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AN EXAMINATION OF THE FEASIBILITY OF ABANDONING SHORELINE STRUCTURES

Gary P. Cantrell
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ABSTRACT

The question as to whether or not it is feasible to abandon existing coastal structures in an attempt to allow the beach system to regain an equilibrium is examined in this report using Wrightsville Beach, N.C. as a type example.

An economic approach is used in this endeavor. The cost of providing protection from storms and erosion for the residents of Wrightsville Beach by moving them and their houses plus removing the Masonboro jetty (which is the cause of increased erosion over 7,000 ft of the beach) comes to about $74,610,000. This solution is relatively free of time restraints (i.e. it removes the problem once and for all). It will cost over $120,000,000 over the next 100 years to supply sand to the beach at the rate supplied in 1980 (all of which has now been washed away which explains the need for continual replenishment). Over all, the economic savings comes to some $45,000,000 over the next 100 years or $450,000 per year if the jetty system were abandoned and the residents reimbursed.

Introduction

The Army Corps of Engineers (hereafter referred to as the A.C.E.) has often attempted to stabilize various beaches along portions of the U.S. coast. Their motives include a desire to maximize the efficiency of navigational channels, protect private homes and property from natural hazards, and maintain the nation's beaches as a suitable recreational resource for the general public. In this pursuit they (the A.C.E.) have spent a fair amount of money (over 60 million at Miami Beach alone). Should the A.C.E. suddenly decide to adopt the popular geologic viewpoint of such attempts being both damaging and futile in the face of a rising sea level, a fair amount of capital would also be needed to set things on their "natural" track again. The purpose of this paper is to examine the feasibility of such an undertaking.

Should the A.C.E. indeed adopt such an attitude it is obvious that some of their ideals must be compromised. Navigational channels must be content with following natural or minimally alterred routes, protection of private property from storms and erosional effects might be accomplished by the coward's method (i.e. running from the things rather than meeting them head on), and recreational beaches shall simply have to get on by themselves.

Possible Methods of Recourse

Basically there are two general approaches to abandoning the A.C.E.'s attempts at coercing the shoreline. They are; a) Passive and b) Active.

The Passive method involves calling it quits and allowing nature

to straighten everything out in her own way and in her own good time. Undoubtedly that approach would work but there are certain drawbacks. The major objection is the length of time involved. The amount of time needed (relative to human standards) would be far too great. A shoreline in the middle of such a transformation would be much too cluttered for recreational purposes and boats would be doomed to dodging floating houses while attempting to make it through an inlet. Obviously Passive abandonment is not particularly feasible.

Active abandonment requires actual removal of structures which effect the equilibrium of the beach-ocean system. Such an action would allow a much quicker recovery of the shore. Simply removing groins and jetties is not enough however since structures which sit upon, say, barrier islands, shall one day occupy a position in the tidal zone and hence play the role of a jetty (not to mention the rubble problem much like the one in the Passive abandonment plan). A move toward remedying that situation would probably prove to be most unpopular with the owners of said structures, especially if they were approached with a "tough nuggies" type attitude after being looked after by the federal government for so long.

The best approach might be one in keeping with the A.C.E.'s adopted policy of assuming some responsibility for the ultimate fate of private property in certain instances. People living along replenished or "protected" shorelines have been given ample opportunity to come to believe that they constitute a portion of those entitled to such considerations. At any rate, the A.C.E.'s point of view must be kept in mind as much as possible to achieve a workable solution. In keeping with this goal, the above-mentioned problem

shall be regarded as a major consideration in this examination.

Data

Currently there are two areas on the North Carolina coast which lend themselves to being scrutinized as models for this feasibility study. Carolina Beach and Wrightsville Beach are the areas in question. They qualify for two reasons, they are both in trouble due to accelerated erosional rates caused by engineering intervention and large amounts of money are currently being spent to remedy this situation by incorporating further engineering intervention endeavors.

Carolina Beach owes it's erosional problem to the artificial opening of Carolina Beach Inlet in 1952. Before the opening the erosional rate was about 18.3 cm per year which then accelerated after the opening to 3.96 m per year (Cleary and Hosier, 1977). Carolina Beach appears to be caught between a rock and a hard place since they need the beach for tourists (and also to hold their houses up) and the inlet to keep fishing interests in the area. Obviously both do not seem possible. The Carolina Beach project is not yet considered complete and so final figures are not yet available, however 13.5 million dollars has been poured into the area for berm and dune construction and beach replenishment.(Atkins, personal com.,1980)

Wrightsville Beach is a more fitting example since it's trouble is the result of a physical A.C.E. construction (the Masonboro jetty). According to Section III Report; Wrightsville Beach North Carolina, July, 1980, the amount of money spent on the project was not small. Initial cost for a series of dunes and berm structures along the southern 14000 ft. of Wrightsville beach was $1,058,000 (completed

1970). This does not include the cost of the jetty which was emplaced to stabilize the Masonboro Inlet. Due to increased erosion caused by the jetty it became neccesary for the A.C.E. to attempt to redo the hurricane protection project and replenish the beach. This was to be done in two phases. Phase I was to place 468,750 cu. yds. of spoil on the 7000 ft. of eroded beach at a cost of over $1,200,000. Phase II was to encompase the restoration of the beach to full protection specifications. Phase I was to have provided protection against a storm with a return period of 20 years and was completed in May, 1980.

Removal of the jetty would have cost $10,000,000 (had the A.C.E. elected that alternative). The average annual benefit from the Masonboro Inlet is $1,292,000.

For simplicity's sake, only residential structures are considered in the following which will also have the effect of generalizing the results. The A.C.E. estimates the real property value of the 923 residential houses as being $62,478,000. Mr. Dunley of Dunley Realty gives a slightly higher value by estimating a range of $60,000 to $110,000 for interior island houses and $100,000 to $200,000 for beach front houses. J.C. Parker House Movers says a ballpark figure for moving a beach house is about $2,000 minimum.

Data Interpretation

There seem to be two alternatives which would allow residents of such areas to avoid economic and life loss. Both entail moving the residents off the island and compensating for their property in one way or another.

The first would be to purchase all the property on the island and either destroy it (the structural portion) or move the structures off the island. If the latter were chosen, it would be possible to sell the houses on the mainland, thereby cutting total costs.

The second method basically accomplishes the same thing using a little different approach. The second method involves buying all the real estate on the island and then paying to have the buildings on the property moved inland.

By using Mr. Dunley's figures (which are higher, thereby giving the residents the benefit of the doubt--it is also not clear as to whether or not the A.C.E. figures included mainland value or not) of $60,000 to $200,000 and coming up with a ballpark average of $110,000 for each house and property on the island and multiplying that times the total number of such units on the island (923), a total value of $101,530,000 is obtained. As much as 50% of that figure is for land alone, or $50,765,000. By using a high figure of $15,000 for moving each house, the total cost for purchasing the land and then paying to move the houses comes to $64,610,000.

As of Dec. 6, 1980, Phase II of the A.C.E. restoration project had not begun. The reason seems to be that Phase I failed so miserably. None of the replenishment sand seems to have survived the 6 month period between it's emplacement in May, 1980 and Dec., 1980 when the photo in figure 1. was taken.

By emplementing the above mentioned plan for abandonment and removing the jetty, the total cost comes to about $74,610,000. This method provides an answer which is relatively long term.

If replenishment is pursued for, say, 100 years (assuming the

erosional rate does not increase and replenishment holds out for an entire year rather than 6 months) the total cost would be (baring inflation and interest rates) 100x$1,200,000 or $120,000,000.

Over 100 years the average benefit of the Masonboro Inlet comes to about $129,200,000 (with a working inlet control system). By assuming a reduction in benefits of 50% (please note; this is an entirely arbitrary assumtion since no data is available concerning the actual effect economically of the jetty) caused by removing the jetty, the figure stands at $64,600,000.

So, if the Masonboro Inlet economic benefits are ignored, it is quite evident that not only is abandonment feasible, it is in fact desireable by some $45,390,000. If the inlet benefits are included (using the 50% loss figure), the economics swing the other way making the abandonment approach come out in the red by $19,210,000 for a 100 year period or $192,100 per year. If the number of visitors to the beach is considered (say, 19,000 per peak day and allowing for 25 such days a year, the total is 475,000) the deficit may be viewed in terms of people affected. It comes out to about $.40 each, which could easily be made up by charging admission to the beach or for ferry service to the island.

Conclusion

Due to the generalized nature of this examination, there is a certain lack of quantitative value and an over abundance of arm waving. However, even with the number of "ball park" figures used it seems apparent that the Active abandonment approach is in fact

a reasonable method of restoring the shoreline to it's rightful place in a dynamic system.

It is important to note that "feasibility" does not neccesarily mean economic gain but rather an avoidance of massive loss (economic or otherwise) relative to the value of the object which would benefit from the proposed action. A final consideration is the problem of putting quantitative values on something with a high aesthetic quality like a beach. How much would the abandonment idea have had to be in the red before it could be considered not feasible?

Fig. 1, Erosional scarp, Wrightsville Beach, North Carolina

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