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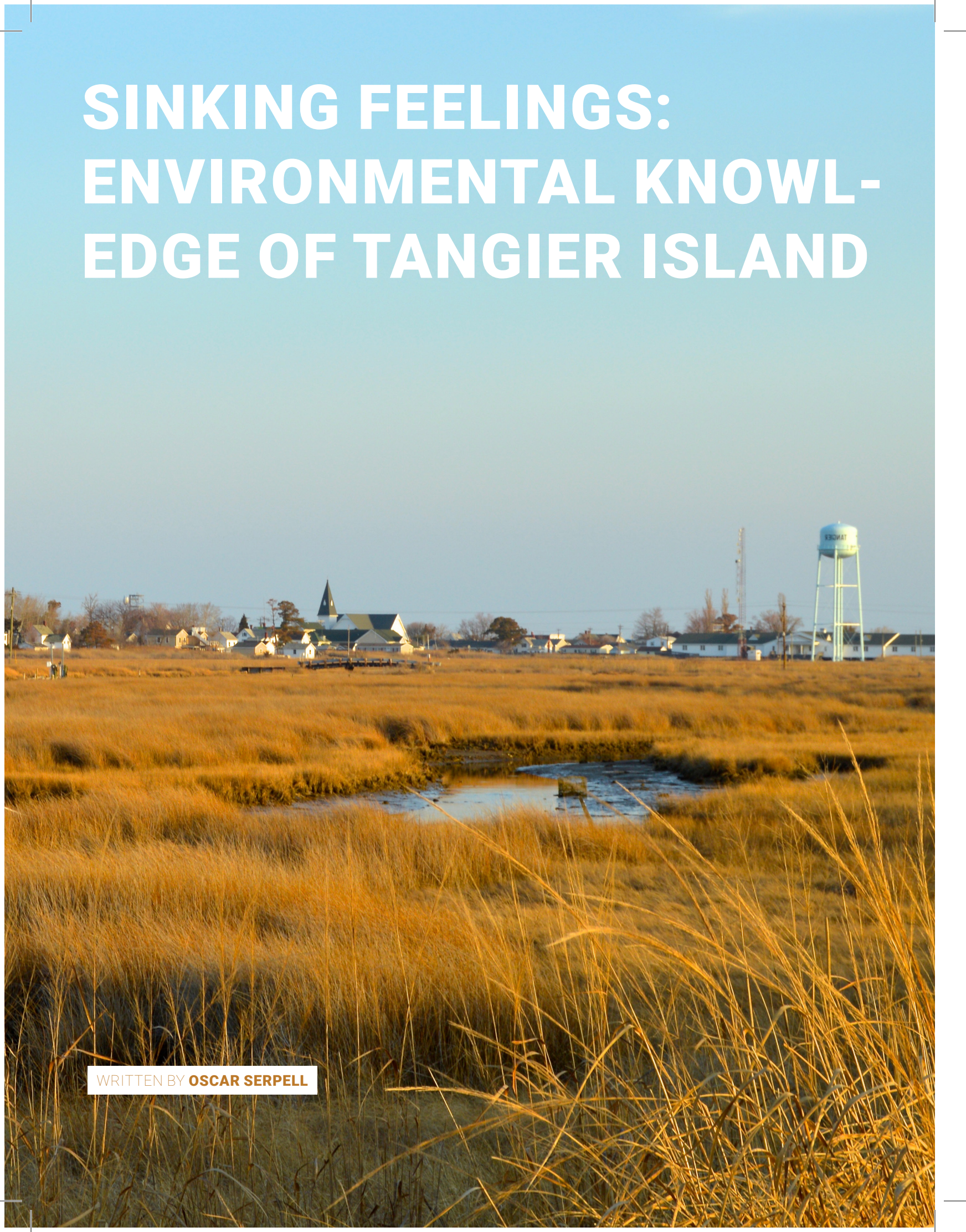
Sinking Feelings: Environmental Knowledge of Tangier Island

Oscar Serpell

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SINKING FEELINGS: ENVIRONMENTAL KNOWL- EDGE OF TANGIER ISLAND

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INTRODUCTION

Located in the middle of the Chesapeake Bay, just south of the Maryland-Virginia border, there exists a small island that has sustained a community of fishermen for hundreds of years. The 1,000-acre island of Tangier was first settled by Joseph Crockett in 1778 and has had a rich cultural history, having played a critical role in both the Revolutionary War and the War of 1812. By the mid 20th century, it also had one of the largest and most impressive seafood industries in the country.¹ Today, the rapidly shrinking community that lives on Tangier Island is a shadow of what the island once was. Over the years, changing environmental conditions have forced many to leave their island homes, and in time, will threaten the existence of the entire community. Despite threats to sustained habitation of the island the islanders seem resolved to continue living as they have in the past.

Tangier Island is representative of communities all over the world for whom their immediate environments are better understood through the lens of culture, tradition, religion, and personal experience than they are by science. Such environmental understanding is commonly referred as traditional (or local) ecological knowledge, or TEK.¹ Tangier Island provides an example of what can

happen when differences in understanding between local populations and the scientific community are left unaddressed. The result is a society on the brink of collapse, a government unwilling to intervene, and no attempt at a cooperative management plan that could sustain this community.

BACKGROUND

Tangier Island is currently losing approximately 2m/year off of its eastern shore and would be losing nearly 5.5m/year off of its western shore if not for a seawall constructed in 1990.² The island is battered daily by the combined effects of erosion, regional land subsidence of 1.7 mm/year³ and sea-level rise of about 2mm/year. Combined, Tangier island is facing relative sea level rise double the global average.⁴

Unfortunately, relative sea-level rise is just one of a series of crippling ecological circumstances confronting Tangier Island. The majority of the men on the island work as commercial fisherman or watermen and the economic survival of the island depends on the fish and crab industry. However, because of Virginia state fishing regulations

1. National Register of Historic Places Registration Form. Department of the Interior. OMB No. 1024-0018 http://www.dhr.virginia.gov/registers/Counties/Accomack/309-0001_Tangier_Island_HD_2014_NRHP_Final.pdf

2. Moller, Henrik; Berkes, Fikret; Lyver, Philip O'Brian; and Kislalioglu, Mina. 2004. *Combining Science and Traditional Ecological Knowledge: Monitoring Populations for Co-Management*. Ecology and Society, Vol.9 no.3

3. Mills, William; Chung, Chih-Fang; Hancock, Katherine. 2005. *Predictions of Relative Sea-Level Change and Shoreline Erosion over the 21st Century on Tangier Island, Virginia*. Journal of Coastal Research, Vol.21, no.2. West Palm Beach, Florida.

Commonwealth of Virginia | Gene Thorp and Patterson Clark - The Washington Post November 20, 2012, Source: 1859 map via NOAA

“Sea-level rise is just one of a series of crippling ecological circumstances confronting Tangier Island.”

4. Kearney, Michael S. & Stevenson, J. Court. 1991. *Island Land Loss and Marsh Vertical Accretion Rate Evidence for Historical Sea-Level Changes in Chesapeake Bay*. Journal of Coastal Research, Vol.7, no.2. Fort Lauderdale Florida.

5. Barbosa, S. M., and M. E. Silva. (2009) *Low-frequency sea-level change in Chesapeake Bay: Changing seasonality and long-term trends*. Estuarine, Coastal, and Shelf Science, Vol. 83, Portugal

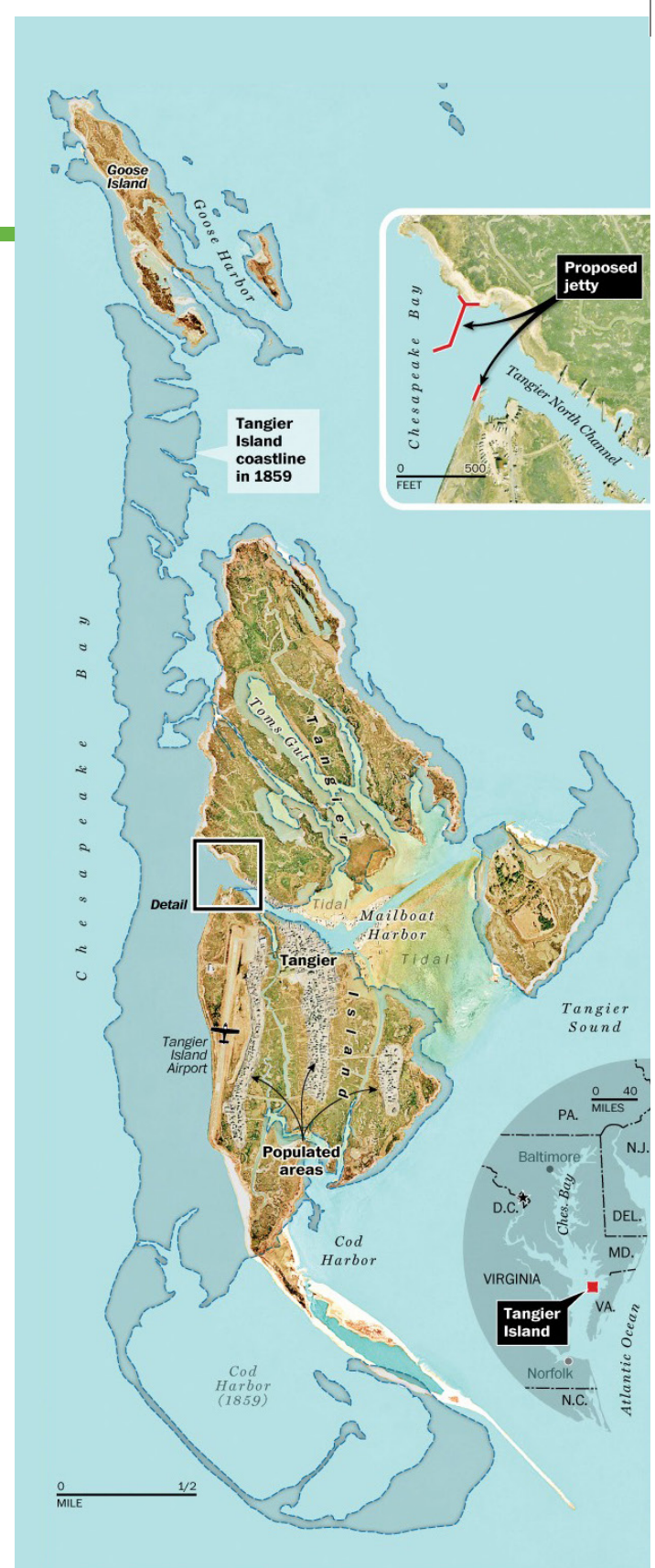
6. Leighter, James. 2013. *Fire, Water and Hooves: Understanding Environment through Local Logic*. Center for Local Strategies Research. University of Washington.

that shorten the work season and limit license acquisition, many of the young men are unable to make a living and are left with no alternative but to leave the island in search of work. The majority find work in the tugboat industry or by joining the military. To understand why the community continues to try and maintain their small town in the precarious position that it's in, one must appreciate the community's traditions, beliefs, and values. Such a framework for examining the impact of local knowledge and culture on sustainability, known as “local strategies research” was proposed by James Leighter in 2013.⁶

The present research uses Leighter's framework to interview and survey the people of Tangier, providing them, and the State of Virginia with a roadmap to unify stakeholders and help set common goals for a sustainable management solution. The hypothesis was that in order to optimize the efficiency and effectiveness of an adaptive sustainability plan, government, scientists, and local communities must begin from a place of common understanding. Failure to do so is nearly guaranteed to negatively impact the long-term sustainability of a system and produce a suboptimal outcome. This study demonstrates why bridging the gap between Traditional Ecological Knowledge and Scientific Ecological knowledge is so vitally important when discussing sustainability. It also provides the groundwork for further research into how small communities and state governments can reconcile their differences in ecological knowledge and work toward sustainable futures.

METHODOLOGY

Two visits were made to Tangier over the duration of this research. During the first visit, 10 island residents, including the Mayor and Town Manager, were interviewed



using a series of 12 open-ended questions. (Appendix I, available at psrsmagazine.org/#!/tangier/useey). After transcribing these interviews and noting the most commonly held beliefs and opinions of these 10 individuals, a 30-question survey was developed using the KAP (Knowl-

edge, Attitudes, Practice) quantitative survey model (Appendix 2).⁷ Given that the island is home to fewer than 500 individuals, the 40 surveys that were collected represented approximately 8% of the island's total population. Moreover, because of the tight-knit nature of the community and the large age and sex range of the survey takers, the 40 survey responses were deemed to provide a reasonable representation of the larger community's knowledge, attitudes, and practices.

WORSENING TIDES

The data from this survey suggest that the majority of Tangier residents have not experienced flooding in their homes in recent years. This presents the first local experience that is at odds with what scientific research would suggest. Local knowledge is primarily based on experience, so a lack of exposure to flooding explains the disconnect between scientific knowledge and individual residents' perceptions of flooding as a real threat. On the other hand, a statistical analysis of responses to a question about high tides showed that the survey group was generally in agreement that tides have become more extreme since their arrival on the island. When working to convince the Tangier community of the flood threat that their community is faced with, it is therefore important to focus on the community's experience of worsening tides, and help the community internalize the connection between tides and flooding.

EROSION

All but one survey participant either somewhat agreed or strongly agreed that erosion was a major threat to the future of the island. However, while 80% believed that erosion was being caused by sea level rise, fewer than one-third of respondents believed that sea level rise was being impacted by global changes in temperature. Scientific research from

all around the world has demonstrated conclusively that climate change is indeed raising global sea levels; however, in the Chesapeake Bay, subsidence exacerbates the problem. The community's uncertainty about sea level and climate change is likely the reason why nearly all of them (98%) agree that a seawall along Tangier's vulnerable shores would be adequate to protect the island. While seawalls effectively arrest shoreline erosion along the stretch of land where they are built, they do not last forever.³ Seawalls become increasingly ineffective as their relative height above sea level decreases, and they are not impervious to water that rises above the ground level on the wall's inland side.⁸ Considering the island's extremely low elevation, even if Tangier was entirely encompassed by a seawall (a project that would likely cost hundreds of millions of dollars), it is very unlikely that the island would be protected from future flooding caused by rising

“A lack of exposure to flooding explains the disconnect between scientific knowledge and individual residents' perceptions of flooding as a real threat.”

7. Gumucio, Sybille. 2011. *The KAP Survey Model: Knowledge, Attitude & Practice*. IGC Communigraphie.

8. Kraus, Nicholas C. & McDougal, William G. 1996. *The Effects of Seawalls on the Beach: Part I, An Updated Literature Review*. *Journal of Coastal Research*, Vol. 12, No. 3, 691-701



A cross reads, "For God so loved the world." The patch of marsh grass was once part of the main island. Photo by J Albert Bowden II



A man on the Western Seawall at sunset Photo by Oscar Serpell

“Any successful action plan must be built on a foundation of trust, mutual interests, and understanding between all stakeholders.”

sea levels and storm surges. Given the islanders’ faith in a seawall’s ability to protect the island, the building of one around the island may convince islanders to stay on the island and might even convince some mainlanders to move to the island. While this may boost the economy, it may also, in the event of a flood, lead to a larger catastrophe. Though an emotionally difficult subject to face, thinking about timeframes and the far future of Tangier is important if the most optimal decisions are to be made today.

RESTORING TRUST

When asked if the state of Virginia has provided the island with the help and protection it deserves, 60% of participants strongly disagreed, and only 10% strongly agreed. In a similar demonstration of the island’s lack of faith in their state government, 73% of survey takers thought that Virginia state scientists do not fully understand the ecology of the Chesapeake Bay, including the life history of blue crabs. The islander’s distrust in their government’s ability to make the best decisions based on the available evidence is a serious obstacle to a cooperative management plan, and is likely the root of much of the disparity between scientific ecological knowledge of the state and the local ecological knowledge of the peo-

ple of Tangier. The only solution to this problem is clear, honest communication between Tangier residents and the state government. If the community senses that the government has a genuine interest in the islanders’ well being, and is willing to listen to their concerns and beliefs, the islanders will be more likely to accept certain regulations and perhaps think differently about the feasibility of an encircling seawall. In order to facilitate an optimal adaptive management plan for this community, the state of Virginia or a third mediating party must address this animosity between the government and the island community.

MANAGED RETREAT

It would be foolish not to accept that most cost-efficient management plan might be managed retreat. This would involve the organized and state-funded removal of the community from the island and its relocation to a safe, mainland location where it could, to the best of its ability, retain its unique culture and way of life. Although an extreme response, managed retreat might eventually be necessary to prevent a disaster, such as a major coastal



storm, which could cause high infrastructural and material loss as well as human injury or death. The sooner the costs and benefits of this option are assessed, the better the chance of implementing a conclusive plan in an efficient and optimally sustainable way.

The Tangier community, understandably, sees managed retreat as a worst-case scenario. The people who call this island their home, do so with nothing but affection. Every single participant in the survey agreed that Tangier Island is a unique place and deserves to be protected at whatever the cost. When asked if they had considered moving to the mainland in the next few years, the majority of survey respondents said, 'no'. More surprisingly, but also more indicative of their love for the island, 18 of 40 respondents said that they would not move to the mainland even if the state of Virginia compensated them for the cost of the move. This presents a huge problem for the possibility of a cooperative management program involving managed retreat, and a fair and open negotiation process will be necessary to reach any agreement on this issue.

CONCLUSIONS

The future of Tangier Island is difficult to predict, even after hearing from so many members of the community.

This research has attempted to unveil the steps needed before a sustainable action plan can be developed, as well as give an indication of the severe consequences if inaction continues. When considering the optimization of sustainability, we must acknowledge that any successful action plan must be built on a foundation of trust, mutual interests, and understanding between all stakeholders. A large part of optimization is learning how to overcome societal and cultural barriers that hinder the implementation of 'best sustainable practices' as understood by the scientific community. This author argues that a system's sustainability is based just as much on the strength and endurance of relationships as it is on the reasonable management of resources.

Oscar Serpell — Oscar graduated in May, 2015 from the School of Arts and Sciences. He completed a B.A. in Environmental Studies with a minor in Biological Anthropology and now continues his education in the Masters of Environmental Studies program at Penn.