study Two: Examining the Effects of Shoreline Stabilization and Beach Nourishment on Property Values in Beachfront Communities

The second study presented by Kriesel examined the economic consequences of implementing beach management options, such as shoreline stabilization or beach nourishment, for entire coastal communities as well as for the individual beachfront property owners. Data from ten Atlantic and Gulf of Mexico coastal counties were used in a hedonic price model to examine the effects of different beach management options on property values for beachfront properties as well as properties several rows inland.

Hedonic price analysis is a type of regression analysis that estimates the individual effects that different property attributes have on housing prices. Property attributes considered in this study included, flooding and erosion risk, the presence of shoreline stabilization, the presence of a beach nourishment project, the distance of the house from the shore and structural characteristics of the house itself, including age of house, house size, parcel size, and compliance with FEMA building codes.

By isolating the effects of flooding and erosion risk on property values, the hedonic price model can be used to predict how property prices will change in response to a shoreline protection project. In the study results presented by Kriesel, price effects were examined for both beachfront properties and properties situated one or more rows back from the shoreline.

Results of the Hedonic Price Analysis

Kriesel reported the results of the hedonic price analysis conducted for the 10 coastal counties in the southeast. He also presented results from similar analyses conducted for coastal counties in other regions of the United States as part of a Heinz Center report (The Evaluation of Erosion Hazards. Washington: The Heinz Center, 2000. Copy available at www.heinzctr.org).

Erosion Risk

The results of the hedonic price analyses conducted for coastal counties in all four regions of the country indicated that housing prices are very responsive to erosion protection. In the model, geological time (or “geotime”) was the variable used to measure degrees of erosion protection. Geotime is a measure of the number of years left until the entire beach area that currently separates a property from the water’s edge erodes away. A greater level of erosion protection will result in a higher estimate of geotime for a property. In the analyses conducted for all four regions of the U.S., the geotime variable was found to have a statistically significant, positive effect on housing prices, indicating that housing prices will increase with increasing levels of erosion protection. Of the four regions, housing prices in the Pacific region exhibited the greatest responsiveness to erosion protection.

Flooding Risk

Other variables describing coastal characteristics also proved to be statistically significant, such as the variable indicating the elevation of a property above the 99-year flood line. This variable serves as a measure of the flood risk a property is subject to because the higher a property is situated above the 99-year flood line, the lower the likelihood of flooding. Again, the results of the analyses in all four regions of the U.S. indicated that the elevation variable has a statistically significant, positive effect on housing prices.

CBRA Area Restrictions on Flood Insurance Availability

One coastal characteristic that proved to have no significant impact on housing prices was the CBRA variable, a dummy variable indicating whether or not a property is located in a Coastal Barrier Resource Area (CBRA). Under the Coastal Barrier Resources Act of 1982, a designated CBRA area may not receive any type of federal assistance that would encourage development in the area, including flood insurance under the National Flood Insurance Program (NFIP).

Implications of Hedonic Price Analysis

The estimated hedonic price model was used to evaluate changes in the property prices of both

waterfront and inland properties in response to different beach management measures, including shoreline stabilization, beach nourishment, and the availability of flood insurance.

Shoreline Stabilization

Kriesel reported that, while in some cases the value of beachfront properties were enhanced by the presence of shoreline stabilization; shoreline stabilization proved to have a negative effect on the price of properties located one or more rows back from the water's edge. With the construction of a shoreline stabilization project, property prices elsewhere in the beach community are diminished because the hard stabilization structures degrade the quality of the beach.

Kriesel explained that the degraded beach reduces property values within the community because part of the value of a house in the beach community is a premium consumers are willing to pay for the ease of access to the aesthetic and recreational amenities offered by the nearby beach. When the quality of the beach is diminished, the value consumers place on access to the beach also declines. This means that the premium consumers are willing to pay to purchase (or rent) a house in close proximity to the beach is reduced. Kriesel pointed out that the diminished, inland property values caused by shoreline stabilization are a negative externality; that is, a cost of shoreline stabilization that is not entirely borne by the beachfront property owners who benefit from the shore protection measure.

To further demonstrate the price effect of beach amenities, Kriesel presented the results of an analysis in which 15 beach communities were divided into two categories. One category included beaches that offered amenities conducive to supporting beach-related tourism and recreation (the "favorable" beaches). The second category included "ordinary" beaches, which did not offer any notable amenities

that would encourage tourism or recreation.⁵ For both categories, the price gradient illustrating how far inland the presence of the beach affects property values was compared. For the "favorable" beaches, the price gradient reached many rows back from the shore and extended far inland into the community. On the other hand, the "ordinary" beach communities showed price bonuses only for properties right at the water's edge; the price gradient did not extend to rows further inland.

Kriesel explained this means that, in beach communities where the beach offers amenities that contribute to property values throughout the beach community, a shoreline stabilization project that degrades the beach will cost the community in the form of diminished, inland property values.

Furthermore, even properties along the shorefront may experience a reduction in value due to the presence of shoreline stabilization measures, depending upon how many shoreline stabilization projects exist within the community. If a waterfront property is the only property in the community protected by shoreline stabilization, its value will be enhanced due to the erosion protection provided by the stabilization structure. If however, the same waterfront property were instead located in a community where 50% of all waterfront structures were also protected by stabilization structures, then the negative, cumulative effects of these many stabilization structures on beach quality will diminish waterfront property values enough to offset any potential gains from increased erosion protection.

Beach Nourishment

Unlike shoreline stabilization, beach nourishment projects do not diminish property values in the beach community. With beach nourishment, not only do waterfront properties benefit from the additional protection afforded by a wider beach, but both waterfront and inland properties benefit from

⁵Assessments of these 15 beaches were based on the evaluations provided in the book, *American's Best Beaches* by Dr. Stephen Leatherman (Florida International University Press, 1998).

the additional recreational and aesthetic amenities offered by a nourished beach. Estimates produced by the model indicated that a beach nourishment project would enhance property values, both along the waterfront as well as inland. Kriesel concluded that if communities only consider the benefits of beach nourishment for waterfront properties, they may be underestimating the full benefits of the project as well as their own ability to pay for the beach nourishment project.

Comparing the Property Price Effects of Shoreline Stabilization and Beach Nourishment

Kriesel summarized the results of the comparison between shoreline stabilization and beach nourishment as alternative shoreline management measures by stating that "...the best of all worlds is to have a stable shoreline. Lacking that, is to have beach nourishment. The worst of all worlds is to have a degraded beach in the presence of stabilization structures everywhere else but on your property."

While property owners in coastal communities have significant incentives to preserve their beach front out of financial self-interest, the shoreline management measure selected will affect property prices both at the waterfront and inland. Seawalls can create negative externalities by degrading the beach and reducing inland property values.

Beach nourishment can create positive externalities by enhancing the beach and increasing property values throughout the community. A beach nourishment project, however, requires periodic renourishment and can be quite costly. Kriesel pointed out that a third alternative available to communities is to exercise eminent domain and buy out those properties that are closest to the waterfront and most vulnerable to erosion. He suggests that industrial revenue bonds could be used to finance the property buyouts. The industrial revenue bonds would then be paid for by the expected increase in future property tax revenues as property values in the coastal community increase after the relocation effort expands and enhances the existing beach.

Flood Insurance

In the hedonic price model, the CBRA variable was used to indicate whether or not a property is located in a Coastal Barrier Resource Area. Because properties located in a CBRA area are not eligible to participate in the National Flood Insurance Program (NFIP), the CBRA variable can be interpreted as a proxy variable that evaluates what effect the availability of flood insurance might have on property values. The CBRA variable proved to have no, statistically significant effect on housing prices. This result suggests that the availability of flood insurance does not significantly affect property values in beachfront communities.

As further evidence supporting this finding, Kriesel described the results of another study conducted for the Heinz Center (The Evaluation of Erosion Hazards. Washington: The Heinz Center, 2000. Copy available at www.heinzctr.org) which evaluated the reasons behind property owners' decisions to participate in NFIP. Of the communities surveyed for the study, the overall participation rate in the NFIP was about 50%. After subtracting out the number of property owners that are compelled to participate because of mortgage requirements, however, the rate of "voluntary" participation was only 8%.

Kriesel suggested two reasons for the limited participation in the NFIP. Coverage under the NFIP is capped at \$250,000, a small proportion of many of the high value beachfront properties. Additionally, he pointed out that in wealthy communities such as St. Simon Island, many properties are purchased with cash, exempting the new owners from any mortgage requirements to participate in the NFIP. Kriesel concluded that, for the region examined in the study, "...flood insurance is an ineffective policy tool when it comes to policies for trying to promote better beaches."

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WHAT ARE THE MAINTENANCE, MANAGEMENT AND EMERGENCY COSTS ASSOCIATED WITH BEACH NOURISHMENT PROJECTS?

Linda Lent, Chrysalis Consulting LLC

SUMMARY: In her presentation, Ms. Lent first addressed the question: What are the maintenance, management and emergency costs associated with beach nourishment projects? In the second part of her presentation, Lent described her current work on a study examining the negative effects of beach erosion on tourism at Waikiki Beach on Oahu Island, Hawaii, and the resulting economic impacts on the federal economy.

PRESENTATION:

Ms. Lent began her presentation with a discussion of factors that determine the beach maintenance, management and emergency costs faced by local governments.

Beach-related Maintenance, Management and Emergency Costs

Defining Maintenance, Management and Emergency Costs

When evaluating the maintenance, management and emergency costs associated with a beach nourishment project, Lent pointed out that several questions must be asked, including:

- What costs are considered to be maintenance, management and emergency costs?
- Is the setting of the project urban, rural or in-between?
- How is the beach used, e.g. for swimming, surfing, fishing, boating and / or other purposes? What types of structures are needed to support the beach uses?
- What are the characteristics of the beach users, i.e. are there many day visitors, overnight visitors and / or international visitors?

She explained that beach maintenance can refer to any number of types of costs, including lifeguards, police, parking facilities, bathhouses, access baths, cleanup, landscaping and guardianship of the sand. Management could refer to both the framework of immediate beach maintenance activities and the decision framework for shoreline development, which might extend well beyond the beach nourishment project, for example, the management costs of a coastal zone management agency.

Lent defined emergency costs as costs that would be prevented by a nourishment project, such as the

costs of emergency evacuations. Emergency costs might also include those costs incurred to maintain a project.

Additionally, Lent points out that the term “beach nourishment” can refer to different types of projects. If the only type of beach nourishment projects considered are those designed primarily to protect structures, then many other types of projects are excluded, including many smaller scale nourishment projects under consideration or ongoing by state and local interests in Delaware, Florida, California, Hawaii and other areas.

Examples of Maintenance, Management and Emergency Costs

After discussing possible definitions of the terms “maintenance, management and emergency costs”, Lent presented examples of beach-related costs she has collected for prior projects.

Lent pointed out that localities can only provide data for costs they have kept track of. Additionally, they are often only able to provide their cost data in the exact format that was used to collect the data. This often requires much work on the part of the researcher to understand and break out the different types of costs that might be lumped together in a single category. For example, she pointed to cost data provided by the City of Virginia Beach, which was classified as “spending on tourism”. After breaking down this single cost category into its components, she found it included a wide range of different types of costs, including \$6.7M spent on convention and visitor development, \$5.7M on tourism-related capital improvements, \$2.9M on salaries for police and emergency services and \$3.4 M on equipment for emergency services and resort, parking and beach maintenance.

Lent also described beach maintenance costs in the state of Delaware. She reported that the state spends \$2M annually on renourishment of its beaches, not for storm protection, but to provide adequate amounts of sandy beaches for recreational use by tourists. She reported the direct annual budget costs (in 1998 dollars) faced by two, differently sized

communities in Delaware. Fenwick, a smaller town including approximately 4,000 feet of beachfront, spent \$56,000 for lifeguards and \$289,000 for police. The larger community of Rehoboth includes 8,100 feet of beach and spent \$206,000 for lifeguards, \$235,000 on parking management, \$50,000 on comfort stations and \$1.1 million on police services. For both communities, estimates of spending on police include police services for the entire community, not just for the beach area. Although it was not possible to separate out just the beach-related police costs, Lent pointed out that the majority of the population in both communities are seasonal tourists with only a few inhabitants requiring year round police services.

A third example of beach maintenance costs provided by Lent came from a project in Ocean City, MD. The Ocean City project is currently renourished periodically at a total annual cost of \$4M, with half of the total paid by the state and the other half paid by the federal government. Lent mentioned that estimates have been made of the storm damages avoided by the Ocean City project. Specifically, the project is estimated to have prevented \$98M worth of damages in the January '92 storm, \$70M of damages in the December '92 storm and \$46M of damages from storms in 1998. Lent added, however, that these damages avoided estimates have been questioned because they require establishing a speculative baseline describing damages that would have occurred in each of these storms, had the project not been present.

Lent also discussed the availability of data on beach-related emergency costs, specifically describing her work with the Federal Emergency Management Agency (FEMA) records of disaster assistance payments. FEMA has maintained records of disaster assistance payments using a cumbersome accounting system which has changed over the years. As a result, the data contain errors and inconsistencies that make it difficult to interpret, particularly for time series evaluations. Lent was hired by FEMA to improve its records of disaster assistance payments. While improvements were made to several years worth of data, Lent explains that the project was ultimately interrupted due to lack of funding and

much of the FEMA data remains difficult to use as a source of information on federal emergency costs.

Factors Affecting Beach-related Maintenance, Management and Emergency Costs

Lent summarizes her findings about beach nourishment maintenance, management and emergency costs with the following four points, displayed on the final slide in her presentation:

- There are different shorelines and conditions in coastal areas
- There are different kinds of nourishment
- There is a lack of data caused by the decentralization/nonstandard methods of conducting shoreline maintenance and management and related accounting
- There are problems with the emergency data on federal expenditures and NFIP claims related to the highly centralized management of those functions.

Considering Beach Nourishment Needs in Waikiki, Hawaii

In the second half of her presentation, Lent described her current work on a project examining the negative effects of beach erosion on tourism at Waikiki Beach on Oahu Island, Hawaii, and the resulting economic impacts on the federal economy.

Lent explained that net economic benefits to the U.S. economy are created by visitors to Waikiki who would have otherwise not vacationed in the U.S. if visiting Hawaii were not an option. Specifically, two types of visitors to Hawaii contribute new spending to the U.S. economy: 1) international tourists that would otherwise not visit the United States if they did not visit Hawaii, and 2) American tourists that would otherwise travel to an international destination if they did not visit Hawaii.

Evaluating the Economic Impacts of Tourism at Waikiki

In order to calculate the annual direct and indirect economic impacts of tourism in Waikiki on the US economy, Lent conservatively assumes that only those

visitors from the eastern half of the United States would choose to travel internationally if not visiting Hawaii. She argues that because visitors from the eastern U.S. must pay higher travel costs to reach Hawaii than do visitors from the west, they are more likely to travel to an international destination as an alternative to visiting Hawaii.

To estimate the annual federal net benefit of tourism in Waikiki, Lent used existing tourism data from Hawaii's Department of Business, Economic Development and Tourism (DBEDT) along with the results of an input-output analysis conducted by the University of Hawaii. She estimated that Waikiki's beaches contribute an annual net direct and indirect benefit to the U.S. economy of approximately \$3B (in 1998\$). An additional \$1.6 B direct and indirect spending results from U.S. West visitors, who are assumed (conservatively) to select destinations elsewhere within the U.S.

These estimated impacts indicate that tourist expenditures at Waikiki contribute significantly to the federal economy. Yet, several measures of tourist activity show a significant decline in the rate of growth in tourist activity at Hawaii and the Island of Oahu, in particular through the 1990s. Three different statistics demonstrate this slowed growth in tourist activity:

- While the annual number of international tourist arrivals grew by 57% worldwide through the 1990s, international tourist arrivals in Hawaii rose by only 0.3% over the same period of time.
- Beach hotels generally hope to achieve a minimum occupancy rate of 85%. In 1999, the occupancy rate of hotels in Hawaii (71.08%) and, in particular Oahu (71.1%), fell short of the desired 85% goal.
- In 1999, the average hotel room rate in Oahu was well below the average room rates in other Hawaiian Islands. The revenue per available room on Oahu (i.e. the occupancy rate multiplied by the average room rate) also fell short of the average revenue per available room on three other Hawaiian Islands.

Assessing the Costs of Decreasing Tourism Caused by Beach Erosion In Waikiki

Lent explained that one factor contributing to the decline in tourism on the Island of Oahu is the severe erosion of Waikiki's beaches. The eroding beaches have created crowded conditions, with as little as 4 ft² of beach area per lodging unit.

In order to determine the contribution of beach erosion to the slowed growth in tourism activity and revenues at Waikiki, Lent used information provided by statewide visitor satisfaction surveys. Based on these survey results, Lent estimated the number of tourists that indicated they would not revisit Hawaii and cited crowded conditions as the primary reason for their decision. Lent explained that most of the crowding in Waikiki is on the beach, rather than elsewhere in the community, making it likely that the crowded conditions survey subjects experienced were attributable to the eroding beaches. She found that, statewide, 3.6% of visitors chose not to return because of crowding.

To calculate the total economic losses to the national economy resulting from the erosion of Waikiki Beach, Lent reduced the \$3B estimated net economic impact of tourism at Waikiki by 3.6%, the percent of visitors choosing not to return due to crowded conditions.

Lent estimated a loss of \$108.1B in net federal benefits as a result of crowding on Waikiki Beach.

Concluding Note: Study Limitations

Lent concluded her discussion by pointing to limitations of the study methods. Lent explained that on-site surveys of Waikiki visitors were not conducted for the study. As a result, the study lacked first-hand information about factors influencing tourists choosing not to visit or revisit Waikiki Beach. In the absence of this first-hand information, Lent chose to conservatively assume that only tourists traveling from the eastern half of the United States would choose to travel internationally, if not visiting Waikiki. In actuality, Lent pointed out that it is likely even travelers coming from the Western half of the United States would choose to travel to an international destination, if not visiting Hawaii.

RELATED PAPERS:

"A Preliminary Estimate of the Regional and Federal Economic Benefits of Nourishment at Waikiki Beach" will be published in the upcoming proceedings of the California and the World Ocean '02 being published by the Coastal Zone Foundation, 21000 Butts Canyon road, Middletown, Ca. 95461 and also made available on <http://www.ChrysalisConsultingllc.com>

HOW DO DAMAGES PREVENTED BY SHORE PROTECTION PROJECTS AFFECT HOUSING VALUES?

William Stronge, PhD., Florida Atlantic University

SUMMARY: In his presentation, Dr. Stronge described studies he conducted for four different beach communities evaluating the effects of beach nourishment on property values within the communities.

PRESENTATION:

Dr. Stronge began his presentation by explaining that most of his research is oriented towards addressing questions that coastal communities face when considering beach nourishment. The local community is often faced with paying some or all of the costs of a beach nourishment project, so one key question is how the community will raise the needed funding.

As a basis for determining how funding responsibility should be distributed among local taxpayers, Stronge addressed the question of how to measure the economic benefits of a beach nourishment project. He described three studies he conducted to examine the effects of beach nourishment projects on three different coastal communities in Florida.

Captiva Island

Stronge first described his work on Captiva, Island. He explained that, at the time his work with Captiva Island began in (1986), local residents of Captiva were unable to reach an agreement over how to

collect the funds needed to finance the local cost-share requirement for a beach nourishment project.

Stronge explained that the diverse mix of properties and residents that inhabit the island contributed to the difficulties in determining how the costs would be shared. The northern section of Captiva is a resort area where a 2-mile segment of beach was previously nourished in 1982 using private funds. Southern Captiva is home to high-value, million dollar homes, while central Captiva is inhabited primarily by moderate income residents.

Evaluating the Effects of Beach Nourishment on Captiva Island Real Estate Prices

The objective of Stronge's work on Captiva Island was to examine how the beach nourishment project affected real estate prices on Captiva. Using property value data from the period of 1980 – 1989, Stronge calculated the average rate of property value appreciation on Captiva Island. Then, he similarly calculated the average rate of property value appreciation for a group of similar, nearby barrier islands to establish a "background" rate. He used this background rate of property value appreciation as a basis for comparison with property price changes on Captiva Island. Since none of the islands in the "background" group had nourishment projects, this comparison effectively controlled for all factors influencing property prices, other than the presence of a beach nourishment project.

Stronge compared Captiva's rate of property appreciation with the background rate of property appreciation for time periods before and after the construction of a beach nourishment project. During the period from 1984-'85, Stronge found that the rate of appreciate of property values fell far short of the background rate. It was during this period of time when the community of Captiva was at a gridlock in trying to determine how to raise the necessary revenues for the beach nourishment project. Individual property owners were beginning to construct stabilization

structures and Captiva was generally perceived as having an eroding beach.

During the period of 1986-'88, a new board was elected for Captiva's local taxing authority and an agreement was reached over the appropriate taxation formula for raising the needed revenues and the beach nourishment project was funded and undertaken. During this period of time, Captiva's rate of property value appreciation far exceeded the background rate. Then, from 1989 –'91, after the nourishment project was completed, the rate of property value appreciation on Captiva returned to the average background rate observed on nearby islands.

Based on this evaluation of property value appreciation on Captiva, Stronge concluded that the property market on Captiva "...anticipates that people who are buying property are betting on the future... and that as a divided island begins to come together and begins to plan to move ahead with a project, property values begin to rise in anticipation of the project going in."

Comparing Property Price Appreciation with Recreation and Storm Damage Reduction Benefits of Beach Nourishment

Stronge then compared the findings of the property appreciation analysis with estimates of the total recreation and storm damage reduction benefits attributed to a beach nourishment project on Captiva.⁶ He pointed out that, in an efficient market setting, the increase in property values observed in his analysis of property price appreciation on Captiva, should reflect the amount of the estimated storm damage and recreation benefits as they are capitalized into property values. Instead, he found that property price increases due to the project on Captiva Island were more than two time greater than the price increases predicted by estimates of storm damage and recreation (NED) benefits.

⁶Recreation and storm damage reduction benefits were estimated using the same methods used by the USACE in their evaluation of NED benefits of shoreline protection projects.

Stronge offered several reasons for the differing rates of property price increases. He explained that the amount of the actual property price increases on Captiva reflected an expectation that the beach nourishment project would be maintained in the future, whereas the estimates of recreation and storm damage benefits were made only for the life of the initial project, assuming no future renourishment.

Also, Stronge pointed out that the increase in actual property values reflected buyers' valuations of many different types of benefits associated with beach nourishment. While he only estimated the recreation and storm damage reduction benefits of a project, property owners would also value the protection a beach nourishment projects affords to the one, main road on the island that provides emergency services quick access to many of the houses. These other benefit categories would be reflected in property prices, but not included in Stronge's estimates of the benefits of a beach nourishment project on Captiva.

Finally, Stronge argued that the beach itself is a type of "visible infrastructure" that plays a role in forming people's perceptions of the quality of other "invisible" infrastructure in the community, such as the quality of the water, the sewage system, or public services. He explained that, "Real estate investors.. look toward visible signs of whether a community has its act together or not." He argued that if a community's beach is badly eroded, buyers will wonder, "What's the quality of the other types of infrastructure there that you won't see, if a community is going to allow the crown jewel to deteriorate?" This means that a beach nourishment project further contributed to the appreciation of Captiva's property prices by providing desirable "visible infrastructure", a benefit of beach nourishment that was not captured in Stronge's estimates of recreation and storm damage reduction benefits.

Anna Maria Island

The second study described by Stronge involved an assessment of the benefits of a federal beach nourishment project constructed by the Corps on Anna Maria Island.

Again, Stronge evaluated the rate of appreciation of beachfront property values on Anna Maria Island before, during and after the construction of the beach nourishment project. Prior to the project, he found that beachfront property values on Anna Maria Island were declining. During the period between the time the project was agreed upon and that date that the project was completed, beachfront property values appreciated substantially. After the project was completed, property prices continued to increase, but by a much smaller amount than the increases observed during the period of project construction.

Stronge then examined the rate of property value appreciation for properties on Anna Maria Island that were within walking distance of the beach, but not located in the first row of properties along the beachfront. These properties showed the same tendency as the beachfront properties to experience their greatest increase in value during project construction, further suggesting that the market is responding most to the expectation of a project. Even properties further inland and not in walking distance of the beach, tended to exhibit a more dramatic increase in property values prior to completion of the project.

Broward County

In a third study completed for Broward County, Florida, Stronge conducted a type of matched real estate study in which he compared the value of properties on several barrier islands running along the coast of Broward County, with properties along the area of Broward County that falls between the intracoastal waterways and U.S. Highway 1, which he referred to as "bay front" properties. Although many of the bay front properties were adjacent to the waterway, none were beachfront. This meant that the comparison of property values for bay front properties with barrier island property values helped isolate the effect that the presence of a beach has on property values. Stronge describes this additional value added by the beach as the "barrier island premium".

Stronge evaluated barrier island and bay front property values using property appraisers' assessments,

expressed in dollars per square foot (\$/ft²). He found that a small premium was attributable to the barrier island for some types of beachfront properties. For example, single family homes on the barrier island were valued \$15/ft² higher than bay front properties, due to presence of a beach on the barrier island. The size of this premium is relatively small, particularly for high value properties. For example, for a multi-million dollar property, the \$15/ft² premium ascribed to the presence of a beach is dwarfed by the total property value.

For apartments and commercial properties, Stronge found no barrier island premium. He suggested that both types of properties are used by working residents of Broward County. Since there are difficulties traveling over the bridge connecting the barrier islands with the rest of Broward County, Stronge pointed out that for workers, these additional transportation costs would likely offset any premium attributable to the beach.

Del Ray

Stronge briefly described a fourth study in which he examined the impact of beach nourishment in one coastal city, Delray Beach, Florida, on property values within both Delray and in coastal communities adjacent to Delray. He explained that the sand replaced by a nourishment project in Delray is eventually redistributed along the coastline. This means that adjacent communities may also benefit from a nourishment project in Delray as some of the replenished sand eventually moves onto their beaches. He found that, while the nourishment project had the greatest impact on property values in Delray, it also contributed positively to property values in adjacent communities.

CONCLUSIONS

Stronge concluded his presentation by using the results of the four studies he described in a type of “back of the envelope” calculation to determine the statewide effects of beaches on property values. Specifically, he estimated that percentage of property price appreciation due to the presence of a beach was 35% on Captiva, 20% on Anna Maria, 18% for Broward County and 20% for Delray Beach. He averaged the percentages for these four

counties, finding that, on average, approximately 25% of property value appreciation was attributable to the presence of a beach. Then, he applied this percentage to all coastal properties to arrive at a quick-and-dirty estimate that \$21.3 billion of Florida’s property values are due to its beaches.

Additionally, by capitalizing the recreation benefits enjoyed by individuals that do not reside in nearby, inland properties, Stronge estimated that the presence of a beach adds \$6.2 billion to the value of non-coastal properties. Adding together the estimated contribution of beaches to coastal and non-coastal property values, he concludes that beaches add \$27.5 billion to Florida property values. He suggested that this amount could then be multiplied by property tax rates to determine the additional amount of property tax revenue received by localities as a result of the price appreciation.

As a final point, Stronge stated that the primary beneficiary of property revenues generated by beaches is Florida’s school systems. Since relatively few students in the public school system reside in coastal properties, these properties are large, net contributors to the local tax bases. Stronge explained that this means in order for a local community to use property tax revenues to pay for a nourishment project, it would likely have to divert these funds from the state’s education system. He argued that, since education “...is a number one priority to voters”, diversion of education funds to support a beach nourishment project is not likely to happen.

Concluding Note on Beach Nourishment Funding Sources

In response to a question from the audience about alternative sources of funding local governments might draw on to finance a beach nourishment project, Stronge described the following funding sources used by the four communities he studied:

- Captiva – used a special assessment tax,
- Anna Maria – relied on tourist taxes,
- Broward – implemented a type of tiered property tax,
- Delray Beach – like Anna Maria, relied on tourist taxes.



CONCLUSIONS

The July, 2002 workshop, “Addressing Economic Considerations in Shoreline Protection” created a forum to identify key issues for the National Shoreline Management Study through a discussion of economic and financial considerations associated with shoreline change and protection.

One objective of the National Shoreline Management Study is to determine the extent and cause of shoreline erosion along the nation’s coasts and to assess the economic and environmental impacts of that erosion. Accordingly, the workshop brought together researchers and practitioners to examine economic and financial issues related to shoreline erosion and management. Additionally, workgroups discussed the presentations and other issues pertaining to the economics of shoreline protection.

The questions and ideas raised in the presentations and subsequent workgroup discussions suggest five key issues that should be addressed in the NSMS.

1. Identifying the nation’s shoreline management goals.
2. Identifying appropriate analytical approaches and criteria for evaluating the economic and environmental consequences of shoreline erosion and shoreline management measures.
3. Understanding how existing federal, state and local policies affect private and public shoreline use decisions.

4. Addressing empirical issues.
5. Addressing financial feasibility issues.

Issue One: Identifying shoreline management goals.

Effective shoreline management requires understanding both federal and local shoreline management goals; a point made by one workgroup participant who stated, “The ‘best’ way to influence the coastal zone depends on (the nation’s) ‘vision’ for the coast.⁷”

Choosing Between Tradeoffs

Defining a national “vision” for the coast means identifying shoreline management goals at Federal, state and local levels and understanding how they relate to one another. A national vision for the coast provides a basis for making choices between the tradeoffs that arise from both coastal and inland water resource management decisions at the local, state and Federal levels. For example, the use of shoreline stabilization structures, particularly along the East Coast of the US to protect the growing industrial sector from storm damages, has created new shoreline erosion problems by interrupting the natural flow of sediment along the coast. (See presentation by Chesnutt) Similarly, dredging to clear navigation channels, particularly in the Gulf Coast region has created a problem of dredge material disposal. Dam construction in the West also created sediment management problems as sediments accumulate behind dams, causing sand deficits downstream and along the coast.

⁷Wording in parentheses was not part of the original statement.

In all three cases, tradeoffs occurred as historical measures taken to enhance economic productivity (i.e. shoreline stabilization, navigation channel dredging and hydropower dam construction) created new sediment management or coastal erosion problems that diminish the current-day and future ability of the shoreline to provide economic and environmental services.

Decision makers face choices between these types of tradeoffs when formulating future shoreline management plans and evaluating the performance of existing programs. Making such choices requires an understanding of the nation's shoreline management goals and priorities.

Attaining Consistency Across Shoreline Management Programs and Planning Criteria

Workshop participants also pointed out that a clear definition of the nation's vision for its shorelines is needed to ensure that shoreline management goals are consistent across all federal agencies and all levels of government. One workgroup member pointed out that shoreline management activities often fail to produce the desired outcome, or conflict with other programs because "...priorities for shoreline use vary between federal, state and local interests." Shoreline management goals can also vary among different agencies at the federal level.

In the absence of a commonly shared understanding of the nation's goals and priorities, each agency or entity involved in shoreline management will develop its own vision for the shoreline according to its particular charge or responsibilities. These differing interpretations of the nation's shoreline management goals and priorities can lead to planning criteria and projects that work at cross purposes.

Recommendations for the NSMS

The National Shoreline Management Study presents an opportunity to identify the Federal, state and local goals and priorities that comprise the nation's "vision" for the shoreline. A clear statement of this vision will provide a basis for making choices between tradeoffs across shoreline management goals and will provide a common baseline against which all agencies and levels

of government can calibrate their planning criteria and shoreline management programs. The following questions, which were raised during workgroup discussions, should be addressed when considering the nation's vision for the shoreline, including:

1. Why should the Federal government be involved in shoreline management?
2. To what extent should the Federal government be involved?
3. Should the level of federal involvement be the same across all type of shoreline management projects?
4. What are state and local roles in shoreline management?

Issue Two: Identifying appropriate analytical approaches and criteria for evaluating the economic and environmental consequences of shoreline erosion and shoreline management measures.

The NSMS also provides an opportunity to ensure that the planning procedures and criteria used by water resource management agencies adequately reflect the Federal, state and local "vision" for the nation's shoreline. Differences in analytical assumptions or criteria can alter the results of analyses that inform decisions.

For example, on Captiva Island, the estimated benefits of a beach nourishment project as measured by property price appreciation were more than two times greater than the NED benefit estimates. (See presentation by Stronge) Another example is the differences between the two storm damage reduction and recreation planning criteria, "National Economic Development" (NED) and "Regional Economic Development" (RED), used by the Corps to evaluate the economic effects of a shoreline protection project. The NED criterion measures the benefits of a project for the national economy as a whole, regardless of where the benefits accrue within the nation. In comparison, the RED criterion provides a better assessment of the local or regional economic impacts of a beach protection project. (See Robinson presentation)

Updating Planning Criteria to Reflect Current-day Goals

Many of the questions and ideas raised by the workgroup participants suggest that the criteria and planning approaches used for shoreline management decision-making may not fully reflect current-day goals and objectives. For example, several workgroup participants commented on the need for better measures of the environmental consequences of shore protection. One participant suggested accounting for the benefits of environmental damages avoided as the result of the coastal storm damage protection afforded by a shore protection project. Such benefits might include avoided contamination from damaged septic systems, chemical spills or toxic debris released from destroyed telephone boxes. Another participant suggested that a better understanding is needed of the environmental benefits of beach nourishment, such as the creation of piping plover habitat and sea turtle nesting habitat.

A second goal of shoreline management decision-making discussed by workgroup participants is that of achieving a fair or equitable distribution of the costs of shoreline protection across different levels of government and between the private and public sector. One participant expressed concern that the Federal government would be a “free-rider” if all the costs of shore protection were borne by state and local governments or the private sector. In this case, the nation as a whole would enjoy the benefits of shoreline protection, while the federal government would pay none of the costs. Another participant suggested obtaining more information about how the benefits of shoreline protection are distributed as they accrue to Federal, state and local levels of government as a basis for determining appropriate cost-sharing arrangements.

Other goals identified by workgroup participants as insufficiently represented in current-day shoreline management planning included addressing public safety concerns and ensuring public access to beaches

Recommendations for the NSMS

In general, workgroup participants recommended that the NSMS be used as an opportunity to review

and, where needed, improve shoreline management planning tools and criteria to better reflect the economic, environmental and social consequences of shoreline change.

The NSMS also provides an opportunity to determine whether or not consistent decision-making criteria are used by the many different federal, state and local agencies involved in shoreline management. For example, FEMA (now the Department of Homeland Security) and the Corps have different perspectives relative to damages included from flooding or coastal storms. FEMA’s perspective is insurance program-related and what damages are covered under that program whereas the Corps considers all damages. In such situations where agencies are using different criteria, they can end up making decisions that undermine each other’s shoreline protection efforts.

One specific charge of the NSMS is to make recommendations regarding the use of a systems approach to sand management, referred to as “regional sediment management” (RSM). Regional sediment management (RSM) is a planning approach that recognizes both the natural, systematic movement of sand within a region, as well as the combined effects any Corps management actions on sand in both coastal and riverine systems. RSM may provide the framework for a planning approach that coordinates planning across agencies and levels of government and refines planning criteria to better reflect national shoreline management goals.

Issue Three: Understanding how existing federal, state and local policies affect private and public shoreline use decisions.

A host of Federal, state and local policies create incentives affecting both public and private shoreline use decisions. Many of the workshop presentations examined the effects of such policies, including the National Flood Insurance Program (NFIP), the Coastal Barrier Resource Area Act (CBRA) and federal shoreline protection projects, on factors influencing private land use decisions, such as property values and development density.

Recommendations for the NSMS

The NSMS should provide a comprehensive inventory of federal, state and local policies that create incentives affecting public and private shoreline use decisions. Such policies would include not only those specifically designed for shoreline management, but any others that may create incentives (or disincentives) for shoreline development, such as tax policies, Small Business Administration programs providing subsidized loans, or Stafford Act disaster assistance payments.

In addition to this inventory, the NSMS should also examine how the policies identified interact with each other and describe their combined effects on shoreline use decisions.

Workgroup participants posed questions that should be answered by the NSMS to provide a better understanding of the effects of federal, state and local policies on shoreline use decisions. One participant questioned whether some policies might have the unintended effect of penalizing localities that are already implementing desirable shoreline management measures, such as requiring setbacks and flood proofing of structures.

Another participant suggested evaluating the effectiveness of existing programs to determine whether they accomplish their intended objectives.

A third recommendation made by the workgroups was that the NSMS provide guidelines for coordinating the many policies and programs affecting the shoreline and its uses.

Issue Four: Addressing Empirical Issues

Both the speaker presentations and workgroup discussions raised empirical issues pertaining to the availability, quality and appropriate uses of existing data to support shoreline management decision making.

Recommendations for the NSMS

The NSMS could facilitate effective collection of empirical data to support shoreline management decision-making by identifying specific data needs and recommending guidelines to ensure that primary data

is collected in a useful format. A survey of empirical data needs that are not currently met should be incorporated as part of the NSMS. Also, the NSMS should consider the most useful format for collecting primary data, including beach maintenance costs, tourism numbers, beach related activities and revenue sources.

Workgroup participants suggested that geographic information systems (GIS) may offer a particularly useful means of both cataloging and analyzing data. One workgroup recommended developing a comprehensive GIS mapping of the nation's coastline, including the following data layers:

- beach-related recreation uses
- physical characteristics of the shore
- economic development indicators – including changes from 1970 to date and projected future changes.
- federal and non-federal spending on beach protection projects
- inventory of environmental resources
- commercial fishing enterprises
- man-made features impacting the shore, including dams, marinas, coastal structures, Federal navigation projects and ship traffic
- presence of NFIP coverage
- FEMA flood risk
- Coastal Zone Management Areas and Coastal Barrier Resource Areas
- building/zoning regulations state-by-state
- identifying locations for which studies on sedimentation and coastal processes are currently available
- illustration of the geographic distribution of benefits

Workgroups provided several other suggestions for consideration in the NSMS as means of improving the base of empirical information available for shoreline management decision-making. These suggestions included:

1. improve the modeling of risk and uncertainty in the estimation of storm damages,

2. collect data needed to conduct post-storm analysis of damages and evaluate the performance of shore protection measures,
3. inventory the body of existing datasets available to researchers and provide metadata documentation and web access, and
4. conduct additional surveys or conduct focus groups including different types of beach users to form a clearer understanding of their varying wants and needs.

Issue Five: Addressing Financial Feasibility Issues

One of the study charges of the NSMS is to make recommendations regarding appropriate levels of Federal and non-federal cost-sharing to finance shore protection activities. Fulfilling this charge requires determining what constitutes an appropriate distribution of costs across different levels of government and the private sector. It also requires assessing the ability of localities to pay for their share of the costs of shore protection. An understanding of how the economic benefits and fiscal impacts of shore protection measures are distributed across government levels and the private sector provides information useful for answering both questions.

Some of the workshop presentations identified ways of measuring the fiscal impacts of beaches and shore protection at different levels of government, including the Federal, state and local share of tax revenues generated by beach related spending (See presentations by King, Kriesel and Stronge). Also discussed were the effects of beaches and different types of beach management measures (i.e. shoreline stabilization, beach nourishment and flood insurance) on both waterfront and inland property prices. (See Kriesel and Stronge presentations).

Recommendations for the NSMS

In order to fulfill its charge of recommending cost-sharing arrangements for shore protection activities,

the NSMS should consider what criteria would serve as the best basis for determining the appropriate local, state, Federal and private sector share of costs. One criterion for consideration is a measure of how the benefits of shore protection are distributed across different levels of government.

The study should also identify what factors enhance or inhibit localities' capacity to pay for shore protection. A survey of the different financing mechanisms available to state or local governments to raise revenues for shore protection would also provide information useful in determining reasonable cost-share arrangements.

FINAL REMARKS

The National Shoreline Management Study has provided an opportunity for interagency collaboration to provide the technical information and expert recommendations needed by policy makers to effectively plan for the future management and protection of the nation's shorelines. The workshop, "Addressing Economic Considerations in Shoreline Protection" was a first step in fostering this collaboration. Workshop participants included representatives from the National Oceanic and Atmospheric Administration's Coastal Services Center, the U.S. Army Corps of Engineers, the Office of Management and Budget, and the Delaware Department of Natural Resources and Environmental Control, as well as faculty from several universities and a representative from the Coastal States Organization. Together, participants attended speaker presentations and shared their ideas and insights in workgroup sessions. These proceedings record the outcome of these workshop activities.

The workshop discussions and proceedings will be used to inform the NSMS as it develops the economic assessment methodology. For the current status of the NSMS, please see the NSMS website: <http://www.iwr.usace.army.mil/NSMS/nsmshomeframeset.html>



APPENDIX A: WORKSHOP PARTICIPANTS

NAME	AFFILIATION
Adkins, Jeff	NOAA Coastal Services Center
Breyman, Terry	Assistant Secretary of the Army, Civil Works
Brown, Jon	Buffalo District, US Army Corps of Engineers
Brumbaugh, Bob	Institute for Water Resources, US Army Corps of Engineers
Cardwell, Hal	Institute for Water Resources, US Army Corps of Engineers
Carlson, Bruce	HQ, US Army Corps of Engineers
Chesnutt, Charles B.	HQ, US Army Corps of Engineers
Cordes, Joe	Institute of Public Policy, George Washington University
Davis, Stuart	Institute for Water Resources, US Army Corps of Engineers
Finch, Bob	Wilmington District, US Army Corps of Engineers
Garman-Squier, Cynthia	Assistant Secretary of the Army, Civil Works
Hershendorfer, Gary	North Atlantic Division, US Army Corps of Engineers
Hillyer, Ted	Institute for Water Resources, US Army Corps of Engineers
Kehoe, Kerry	Coastal States Organization
King, Philip	San Francisco State Univ.
Knight, Kevin	San Francisco District, US Army Corps of Engineers
Kriesel, Warren	Department of Agricultural and Applied Economics University of Georgia
Lent, Linda	Consultant



NAME	AFFILIATION
Mathis, Ian	Institute for Water Resources, US Army Corps of Engineers
Mills, Allen	Virginia Commonwealth Univ.
Moseby, Bernard	Mobile District, US Army Corps of Engineers
Pietrowsky, Bob	Institute for Water Resources, US Army Corps of Engineers
Pratt, Tony	Delaware DNREC
Robinson, Dennis	Institute for Water Resources, US Army Corps of Engineers
Shoudy, Harry	Headquarters, US Army Corps of Engineers
Smith, Tom	Jacksonville District, US Army Corps of Engineers
Starler, Norm	OMB
Stronge, William	Florida Atlantic Univ. Boca Raton, FL
Sulzer, Dan	Los Angeles District, US Army Corps of Engineers (on assignment at IWR)
Waxman, Gary	OMB
Yezer, Anthony	Department of Economics George Washington University
Zepp, Laura	Institute for Water Resources, US Army Corps of Engineers



APPENDIX B: SPEAKER PRESENTATIONS

BACKGROUND TO THE NATIONAL SHORELINE MANAGEMENT STUDY

Robert Brumbaugh, PhD. Institute for Water Resources (IWR)





Addressing Economic Considerations in Shoreline Protection

Workshop Sponsored by the National Shoreline Management Study and the Center for Economics Research, The George Washington University
23 July 02


Background: NATIONAL SHORELINE MANAGEMENT STUDY (NSMS)

Study Manager: Institute for Water Resources



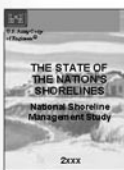
NSMS Origin & Approach



- **Concerns**
 - Morass of agency programs
 - No framework to revolve programmatic conflicts, promote collaboration or system approach
- **Emphasize interagency approach**
- **Emphasize regional perspectives**



NSMS Authority

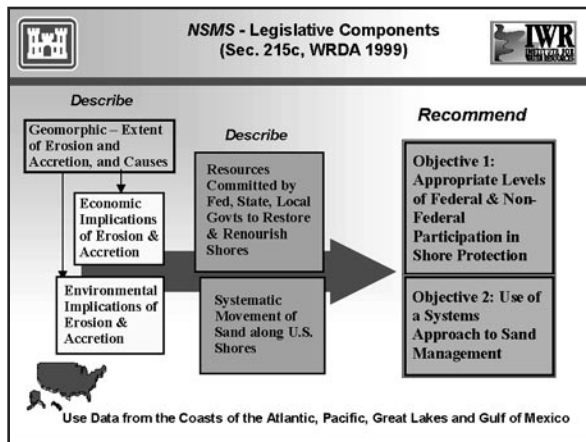
- Section 215(c), WRDA 99
- Report to Congress on the State of the Shores of the United States
- Identifies contents of the report
- Data from Atlantic Ocean, Pacific Ocean, Great Lakes, & Gulf of Mexico coasts





NSMS Study Phases

- **Phase 1 in FY 2002 & 2003 Set up team**
 - Review prior studies/existing information
 - Establish protocol for assessing shoreline
 - Initiate other policy and technical studies
- **Phase 2**
 - Assess state of national shoreline by region
- **Phase 3**
 - Complete reports with recommendations




- NSMS Process**
- Intra-agency and inter-agency efforts
 - Study management
 - Seek other agency collaboration
 - One of several Corps coastal initiatives
 - Involve Corps district staff
 - Outreach to other stakeholders

- NSMS**
FY 2002 Activities Include
- Begin assessing status of shoreline change knowledge
 - Initiate identification of agency roles, responsibilities, and resources contributed to shoreline management
 - Begin examination of various regional sediment management demonstration efforts to assess potential contributions to national study

- NSMS**
Next Year
- Complete review of status of shoreline change analysis & data collection
 - Identify technical guidelines for collecting & analyzing shoreline data


- NSMS**
Regional Sediment Management
- An approach for managing projects & programs involving sand and other sediments
 - That incorporates many of the principles of integrated watershed management
 - Applied initially in the context of coastal watersheds and sand
 - Now includes riverine systems and fine sediments

- NSMS**
Relevant Past Studies
- Include:
- 1971 USACE National Shoreline Study
 - 1995 NRC Study ñ Beach Nourishment and Protection
 - 2000 Heinz Report for FEMA ñ Evaluation of Erosion Hazards
 - 2002 California Beach Restoration Study




NSMS

Regional Sediment Management




- Regional views of
 - Sources of material
 - Effects of projects, dredging, disposal & other activities in the littoral zone
 - Sediment needs and opportunities in the system
- Appreciation for "sand as a resource"
 - Much as water is a resources – with computing demands and both quantity and quality issues




NSMS

Study Charges & Economics




- Description of extent of economic effects caused by shoreline change
- Recommendation regarding appropriate levels of Federal & non-federal participation in shore protection
- Description of the systematic movement of sand along U.S. shores & Recommendation regarding use of systems to sand management



NSMS

Study Charges & Economics



Economic effects of shoreline change				
Recommendation for Federal & non-federal participation in shore protection				
Regional/systems approach to shoreline management				

WHAT ARE THE NATIONAL AND REGIONAL ECONOMIC BENEFITS OF SHORE PROTECTION PROJECTS?

Dennis Robinson, PhD., Institute for Water Resources

***National and Regional Economic
Benefits of Shore Protection***

Dennis Robinson, PhD
Institute for Water Resources

- **National Economic vs. Regional Economic Development
(*NED vs. RED*)**
- **What are the “*with and without*” questions?**

DEMOGRAPHY, GEOLOGY AND COASTAL PROJECTS
TECHNOLOGY PRESENT AND FUTURE
 Charles Chesnutt (U.S. Army Corps of Engineers, Headquarters)

**THE INFLUENCE OF
 GEOLOGY,
 DEMOGRAPHICS, AND
 HISTORY ON U.S. ARMY
 CORPS OF ENGINEERS
 COASTAL PROJECTS**

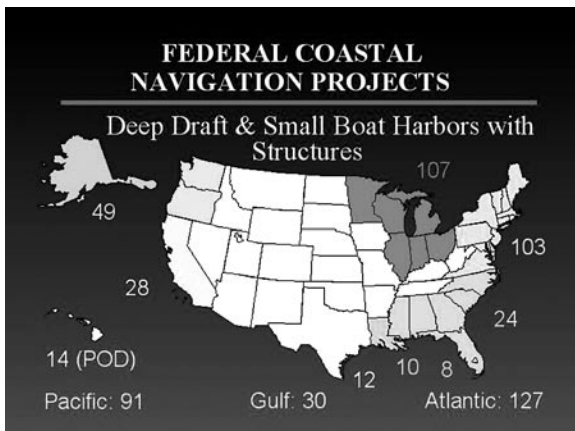
National Shoreline Management Study
 July 23-24, 2002

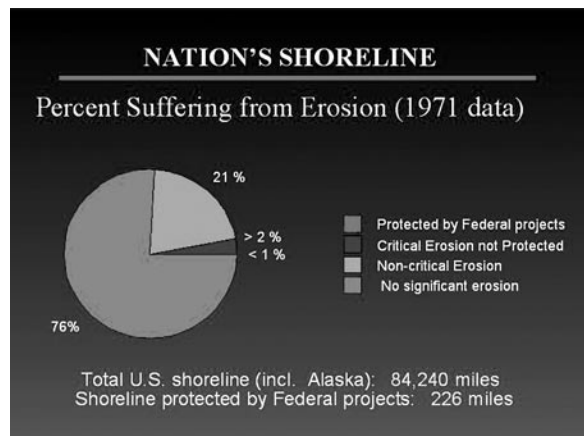
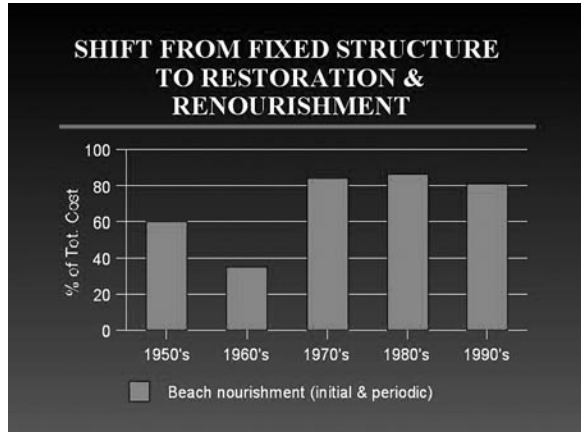
INTRODUCTION

Summary Statistics and Characteristics of
 USACE Coastal Projects

Purpose:

- Summarize types and locations of USACE coastal projects -navigation, shore protection and restoration.
- Review demographic and economic trends.
- Review geologic characteristics of U.S. coasts.





VISITORS TO BEACHES: WHAT WE KNOW AND HOW TO COLLECT THE INFORMATION WE NEED
 Allan Mills, PhD., (Virginia Commonwealth University)

“Visitors to Beaches: What We Know and How to Collect the Information We Need”

Presented by
 Allan S. Mills, Virginia Commonwealth University
 At The
 Workshop for the National Shoreline Management Study: Addressing Economic Considerations in Shoreline Protection

Sponsored by IVR/USACE & GIV CENTER FOR ECONOMIC RESEARCH
 JULY 23 & 24, 2002 - George Washington University

What We Know

ORRRC Study Report # 4, 1962

1. Chapter on wants and needs of American people, and projections to 1976 and 2000.
2. Chapter on Shoreline Recreation Resources available, and projection to 2000
3. Chapter on Federal, State, and Local institutional arrangements, present and future.
4. Chapter on Policies and Programs to adequately meet present and future recreation needs.
5. Appendix: State-by-State inventory of physical and administrative aspects of shoreline.

Sea Grant (NOA) Report 13, 1973
 by: Irving A. Spaulding

- On Site survey of Rhode Island beach users at one ocean beach, “Sandy Beach.”
- Data collected on 31 days in July of 1972, from 8 a.m. to 6 p.m.
- 400 interviews obtained, with few refusals.
- Subjective Sample, not a probability design.

**Selected Study Findings,
 Types of Beach User Groups**

<p><u>Family Groups 52.8%</u> 41% Included children. 59% Were various adult combinations.</p>	<p><u>Non-Family Groups 47.2%</u> 54% Friends, both sexes. 19% Friends, all female. 8% Friends, all male. 11% Males alone. 8% Females alone. 2% Church/School Groups.</p>
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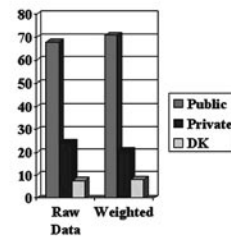
Selected Study Findings, Reasons for Visiting and Not Visiting

<p><u>Reasons for Going to a Beach (72% gave a single reason):</u> 20% Weather 15% Personal Feelings 14% Miscellaneous Other 9% A Planned Event 6% Break in Work 3% Interpersonal Influences 3% Routine Activity 2% Repeated Activity 1% Beach is Nearby</p>	<p><u>Factors Limiting Beach Use:</u> 24% Work and Available Time 7% Distance to Beach and Work 7% Weather and Time 5% Transportation, Traffic, Work and Time</p>
--	--

Economic Impact of Texans' Recreational Trips to the Texas Gulf coast, 1987

- 30,791 Telephone Interviews and 3,224 completed Mailed questionnaires in 1986.
- 10.3 million visits to Tx. Coast in 1986.
- Visitors spent total of \$586,600,000.
- Total Texas impacts in 1986 =
\$1,913,700,000000

Where Do Virginians Sunbath and Relax on Beaches? Source: VA Dept. Conservation and Recreation



- 44.3% did it in 2000
- 58.8% of those did it mostly in Virginia.
- 67.9% of those did it mostly in public places
- Average number of days doing it in 2000:
Mean = 16.9 days
Median = 10.0 days

Limitations to Participate in Favorite Outdoor Recreation Activities – Va. Beach Visitors

	1 Not Limiting	2 Limiting	3 Strongly Limiting	Mean	Median
TIME	17.9%	55.5%	26.6%	2.1	2.0
MONEY	36.7%	49.2%	14.1%	1.8	2.0
OVERCROWDING	40.4%	43.9%	15.8%	1.8	2.0
DISTANCE	39.3%	48.1%	12.6%	1.8	2.0
INFORMATION	47.1%	36.3%	16.6%	1.7	2.0
FACILITY AVAIL.	46.3%	43.1%	10.6%	1.6	2.0
ACCESSIBILITY	61.1%	32.2%	6.7%	1.5	1.0
FACIL. QUALITY	65.0%	27.6%	7.4%	1.4	1.0

Data Sources for Domestic and International Tourists

- Domestic (USA)
"US Travel Data Center, Tourism Industry Assn."
-Telephone Surveys.
-Reports for Sale.
-Can Add Questions for a Fee
- International Visitors
"Tourism Industries", in U.S. Dept. of Commerce
-Inflight Survey.
-Reports for Sale.
-Can Purchase their Raw Data, *E.G. 1990*
Of those visiting Virginia, 16% did Water Sport/Sunbathing.

How to Collect the Information Needed

Survey Research Methods

- *National Economic Development Procedures Manual – Public Surveys Volume 1: Use and Adaptation of Office of Management and Budget Approved Survey Items for the Collection of Corps of Engineers Planning Data. IWR Report 93-R-2. January 1993.*
- WWW.IWR.USACE.ARMY.MIL(OMB)

The Steps of Survey Research

1. Define the Problem and/or Research Objectives.
2. Select Survey Method.
3. Design Questionnaire and Write the Questions.
4. Pretest Questionnaire and Survey Procedures.
5. Draw the Sample.
6. Select and Train Personnel.
7. Collect Data.
8. Assess Non-Response/Correct for Bias.
9. Code, Enter, and Edit Data.
10. Analyze Data.
11. Write Final Report.

Two of the Most Important Steps

2. Select the Survey Method.
3. Design the Questionnaire and
Write the Questions.

Selecting Survey Method

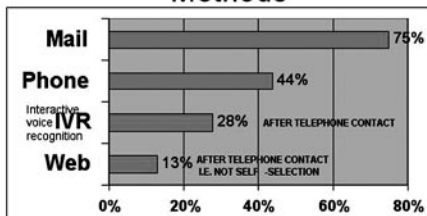
Ways to Conduct A Survey

1. Face to Face
(Generally Best Method)
2. By Telephone
(Usually Fastest Method)
3. By Mail (Lowest Costs)
Regular Mail
E-Mail
4. Internet/WWW
(Method of the Future)

Which is Best?

1. Face-to-Face Interviews
(Overall Best Method)
2. By Telephone
(Fastest Method)
3. By Mail
(Lowest Costs)

Response Rates For Some Different Data Collection Methods



Source: Dillman, D.A et al (2001), *Response Rate and Measurement Differences in Mixed Mode Surveys Using Mail, Telephone, Interactive Voice Response and the Internet* draft paper, <http://surveys.isr.umich.edu/dillman/papers.htm>.

Which is Best?

Source: *Mail and Telephone Surveys* (1978), by Don A. Dillman

	Face-to-Face Interviews	Mail-Regular Surveys	Telephone Surveys
For Long Questionnaires:	GOOD	FAIR	FAIR
For Very Complex Questionnaires:	GOOD	FAIR	POOR
For Open-Ended Questions:	GOOD	POOR	GOOD
To Avoid Social Desirability Bias:	POOR	GOOD	FAIR
To Avoid Contamination By Others (friends, family) :	FAIR	FAIR	GOOD

Questionnaire Design

IMPORTANT DESIGN PRINCIPLES

- Always number the questions.
- Maximize “white space” (Very Important).
- Use a gradient of ascending difficulty
- Place sensitive/controversial items at end.
- Always provide for comments at the end.
- Always put a “thank you” statement at end.
- Design a “Package” for Mail Surveys.

EG. Gradient of Ascending Difficulty

Q1. In general, how important is it to you to have access to outdoor recreation opportunities?

1. NOT IMPORTANT
2. SOMEWHAT IMPORTANT
3. VERY IMPORTANT

Place Sensitive/Controversial Items at the End

- Q17A. Where is your permanent residence?

• _____ / _____ / _____
CITY STATE ZIP

Q17B. [ASK IF STATE IS MISSOURI OR ARKANSAS]
Is your permanent residence located on Table Rock Lake? (Circle)

1 NO 2 YES

EG. COMMENTS AND THANK YOU AT END

Q18. Are there any additional comments you would like to make concerning Table Rock Lake? _____

THANK YOU FOR YOUR COOPERATION

Mail Survey Package

- “Booklet” Questionnaire with graphics.
- Design cover letter(s) for each “wave”.
- Design post-card reminder with graphics.
- Self-Addressed postage-paid return envelope.
- Incentive.

Writing Good Questions

Rules for Good Questions

- Short and Simple questions are best.
- Reliability: Consistent measurement results.
 - Wording should be Clear and Unambiguous.
 - Negative Wording should be avoided.
 - No “double-barreled” questions.
 - “Mutually Exclusive” answers.
- Validity: Measuring what you intend to measure.
 - “Exhaustive answers
 - No “loaded” questions.

Double-Barreled Question

12. Are any changes or improvements needed to make it easier or safer for you to access the shoreline?

_ YES _ NO

Mutually Exclusive Answers

Q46. Which of the following income categories most closely describes your total annual household income? (Circle)

1. LESS THAN \$10,000
2. \$10,000 - \$24,999
3. \$25,000 - \$49,999
4. \$50,000 - \$74,999
5. \$75,000 OR MORE

Exhaustive Answers

6. How did you receive information about this beach? (Check all that apply)

- BROCHURE WEBSITE
 FAMILY/FRIENDS DID NOT RECEIVE
 OTHER(Specify:) INFORMATION
- _____

Loaded Question

1. You like going to the beach, don't you?

- YES
 NO

The Steps of Survey Research

1. Define the Problem and/or Research Objectives.
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4. Pretest Questionnaire and Survey Procedures.
5. Draw the Sample.
6. Select and Train Personnel.
7. Collect Data.
8. Assess Non-Response/Correct for Bias.
9. Code, Enter, and Edit Data.
10. Analyze Data.
11. Write Final Report.

Two Other Important Steps

5. Draw the Sample.

8. Assess Non-Response/Correct for Bias.

STEPS IN SAMPLING

1. Define the Study Population.
2. Determine Unit of Analysis.
3. Establish a Sampling Frame.
4. Select a Random Sampling Procedure.
5. Determine Sample Size.
6. Draw the Sample.

Random Sampling Methods (Representative/Probability Samples)

1. Simple Random Sampling.
2. Stratified Random Sampling.
3. Systematic Sampling.
4. a) Sampling Interval = Population/Sample Size.
5. b) Random selection of starting point.
6. c) Select every "nth" element in *entire* list.
7. d) Guard against periodicity bias.
4. Cluster Sampling.
5. Multi-Stage Sampling.

What Can You Do When Things go Wrong?

Step# 8: CORRECTING FOR NON-RESPONSE BIAS

EG. RACE

<u>RACE:</u>	<u>2000 VA Census</u>	<u>VA Sample</u>	<u>ASSIGNED "WEIGHT"</u>
Caucasian	72.3 %	89.4 %	0.81
African American	19.6 %	6.5 %	3.02
Asian/Pacific Islander	3.8 %	1.2 %	3.17
American Indian	0.3 %	0.6 %	0.50
Other	4.0 %	2.3 %	1.74
Total %	100.0 %	100.0 %	NA

**DO SHORE PROTECTION PROJECTS INDUCE LOCAL DEVELOPMENT?
CAN THEY PREVENT THE DECLINE OF BEACH ECONOMIES?**
Anthony Yezer, PhD., The George Washington University

Remarks by Anthony Yezer, GWU

Workshop for the National Shoreline Management Study

July 23-24, 2002

Introduction and Summary

Based on Research at GWU, Most Already Published We Have Learned That:

Shoreline Protection Projects Have Effects On Beachfront Community Development That Are Small Compared To Flood Insurance and CBRA Regulations.

1. Building Permit Studies Show That Shore Protection Has Little Effect On New Building Permits In Beach Communities
2. House Price Change Studies Show That Shore Protection Has Little Effect On House Prices At The “Water’s Edge”
3. Housing Density Studies Show That Shore Protection Has Little Effect On The Density of Development In Shoreline Areas

In Contrast Studies Show That Flood Insurance Has Important Effects On Beachfront Development — If We Are Concerned About Development Going in Harm’s Way Then Flood Insurance Should Be Our Main Concern

There Are Important Interactions Between Shore Protection And Flood Insurance That Should Be Considered — To What Extent Is Shore Protection A Way Of Lowering Flood Insurance Losses?

**DETERMINANTS OF NEW RESIDENTIAL BUILDING PERMITS
IN BEACHFRONT COMMUNITIES
(Logarithmic Specification)**

**Dependent Variable: LNNEWHOUSE
(Mean of Dependent Variable: 4.84)**

VARIABLE	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MEANS
CONSTANT	6.79***	6.80***	7.04***	7.08***	--
LNEMPLOY	0.21***	0.21***	0.22***	0.22***	4.49
LNFORM1	0.06	0.08	0.07	0.08	.122
LNFORM2	-0.97***	-0.94***	-0.61**	-0.56**	.025
TIME	-0.01***	-0.04***	-0.009**	-0.35***	17
W.FLA	-2.82***	-2.82***	-3.11	-3.14***	.238
E.FLA	-2.73***	-2.71***	-3.04***	-3.03***	.214
SO.FLA	-2.20***	-2.17***	-2.47***	-2.45***	.238
NY	-2.12***	-2.11***	-2.48***	-2.49***	.047
NJ	-3.18***	-3.17***	-3.52***	-3.52***	.119
MD	-2.44***	-2.43***	-2.77***	-2.79***	.024
NC	-3.72***	-3.73***	-3.86***	-3.88***	.047
SC	-2.90***	-2.89***	-3.26***	-3.27***	.048
NFI	N.A.	0.55***	N.A.	0.51***	.651
FEMAP	N.A.	0.06	N.A.	0.13	.582
LNTSAND	N.A.	N.A.	0.12**	0.11*	.510
LNTCOST	N.A.	N.A.	-0.16***	-0.15***	.824
YRAUTH	N.A.	N.A.	-0.38	-0.31	.022
YRMOD	N.A.	N.A.	-0.78*	-0.88**	.009
ACTIVE	N.A.	N.A.	--	-0.02	.467
No. Obs.	1386	1386	1386	1386	
R ²	.1977	.2074	.2135	.2234	
Adjusted R ²	.1907	.1993	.2044	.2126	
F Statistic	28.19	25.63	23.23	20.68	

*** Significant at the .01 level
 ** Significant at the .05 level
 * Significant at the .10 level

**DETERMINANTS OF NEW RESIDENTIAL BUILDING PERMITS
IN BEACHFRONT COMMUNITIES
(Linear Specification)**

**Dependent Variable: NEWHOUSE
(Mean of Dependent Variable: 389.79)**

VARIABLE	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MEANS
CONSTANT	3447.38***	3452.49***	3391.98***	3393.26***	--
EMPLOY	0.38***	0.38***	0.40***	0.40***	222.23
STORM1	17.76	25.18	23.20	29.37	.154
STORM2	-113.27*	-104.53*	-116.90*	-105.79*	.043
TIME	-2.44	-13.15***	-2.958	-14.27***	17
W.FLA	-3156.70***	-3154.38***	-3112.90***	-3106.67***	.238
E. FLA	-3242.86***	-3229.45***	-3186.72***	-3165.94***	.214
SO. FLA	-2940.08***	-2923.89***	-2888.88***	-2863.47***	.238
NY	-3108.42***	-3099.14***	-3048.20***	-3034.49***	.047
NJ	-3341.25***	-3332.29***	-3295.25***	-3280.40***	.119
MD	-3341.25***	-3522.26***	-3490.89***	-3492.88***	.024
NC	-3341.25***	-3342.67***	-3333.89***	-3332.83***	.047
SC	-3428.78***	-3418.95***	-3374.13***	-3360.98***	.048
NFI	N.A.	213.31***	N.A.	203.01***	.651
FEMAP	N.A.	46.19	N.A.	73.50	.582
TSAND	N.A.	N.A.	0.11	0.12	76.87
TCOST	N.A.	N.A.	0.019*	-0.02***	708.59
YRAUTH	N.A.	N.A.	-148.46	-114.27	.022
YRMOD	N.A.	N.A.	-209.58	-251.40	.009
ACTIVE	N.A.	N.A.	50.25	48.50	.467
No. Obs.	1386	1386	1386	1386	
R ²	.4925	.4990	.4958	.5027	
Adjusted R ²	.4881	.4939	.4896	.4958	
F Statistic	111.04	97.53	79.14	72.69	

*** Significant at the .01 level

** Significant at the .05 level

* Significant at the .10 level

FIGURE 3

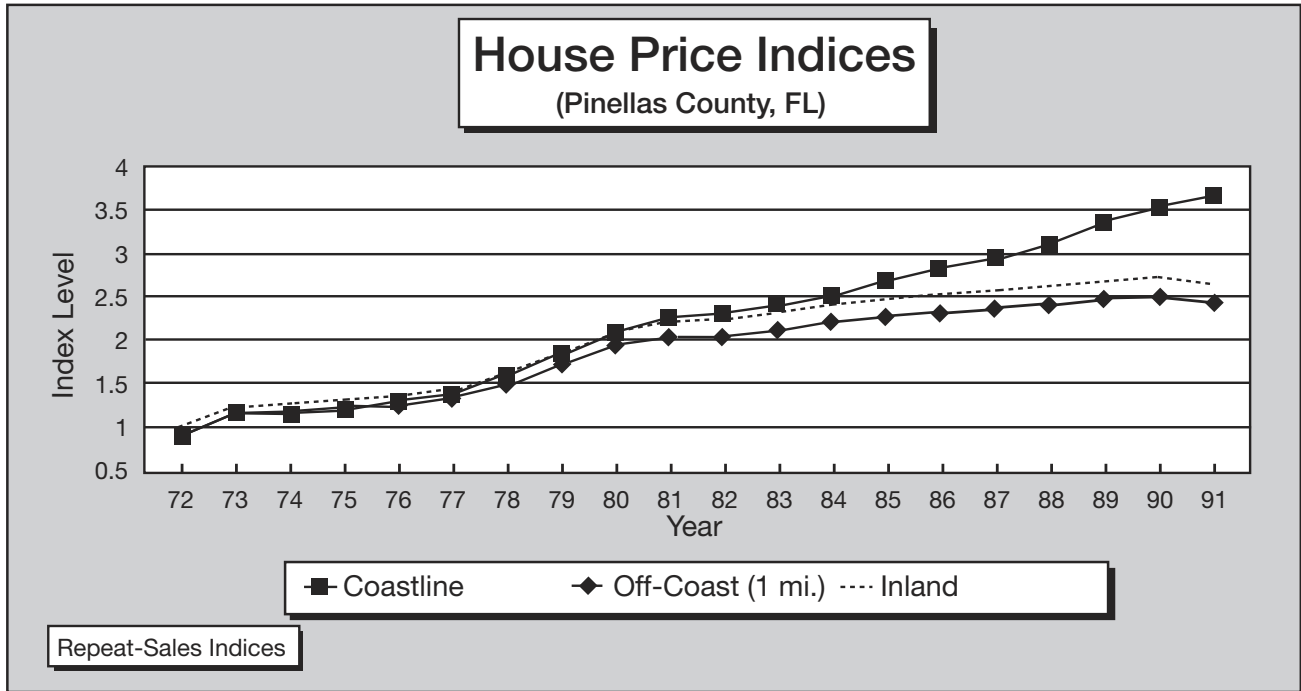


FIGURE 6

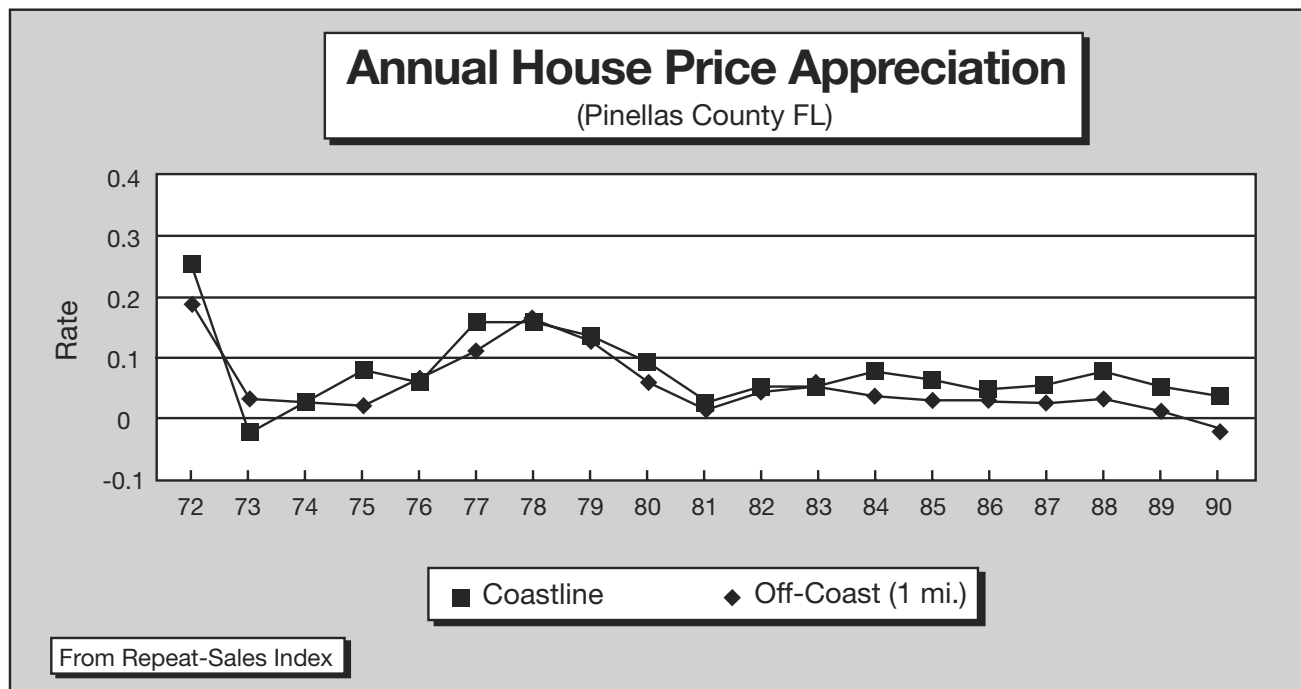


Table 1

Determinants of Beach Housing Price Change
 Dependent Variable: Annual Percentage House Price Change

	Effects of inland price change		Add effects of corps activities and storms		
	(1)	(2)	(3)	(4)	(5)
Constant	2.007* (3.297)	2.082* (2.068)	1.873* (1.808)	1.920* (1.818)	1.957* (1.848)
Dade		0.200 (0.146)	-0.259 (-0.176)	-0.396 (-0.255)	-0.460 (-0.296)
Duval		-0.422 (-0.307)	-0.226 (-0.162)	-0.309 (-0.215)	-0.401 (-0.278)
Inland	1.012* (39.176)	1.012* (38.561)	1.006* (37.266)	1.009* (35.739)	1.011* (35.625)
Active			1.316 (0.886)	0.912 (0.454)	0.531 (0.258)
Tcost				0.000 (0.300)	0.000 (0.682)
Storm					-2.341 (-0.911)
R-square	0.9639	0.9637	0.9642	0.9643	0.9648
Adj.R-square	0.9630	0.9618	0.9616	0.9610	0.9609

Note. No. of observation=60

Numbers in parentheses are t values.

*indicates that the estimated coefficient is statistically significant at the 90% level

FIGURE 2: DEVELOPMENT DENSITY
 CAPITAL/LAND RATIO: GLYNN RECTANGLE 1

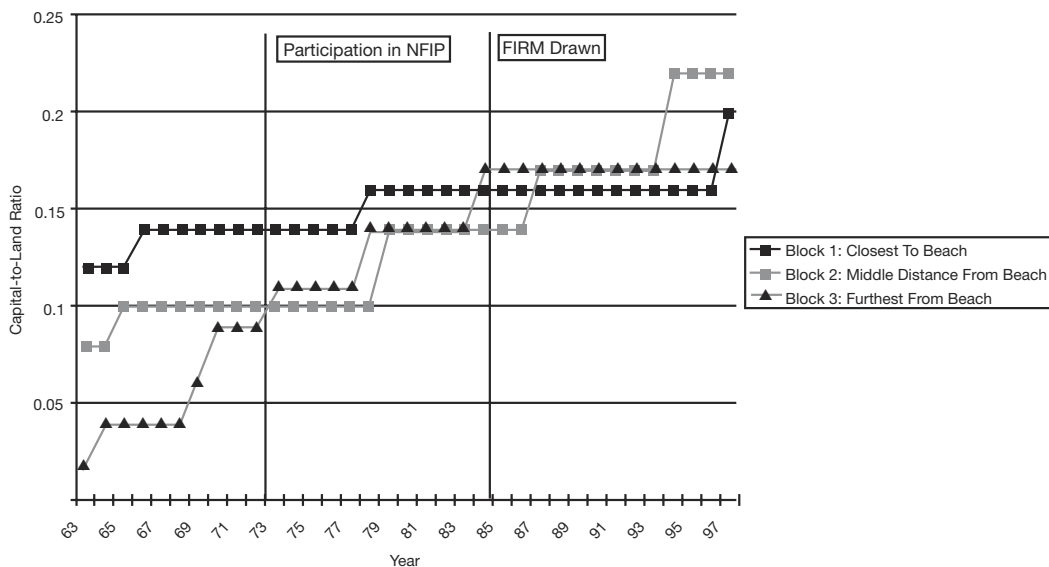


TABLE 6: STATISTICAL MODEL OF DEVELOPMENT DENSITY (Equation 1)				
Dependent Variable: Capital-Land Ratio				
	MODEL 1		MODEL 2	
INDEP.VARIABLE¹	Coefficient	Standard Error	Coefficient	Standard Error
CONSTANT	.1033***	.0292	.1017***	.0292
TIME	.0041***	.00027	.0041***	.00027
BEACH1·TIME	-.0028 ***	.00028	-.0028***	.00029
BEACH2·TIME	-.0011	.00025	-.0011***	.00025
EMPLOY (Per 1000 employees)	.0034 ***	.00031	.0034***	.00031
BEACH1	.0321***	.0149	.0322***	.0149
BEACH1·DISTANCE²	-.0157**	.0041	-.0157***	.0041
BEACH2	.0190	.0183	.0194*	.0182
BEACH2·DISTANCE²	-.0050	.0037	-.0051	.0037
GEOTIME	-.00017*	.00093	-.00016*	.00009
(GEOTIME·THIRTY)	.0009***	.0003	.0009***	.0003
(GEOTIME·SIXTY)	N.A.	N.A.	.00004	.0001
VZONE	-.0230*	.0127	-.0230*	.0126
STORM	.0066**	.0027	.0066***	.0028
NFIP	.0375***	.0052	-.0375***	.0052
NFIP·DISTANCE²	-.0108**	.00129	-.0109	.00129
FIRM	.0395***	.0059	-.0395***	.0058
FIRM·DISTANCE²	-.0113***	.00149	-.0113***	.00149
CBRA	.0116	.0274	.0118	.0273
CBRA82	-.0369***	.0055	-.0370***	.0055
CBRA91	-.0530***	.0069	-.0531***	.0069
NOURISH	-.0081	.0058	-.0081	.0058
BCH1·NOURISH	.0129*	.0070	-.0129*	.0070
BCH2·NOURISH	.0113	.0073	.0115	.0072
R²	.626		.620	
No. of Observations	3921		3921	

¹ Coefficients for the community dummy variables are not shown.

*** Significant at the .01 level; ** Significant at the .05 level; * Significant at the .10 level

² Distance is scaled in units of 100 feet.

TABLE 7: STATISTICAL MODEL OF DEVELOPMENT DENSITY (Equation 2)				
Dependent Variable: Capital-Land Ratio				
INDEP.VARIABLE¹	MODEL 1		MODEL 2	
	Coefficient	Standard Error	Coefficient	Standard Error
CONSTANT	.1107***	.0284	.1101***	.0285
TIME	.0038***	.00026	.0038***	.00026
BEACH1·TIME	-.0019***	.00025	-.0019***	.00025
BEACH2·TIME	-.0007***	.00024	-.0007***	.00024
EMPLOY (Per 1000 employees)	.0034***	.00031	.0034***	.00031
BEACH1	.0466***	.0147	.0466***	.0146
BEACH1-DISTANCE²	-.0133***	.0042	-.0132***	.0042
BEACH2	.0305*	.0181	.0308*	.0181
BEACH2-DISTANCE²	-.0048.	.0037	-.0049	.0037
GEOTIME	-.0002***	.00009	-.0002***	.00009
(GEOTIME·THIRTY)	.0009***	.0003	.0009***	.0003
(GEOTIME·SIXTY)	N.A.	N.A.	.000002	.0001
VZONE	-.0282**	.0130	-.0282**	.0128
STORM	.0073***	.0028	.0073***	.0027
NFIP	-.0029	.0032	-.0029	.0032
NFIP·VZONE	.0169***	.0057	.0169**	.0057
FIRM	-.0024	.0042	-.0025	.0043
FIRM·VZONE	.0099**	.0051	.0099*	.0051
CBRA	.0094	.0267	.0094	.0265
CBRA82	-.0387***	.0056	-.0387***	.0056
CBRA91	-.0531***	.0070	-.0531***	.0070
NOURISH	-.0037	.0036	-.0037	.0036
NOURISH·VZONE	.0132**	.0057	.0132**	.0057
R²	.620		.620	
No. of Observations	3921		3921	

¹ Coefficients for the community dummy variables are not shown.

*** Significant at the .01 level; ** Significant at the .05 level; * Significant at the .10 level

² Distance is scaled in units of 100 feet.

THE FISCAL IMPACTS OF BEACHES AT TWO BEACH TOWNS: SAN CLEMENTE AND CARPINTERIA

Philip King, Ph.D., San Francisco State University

The Fiscal Impact of Beaches at two Beach Towns: San Clemente and Carpinteria

Philip King, Ph.D.
Chair, Economics Dept.
San Francisco State University
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Motivation

- The mantra for the NYT, OMB and other sources has often been that locals benefit most from Beach Project.
- No empirical evidence for this assertion.
- Our work in California contradicted the assertion.
- We decided to do fiscal impact studies.

Demand for Recreation is Growing

How Much Do People Spend on Recreation?

Year	Percentage of Household Budget Devoted to Recreation
1919	3.60%
1935	4.00%
1950	5.30%
1972	6.70%
1991	8.00%
2000	8.50%

Source: Costa, 1999, 1997

California's Population is Growing Faster than the U.S.

Population Projections for California, Los Angeles and San Diego Counties (millions)

Year	California	Los Angeles	San Diego
2000	34.5	2.8	
2005	37.5	3.1	
2010	40.3	3.4	
2020	45.8	3.9	
% increase 2000-2020	32.8%	39.3%	

Source: California Dept. of Finance

Beaches are Popular

Table 1: How Many People Go to the Beach?

Percentage of Californians who go to the Beach Every Year	63.8
Percentage of Americans who go to the Beach Every Year	24.8
Percentage of Americans who go to Picnics Every Year	15.7
Percentage of Americans who go Birdwatching Every Year	5.1
Percentage of Americans who go to the Zoo Every Year	13.6

Source: King and Potepan (1997), Statistical Abstract of the U.S.

Tax Benefit to Governments

Estimated Taxes Derived from Beach Spending for Federal, California State, County and City Governments Including Social Insurance

Government	Estimated Tax Generated	Percentage of Total Taxes Generated
Federal	\$ 13,627,622,167	65.8%
California State	\$ 4,626,104,009	22.3%
County	\$ 1,227,713,709	5.9%
City	\$ 1,227,713,709	5.9%
Total	\$ 20,709,153,594	100.0%

Tax Benefit to Governments (Putting Social Insurance in “Lock Box”)

Estimated Taxes Derived from Beach Spending for Federal, California State, County and City Governments Excluding Social Insurance

Government	Estimated Tax Generated	Percentage of Total Taxes Generated
Federal (Ex Soc Ins)	\$ 8,102,910,478	53.4%
California State	\$ 4,626,104,009	30.5%
County	\$ 1,227,713,709	8.1%
City	\$ 1,227,713,709	8.1%
Total	\$ 15,184,441,905	100.0%

Methodology of Study

- Conducted Random Survey of Visitors during High Season in 2001
- Written Survey which Respondents filled out or had surveyor fill out.
- Attendance numbers from City
- Other estimates from City and private sources (e.g., hotels)

Overview of San Clemente City Beach

- Affluent Beach Town in Orange County, between LA and San Diego
- 1.9 million visitors a year
- 1.1 million in high season

Beach is Eroding

- Pier, RR tracks, and other structures are Threatened
- Beach is crowded but crowds limited by scarcity of Parking
 - In 10-20 years could be no beach
 - Beach is slated for USACE project

Details from Survey

- Collected Data on:
 - Size, demographics and composition of HH
 - Location of Permanent Residence
 - Type of Trip (Day, Overnight, etc.)
 - Beach attendance: survey beach and elsewhere
 - Spending including % local
 - Travel Cost info

City Expenses

City Expenditures to Maintain the Beach-San Clemente

Item	Cost to the City
Beach Maintenance (Including Admin overhead)	\$ 237,762.00
Lifeguard Services	\$ 725,065.00
Police	\$ 595,000.00
Total	\$ 1,557,827.00

Source of Revenue/Expense

Sales Tax	\$	370,880.00
Transient Occupancy Tax	\$	641,461.00
Beach Concessions	\$	147,067.80
Net Parking	\$	491,194.45
Total Revenue Generated	\$	1,650,603.25
Est. revenue per visitor	\$	0.87

How much Does the City make

- City Gains \$92,776 in net Revenue
- About 5 cents per visitor
- Basically it Breaks Even
- City does not generate sufficient revenues for major shore protection

How does State Compare?

- Computed State Sales Tax and used State Average based on spending/type of spending
- Estimate State receives \$4.16 per visitor Day

How does Federal Govt. Compare?

- Used Averages based on Spending
- Excluded Social Security
- Federal Govt. receives \$10.32 per visitor per day

Limitations of Study

- Property Tax not Included
 - This is not a user tax but obviously beach influences property values
 - 77% of visitors in High Season Not City residents
- Respondents have difficulty estimating expenses
 - Most estimates from other sources
 - Sales Tax relatively small overall

Carpinteria

- Small beach town South of Santa Barbara
- Less Affluent than San Clemente
- Half of Beach run by City/Half by State
- Potential USACE project
- 1.4 million visitors a year
- 1.3 million in high season

Source of Revenue/Expense		
Sales Tax	\$	691,300.00
Transient Occupant Tax	\$	578,584.00
Net Parking	\$	-
Total Revenue Generated	\$	1,269,884.00
Est. revenue per visitor	\$	0.98
Beach Safety and Maintenance (excl. Police)	\$	300,000.00
Police	\$	225,000.00
Total City Cost	\$	525,000.00
Net Revenue from Beaches	\$	744,884.00
Net Revenue per visitor	\$	0.57

Revenues

- City generates \$1.3 million per year in revenue
- City Spends \$525 thousand on lifeguards, police, etc.
- Part of beach is State property and State pays for public safety, etc.

Fiscal Impact of Carpinteria's Beaches

- City nets \$745 thousand from beaches
- City generates 98 cents per visitor in local taxes and fees
- After expenses it nets 57 cents per visitor
- State generates \$6.90 per visitor
- Federal Government generates \$17.07
- These are Direct tax benefits

Cities cannot afford to pay for nourishment

- San Clemente's and Carpinteria's beaches are eroding
- Nourishment projects cost millions
- Cities do not generate revenue to pay
- Federal government does

Federal Government benefits

- San Clemente: Direct Spending generates over \$13 million per year to Federal Government
- Carpinteria: Direct Spending generates over \$22 million per year to Federal Government

Conclusion

- Recreational Benefits of California Beaches Enormous
- Few Good Substitutes
- Federal Government receives Greatest Tax Benefit
- Locals Receive small Benefit
- Crowding and Erosion are Serious and will Lead to Loss in of Recreation

Conclusion (cont.)

- Beaches are considered a public good available to all
- Many are eroding and must be maintained
- Local governments in California simply cannot afford to do this
- Beaches are a valuable part of the country's recreational infrastructure and they are diminishing every year

For more information:

- pgking@sfsu.edu
- Reports are available

FINANCING BEACH IMPROVEMENTS AND THE IMPLICATIONS OF ECONOMIC EXTERNALITIES FOR COASTAL POLICY

Warren Kriesel, PhD., University of Georgia

Two Topics in Shoreline Protection: Financing Beach Maintenance and The Implications of Economic Externality for Coastal Policy

Warren Kriesel, Assoc Prof
Ag & Applied Economics
The University of Georgia

Two Research Papers

- *Financing Beach Improvements*
 - Sea Grant funded
 - study of beach management alternatives
 - mail survey of Ga beach visitors
 - used contingent valuation and trip response
- *Coastal Hazards and Economic Externality*
 - FEMA and Heinz Ctr.
 - study of hazards and NFIP impacts on property prices
 - mail survey of coastal property owners in 13 states
 - used hedonic price analysis of property sale prices

A Community's Choices for Dealing with Degraded Beach

1. Beach nourishment very expensive and only temporary.
2. Retreat policy preserves beach but is politically difficult and expensive.

Either option must be financed

- Perform BCA for beach improvements, financed by general government revenue.
- Perform feasibility for beach projects financed by bonds, paid off with parking revenue.

Contingent Valuation Survey

- On-site survey in 1998.
- 2,672 contacts made, 55% response rate, 1,040 usable questionnaires.
- All prices stated in term of increase to the existing daily parking fee of \$2

The valuation question

- *Considering the beach conditions and the price of using the beach, which management scenario you would prefer to see at Jekyll Island? (circle one)*
- *a. Current Conditions (at \$2/day)*
- *b. Alternative Management (at \$2.50/day)*

Logit results for beach preferences

Variable	Beta Est.	Std Error
• Intercept	0.110	0.502
• Price	-0.159	0.013*
• Income	0.001	0.001
• Age	-0.004	0.006
• Education	0.464	0.177*
• Pro-government	0.245	0.051*
• Green	-0.094	0.035*
• Travel time	0.003	0.012
• Local	-0.651	0.391*
• Years Visited	-0.001	0.006
• Substitute beach	-0.043	0.015*
• Nourishment	0.252	0.183
• Retreat	0.363	0.194*
• Summer	0.078	0.161

Contingent Valuation Results

- Average WTP for improvements
 - \$30.53/year/household
 - \$4.2 million/year
- No statistical difference for :
 - Beach nourishment
 - Seasons of the year

The visitation question

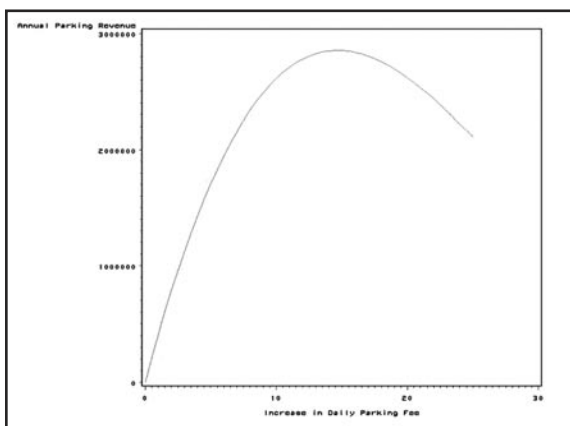
- *Suppose that the **alternative management plan** happens and beach conditions in the right_hand map result. At the new fee of \$2.50/day, how would you change the number of days you visit Jekyll in a one_year period? (circle one)*

Tobit results for beach visitation

Variable	Beta Est.	Std Error
• Intercept	2.227	0.489*
• Price	-0.136	0.010*
• Income	0.001	0.001*
• Age	0.001	0.005
• Education	0.050	0.168
• Pro-government	0.071	0.047
• Green	0.007	0.033
• Travel time	0.005	0.011
• Local	0.070	0.374
• Years Visited	0.014	0.006*
• Substitute beach	-0.020	0.005*
• Nourishment	0.231	0.177
• Retreat	0.265	0.186
• Summer	0.027	0.155

Trip Response Results

- Revenue = Price _ Days _ Visitor Base
- Tobit analysis of visitation estimates
 - How # days change
 - How visitor base changes as people opt out
- Increased revenue could fund improvements



Beach Nourishment Policy Retreat Policy

Project Life	10 Years	30 Years
General Revenue Financing		
By WTP \$ mil.		
Annual WTP	\$4.8/year	\$5.4/year
Total WTP	\$35.8*	\$74.3*
Project Costs	\$13.2*	\$29.8
WTP/Cost ratio	2.7	2.5
User Fee Financing By		
Parking Revenue \$ mil.		
Annual Revenue	\$3.0/year	\$3.1/year
Total Revenue	\$22.1*	\$42.7*
Project Cost	\$13.2*	\$28.1
Revenue/Cost Ratio	1.6	1.5
Break-even Parking Fee	\$7.00/car/day	\$8.00/car/day

* Indicates present value discounted at 6%

Used Parson's approach to valuing land loss from retreat policy

- From private viewpoint, owners affected by retreat are compensated at fair market value.
- After waterfront house is removed, amenity value accrues to inland neighbors, and so on . . .
- Therefore, from public viewpoint, net loss is the value of land with the *least* amenity value.

Conclusions:

- Both management alternatives are feasible under either financing option at Jekyll.
- A locality may not afford general revenue financing (will look for cost sharing???)
- Tourist demand conditions must be right for user fee financing to work.
 - Large customer base.
 - Little nearby competition, or beach is unique

Coastal Hazards and Economic Externality

- Research Mandated by Flood Insurance Reform Act of 1994
- Estimate benefits and costs of changes to NFIP : erosion + flood rating
- FEMA identified 19 counties in 13 states

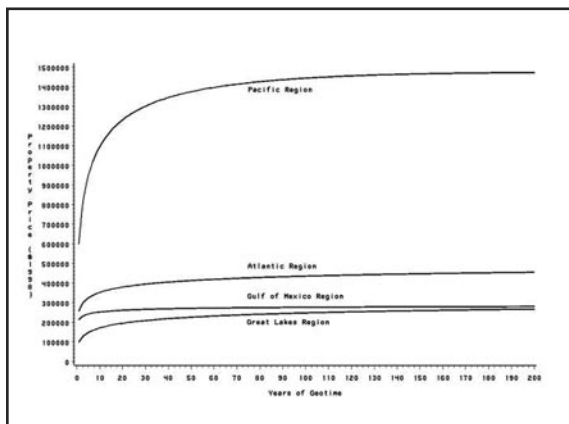
Hedonic Price Analysis

- A standard method of measuring benefits of environmental attributes
- Applies a regression model: $hp = f(S, N, Q)$
 - where hp is the latest actual sales price
- \exists is the marginal implicit price
- Benefits = property value change, under right conditions

Summary of the Hedonic

- 3,600 responses for 37% return rate
- used 19 independent variables, all but 3 were significant
- R-squared = 67 percent
- Erosion hazard = geological time

Variable	Beta Coefficient	t-Statistic
intercept	6.070	12.18*
House Size (square feet)	0.552	11.47*
Parcel Size (square feet)	0.143	4.18*
Bedrooms	0.135	2.51*
Distance to CBD (miles)	-0.032	-1.67*
Age of Transaction (years)	-0.468	-22.87*
Age of House (years)	-0.085	-2.61*
Fireplace (1-0)	0.204	5.50*
Brick Exterior (1-0)	0.129	1.95*
Geotime (years)	0.119	2.71*
Geotime Squared	-0.008	-2.72*
Elevation (feet)	0.244	3.61*
Distance to Water (feet)	-0.024	-1.21
Beach Width (feet)	-0.002	-0.18
CBRA (1-0)	0.010	0.09
Waterfront (1-0)	0.328	6.32*
Waterfront Stabilization (1-0)	0.141	1.96*
Percent Stabilization	-0.031	-2.18*
Waterfront Nourishment (1-0)	-0.276	-3.99*
Beach Nourishment (1-0)	0.539	7.9*
Built Post-FIRM (1-0)	0.204	4.52*



Synopsis of Table 3, text on page 1

Waterfront

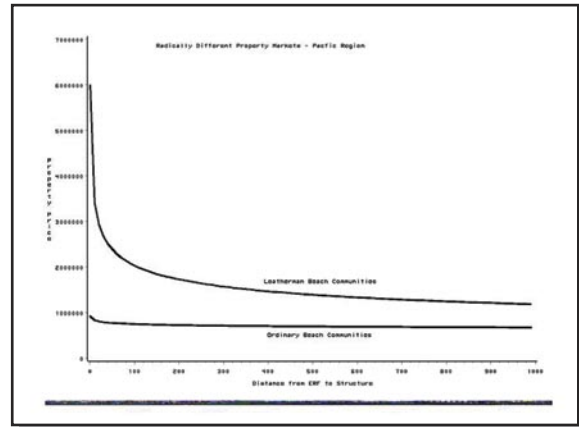
Case 1	stable shore	\$640k
Case 2	3ft erosion, no action taken	\$481k
Case 3	3ft erosion, nourishment	\$555k
Case 4	3ft erosion, own & few stablz'd	\$554k
Case 5	3ft erosion, own & many stablz'd	\$486k
Case 6	3ft erosion, no own & many stablz'd	\$422k

Non-waterfront

Case 7	stable shore	\$499k
Case 8	3ft erosion, no action taken	\$383k
Case 9	3ft erosion, nourishment	\$500k
Case 10	3ft erosion, no own & many stablz'd	\$335k

Summary of Hedonic

- Johann von Thunen (c. 1826) predicted property prices increase with better access to amenities.
- If the beach amenity changes, owners' assets *throughout* the community are affected.
- Owners who stabilize their property may harm their inland neighbors (negative externality)
- At worst, prices in a degraded beach community will exhibit no price-amenity gradient.



Property owners should preserve the beach out of financial self-interest.

- Seawall construction represents serious negative externality, nourishment is positive
- May be better for the community to exercise eminent domain.
- Compensate owners with I.R. bond funds.

Flood Insurance

- Average subsidy is about 47%
- Overall participation rate is about 50%
- Voluntary participation rate = 8%
- Availability does not affect property prices
- Is a complement, rather than a substitute, for man-made asset protection
- Is an ineffective policy tool

Great Lakes Shore Protection is an Exception

- Lack of recreational beaches and less public access implies protection is more of a private decision.
- Relevant economic question is not whether but when to construct protection.
- Value-maximizing owner should construct protection when marginal user cost of Geotime equals interest payment on construction.

WHAT ARE THE MAINTENANCE, MANAGEMENT AND EMERGENCY COSTS ASSOCIATED WITH BEACH NOURISHMENT PROJECTS?

Linda Lent, Chrysalis Consulting LLC

What are the maintenance, management and emergency costs associated with beach nourishment projects?

Presented by Linda Lent,
Economic Consultant
July 23, 2002

The Short Answer: It all depends

- On the definitions of maintenance, management, emergency costs and beach nourishment projects.
- On the setting: urban, rural or in-between?
- On the beach use: swimming, surfing, fishing, boating, walking, sunbathing, structural protection?
- On the beach users: local, day visitors, overnight visitors, international visitors.

Working Definitions:

- Maintenance can include lifeguards, police, parking facilities, bath houses, access paths, clean-up, landscaping, as well as guardianship of the sand.
- Management can include the framework of maintenance and the decision framework for shoreline development, i.e., the local Coastal Management agency.
- Emergency costs can include those avoided by a nourishment project and/or those incurred to maintain the project.

Defining the Beach Nourishment is not straightforward:

- Do nourishment projects relate only to those projects that protect structural development?
- If so, we are excluding many smaller scale nourishment projects under consideration or ongoing by State and local interest in Delaware, Florida, California, Hawaii, and other areas.

Examples of Costs: Virginia Beach (1998\$)

- \$6.7M convention/visitor development
- \$5.7M capital improvements including beautification, convention facility renovation, beach erosion control and hurricane protection
- \$2.9M police, fire & lifeguard salary + fringe
- \$3.4 dep. of police/fire equipment, beach maintenance, resort bldg & maint, dredging & parking

Delaware (\$1998)

- \$2M annually to renourish beaches (State)
- Fenwick has @4000' of beach and spent \$56K for lifeguards and \$289K for police
- Rehoboth has @8100' of beach and spent \$206,000 for lifeguards; \$235,000 for parking mgt; \$57K for comfort stations; and \$1.1M for police
- Other reaches were maintained by the County or other municipalities.

Ocean City, MD (35,400')

- \$2M federal cost of annual renourishment cost, plus
- \$2M State/county/local cost of annual renourishment
- Damage prevention of \$98M for Jan '92 storm, \$70M for Dec '92 storm and \$46M from storms in 1998: Total \$214M since completion in Oct '91.

Waikiki Beach

- No monies have been spent on nourishment since a limited project funded by the County/State in 1991
- Nourishment is not justified based on structural protection as the average annual damage estimates are slight
- No governmental office or agency manages the Waikiki shoreline.

Waikiki Beach Cont., But...

- The full economic impact of annual tourism expenditures at Waikiki Beach exceeds \$5B
- Cont'l US and international visitors can and do choose alternatives outside of the US
- A preliminary estimate of the annual Federal loss from erosion at Waikiki is \$108M (lost exports + avoided imports).

Federal Emergency Costs

- Large expenditures are made in response to coastal disasters by Presidential Declaration
- Records are maintained in a very cumbersome accounting system, maintained by FEMA, which has been changed several times over the years
- Outside pressure likely will be needed to ever utilize this data in the shoreline management framework.

National Flood Insurance Program (NFIP)

- Properties within most coastal areas are eligible for flood insurance from the NFIP
- Accurate records from the NFIP/FEMA could help us better understand damage to residences from coastal events
- Many limitations relate to these data:
 - participation is not mandatory
 - data are not always recorded correctly
 - fraudulent claims can be a problem.

In Conclusion:

- There are different shorelines and conditions in coastal areas
- There are different kinds of nourishment
- There is a lack of data caused by the decentralized/nonstandard methods of conducting shoreline maintenance and management and related accounting
- There are problems with the emergency data on federal expenditures and NFIP claims related to the highly centralized management of those functions.

HOW DO DAMAGES PREVENTED BY SHORE PROTECTION PROJECTS AFFECT HOUSING VALUES?

William Stronge, PhD., Florida Atlantic University

Impact of Beach Projects on Housing Values

- Real estate studies of housing values affected by beach projects
- Before and After Studies e.g. Captiva Island
- Matched Samples
 - Anna Maria Island
 - Broward County – large metropolitan area
 - Delray Beach –adjacent communities

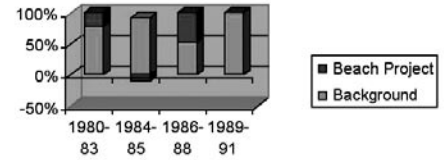
Reasons for Underestimating Real Estate Impact

- Excluded maintenance projects
- Narrowness of Benefits Included
- Income Effects Excluded (Producers' Surplus)
- Exogenous Parameters (Discount Rates, Planning Horizon)

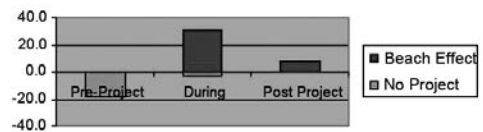
Statewide Impacts

- Coastal Property Value = 10% of Total
- Beaches contribute 24% of coastal values
- Beaches add \$21.3 billion to Florida coastal property values
- Beaches add \$6.2 billion to non-coastal, nearby values
- Beaches add \$27.5 billion to Florida property values

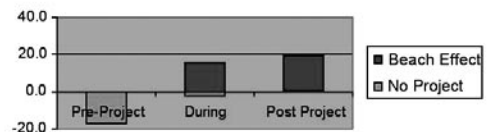
Captiva Property Appreciation



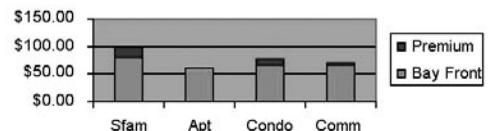
Anna Maria Island Beachfront Property Appreciation %



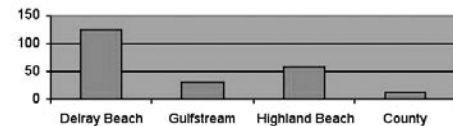
Anna Maria Island Near Beach Property Appreciation %



Value Per Square Foot Bay Front and Broward Barrier Island Premium



Impact of Delray Project on Property Values (\$ Million)



Property Appreciation Due to Beaches %



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