Managaha, in case anyone hasn't noticed, is changing its shape - though not its size. The beach area is gaining sand, getting larger, while the "back side" is losing sand, very noticeably eroding. As a result, trees in the eroding area are losing their hold and falling into the water, and pala palas put in place for island visitors are sliding into the lagoon as well. The erosion threatens to expose the nesting area for shearwater birds known to breed on Managaha, as well as the statue and the grave of the Carolinians' King Aghurub.

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A major cause of the erosion, all observers appear to agree, is the removal, about six years ago, of some World War II remnants from the southeastern shoreline by contractors during the process of dredging the harbor. The removal was triggered by concern on the part of what was then the Marianas Visitors Bureau that the protruding rusting metal of the remnants endangered tourists. (Of course, the fact that there is no record of tourists - or anyone else - having been endangered during the intervening fifty years was ignored.) Possibly contributing to the erosion has been the dredging of the harbor.

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The question now is what to do about it. Technically, it is possible to erect some sort of barrier to replace the wreckage that was removed six years ago. In today's climate, however, that would mean all sorts of feasibility and environmental impact studies, as well as the preparation of requests for proposals, and trying - in these days of economic shortfall - to find money to fund it all.

And there's no assurance that whatever barrier was put up would result in returning the island to its earlier shape. The barrier could bring entirely different results.

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In a sense, it comes down to the question of which is more important: catering to tourists' pleasures, safeguarding the shearwater breeding site, preserving the grave of Carolinian's King Aghurub, protecting the investment in the construction of pala palas - or letting nature take its course.

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Strong arguments can be made for any and all of the first four choices - though it might do well to prioritize them. Being an environmentalist, I would put the shearwater breeding site first. On my list, Aghurub (statue and burial site could, theoretically, be moved) would come second. Mindful of the original Constitutional provision that Managaha should be used only for cultural and recreational purposes - and not for commercial tourism - I would put the concern for tourists last. The concrete pala palas - as opposed to those made of wood and fronds - were unnatural to begin with, and I would not mourn their demise.

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That having been said, what about the argument that one should let nature take its course? As eroding shores along the U.S.'s eastern coast from Maine to Florida attest, no material, no strategy, no form has yet been developed that effectively stops erosion from occurring. There is, therefore, no guarantee that an effort to replace what was removed from Managaha would reverse the erosion now occurring there.

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Moreover, as one involved scientist has said, "It is [merely] a moving sand bar," implying that there isn't very much that can be done about it. It will always be there - in one configuration or another. Perhaps what we ought to do is let it revert to what it was - a protected uninhabited island - and let tourists as well as local residents take pleasure in its natural state - without all the concrete and commercialism.

While the northern island of Pagan will also, presumably, always be there, it too could change drastically - but in appearance rather than shape - if the Marianas Public Land Authority permits the mining of pozzolan ash on Pagan. Thanks to the efforts of a group calling itself the Chamorro.com Team, pictures of what pozzolan mining sites look like can now be found on the web. https://doi.org/10.1007/journal.com/ and present the mining of pozzolan mining sites look like can now be found on the web.

The site is: "www.chamorro.com/community/pagan/pagan.html." The site offers far more than that, however. Also posted are articles on how pozzolan is mined, a technical discussion of various forms of pozzolan, what a responsible environmental impact statement for pozzolan mining looks like, and copies of correspondence and documents about ash mining on Pagan, and about related permits and audits.

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Among the links provides is one to a report that quotes from scientific evaluation and testing of Pagan's pozzolan performed some time ago. The report states that Pagan is one of only three of the world's 1282 volcanoes whose eruption deposited high quality pozzolan ash. The other two are Santorini Volcano, in Greece, which erupted during $1600 \, \text{BC} \sim 1500 \, \text{BC}$. and Mt. Vesuvius, in Italy, which erupted in AD 79. Pozzolan is named after the Italian town of Pozzuoli where the ash was deposited, according to the report.

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The report states that 200 million tons of pozzolan exist on Pagan (a number all subsequent reports seem to have accepted without verification), compares fly ash and slag to high quality pozzolan, and lists 21 benefits and advantages of using Pagan's high quality pozzolan, among other things. The origin of the report, which appeared on a now-defunct Nongtang.com website, is unknown. Pete Perez, a member of the Chamorro.com Team, and creator of the Chamorro.com site, speculates that the research may have been done by FarEast Mining, CNMI Mining or J.G. Sablan.

According to figures Perez has collected, a cubic yard of pozzolan weighs approximately one ton. Fly ash, a low-quality form of pozzolan sells for \$30-\$40 a ton. For Pagan's supposed 200 million tons of pozzolan ash, that would amount to \$6,000,000,000 (six billion dollars). Azmar, currently seeking a permit to mine Pagan's pozzolan, has offered the CNMI up to 7% of their expected gross receipts of an estimated \$160 million, or \$11.2 million.

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Perez acknowledges that the market value of Pagan's pozzolan has never been determined, but, he says, quite logically, "it can be assumed to be worth more than fly ash." For comparison purposes, Perez cites the price of a pozzolanic additive as selling for about \$800 per ton. The six billion dollars is a heady enough figure, but at even half of that \$800/ton figure, the gross return would amount to some \$80 billion.

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Of course, it may not be feasible, or even economically viable to mine all 200 million tons of ash - assuming that figure is correct to begin with. But clearly, the MPLA should proceed with caution and due deliberation before it signs away the rights of the CNMI and the Pagan islanders to so valuable a resource.

While on the subject of "natural" resources: Chuck Jordan, the governor's Special Assistant for CIP Management, said recently that the area proposed for a wetland for the Garapan Revitalization project is "one of the best preserved sites in the Marianas," containing an ancient Chamorro village and burial grounds. Jordan has said that a new museum is now being proposed for the site, but little has been said to date about what will happen to artifacts and remains found in and around the historic village and its burial grounds.

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Let us hope that regardless of whether a wetland or a museum occupies the area, its historic research value will have been neither denigrated not destroyed.

"Natural" resources of a different sort were on display last week-end when the Friends of the Arts production "Guys and Dolls" was performed at the multi-purpose center in Susupe. For the first time ever, a musical was presented with accompaniment by live musicians rather than taped music, and what a difference it made! The orchestral sounds may not have been quite as smooth as those of a professional group, but then, the players are not yet professionals, and on the whole, their performance added a most enjoyable richness, texture, depth, to the evening.

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It was an impressive show from any angle - the staging simple but clever and effective, the singing and dancing alternately full of verve, vigor, romance and humor, and the acting - by so many familiar faces - absolutely captivating. The talent in this community is a valuable resource all its own!

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And while on the subject of performances, have YOU sent in your contribution to public radio, and public radio international? The formal semi-annual drive has just ended, but contributions are welcome any time of year. If you listen to, enjoy, KRNM's offerings, the only way to make sure you will be able to continue doing so is to help pay for them. Send your contributions to: KRNM/NMC, P.O. Box 501250, Saipan, MP 96950.