



REPLY

Reply to: Hillyer, T. M. and Stakhiv, E. Z., 1997. Discussing of: Pilkey, O. H., 1996. The fox guarding the hen house (editorial). *Journal of Coastal Research*, 11(3), iii-v.

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WHEN THE FOX PREACHES, LOOK TO YOUR GEESE*

Hillyer and Stakhiv discuss my editorial entitled "The Fox Guarding the Henhouse" (Pilkey, 1995). I welcome the opportunity to continue a dialogue on this important issue. The discussion of the success or failure of the Corps in predicting beach nourishment costs is a critical one at this time. The current administration in Washington is attempting to reduce federal funding of such projects and the Corps is in the middle of a large campaign to assure their future financial well being by continuing to replenish American beaches.

The original editorial (PILKEY, 1995) described numerous shortcomings in the 1994 Corps of Engineers report entitled *Shoreline Protection and Beach Erosion Control Study; Phase 1: Cost Comparison of Shoreline Protection Projects of the US Army Corps of Engineers* (hereafter referred to as the "purple report" in reference to the color of it's cover). My editorial basically argued that the Corp's claims of excellent success in predicting the upkeep needs or the long term costs of replenished beaches were wrong. This was primarily because the report compared actual and predicted cost and sand volume numbers without considering whether or not the beach remained in place between nourishments. In addition, the purple report failed to note which of the many cost predictions that come out during the planning phase of a project were used for comparison. However, predictions given to the Congress and the public are the only ones that count.

Hillyer and Stakhiv don't fundamentally dispute my conclusions. The point brought forth in my editorial, that cost prediction success does not equate to project success, remains uncontested. We are told that the situation is complex, that storms are highly variable and unpredictable, that the required volumes of sand can vary widely, that there has been little monitoring of beach behavior, that things are improving, that we have learned from past mistakes, and

that if you consider underwater sand to still be part of the project, things aren't all that bad. I wish that the public was told about all of these things during the societal debate about whether or not to nourish a beach. Because the public is not told about these uncertainties and because replenished beaches are regularly underestimated in terms of cost and sand volumes, the procedure amounts to a bait and switch operation. Perhaps even worse, the underestimation of costs precludes consideration of other modes of shoreline management such as relocating buildings from the shoreline.

Hillyer and Stakhiv note that some of the shortcomings in the purple report have been addressed in purple report, part 2. At the time of this writing, we have been unable to obtain a copy of purple report, part 2 although organizations promoting Corps participation in beach replenishment have already quoted from it extensively.

Although they do not contest my conclusions, accompanying Hillyer and Stakhiv's article is a large fogging cloud of beside-the-point statements (paraphrased below in italics) some of which I will address.

- *Why shouldn't the Corps be evaluating its own work, other agencies do it.* The Corps is different from other agencies such as the Environmental Protection Agency and the U.S. Geological Survey. These agencies have been assigned long term tasks and are not required to live from task to task. Corps districts must survive on project funding. This means that proof of success is a life or death matter for the agency, realistically making objectivity an impossibility.
- *Hillyer and Stakhiv claim a misunderstanding of a critical phrase in my Tybee Beach example. I agreed with the purple report that predicted and actual costs for the Tybee beach project were close but I pointed out that the purple report did not address the point of "whether or not the beach was maintained between nourishments".* This seems like a very clear statement to me but Hilyer and Stakhiv claim to be uncertain as to the its meaning. They note "we are

* A German proverb.

96101 received and accepted 23 August 1996.

uncertain what is meant by 'maintained' in the discussion [by Pilkey on the Tybee Island project]. If it means [maintenance through] 'periodic nourishment' then the [purple] report does address the comment." As it turns out the beach was basically gone for a decade between the initial and the second emplacement which was the point I made and the point they chose to ignore. Putting it another way, the purple report seems to have been written by accountants concerned only with the numbers of sand volume and costs and unconcerned with the critical public issue of whether the beach stayed in place.

- *In evaluating project success, underwater sand should be taken into account and therefore the disappearance of the subaerial beach is not a good measure of beach performance.* The evidence (e.g. THIELER *et al.*, 1995) indicates that eroded replenishment sand eventually is spread across and well beyond the shoreface. There is no study, theoretical or field, that shows that this layer of sand impacts in any significant way on storm damage mitigation or on the quality of the recreational beach. Such a sheet of sand is not part of the storm damage mitigation discussed in project design documents. Damage prevention is assumed in Corps documents to be a function of berm or dune design. Certainly the public is not warned ahead of time that, even after the subaerial beach has disappeared, the project may be considered a success. The underwater sand argument is a sham.
- *The Corps numerical modeling capabilities are based on engineering and scientific principles which are as close to the state of the art as is available.* The computer modeling (e.g. HANSON, 1989) may be state of the art but it is not even close to the state of nature (PILKEY *et al.*, 1993; YOUNG ET AL., 1995; RIGGS *et al.*, 1995)). Beach design which assumes a sandy shore face of uniform grain size without rock outcrops, an erosion rate unaffected by underlying geology, an equilibrium grain size, a system in which all sand movement is by wave orbital interaction with the bottom bounded by a sediment fence called closure depth and a system where wave height is the only controlling factor in beach changes depends on oceanographically invalid assumptions.
- *On the basis of HOUSTON's (1995) report, it is apparent that the US national nourishment effort is a small one compared to other countries.* Houston's 1995 estimates of the national federal expenditures for beach replenishment (\$15 million per year for the last 40 years) are used by Hillyer and Stakhiv to make the point. We are currently reviewing and updating a summary of the national beach replenishment experience and I believe Houston's numbers for the annual cost of beach replenishment in this country will prove to be off by one order of magnitude. His numbers are vastly understated because of the long time frame for averaging beach nourishment costs (in the last decade, US nourishment costs have skyrocketed) and because he does not include many federal projects, such as mitigation and navigation dredge disposal projects and no state and local projects. Replenishment in this country consists of far more than the federal effort (LEONARD *et al.*, 1990a).
- *Miami Beach has been a huge success.* This has nothing to

do with the subject at hand; the predictive success of Corps beach nourishment cost and sand volume estimates. In fact, although underestimation is the norm, the Corps greatly overestimated costs and sand volumes for Miami Beach (LEONARD *et al.*, 1990b).

- *The mayor, the governor and the Corps are all happy with the way the Ocean City, Maryland beach performed during a storm. [This assertion comes in response to my assertion that close to a third of the volume of sand predicted to be needed in 50 years has already been placed on the Ocean City beach in 3 years.]* The fact that the beach did what it was supposed to do in a few storms has absolutely nothing to do with the predictive success of the Corp's nourished beach design. The design predictions of cost and sand volumes for the Ocean City beach are spectacularly off target. As in the case of Ocean City, underestimation of sand requirements is frequently explained away by unexpected or unusual storm events.
- *Broward County, Florida, and Myrtle Beach, South Carolina, replenished beaches successfully prevented property damage from hurricanes.* Neither of these beaches was struck by the brunt of the storms. Broward county experienced only a small storm surge in Hurricane Andrew. In the case of Myrtle Beach, there was, in my opinion, no replenished beach remaining when Hurricane Hugo struck. And of course whether damage was prevented by the beach is beside the point. I did not argue this point in my editorial.
- *"The key to analysis of project performance is based on a probabilistic assumption that over the period of analysis (generally 50 years) a comparable sequence of events will occur as in the past"* This is in response to my criticism that the Corps uses deterministic models rather than probabilistic ones recognizing the random occurrence of storms. A probabilistic approach should provide a prediction with an error bar; "the nourishment interval will be 5 years plus or minus 4 years." But this does not happen. Making the assumption that the shoreline will behave in the next 50 years like it did in the last 50 years is wrong. It's wrong because this assumes that replenished beaches behave like natural beaches which is decidedly not the case.

In summary, my conclusions concerning the lack of validity of the purple report remain unchallenged. If one reads the Hillyer and Stakhiv discussion, keeping in mind the original criticisms in my editorial, it should be clear why the corps should not evaluate its own projects. Hillyer and Stakhiv wander far from the point throwing in numerous facts and assertions which serve only to befuddle and baffle the reader and prevent a clear objective analysis of the national replenishment program.

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