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Resistance to Coastal Climate Adaptation and Mitigation in New Jersey:

A Case Study of Coastal Sand Dunes after Hurricane Sandy

A thesis submitted in partial satisfaction  
of the requirements for the degree Master of Science  
in Environment and Sustainability

by

Jessica Christine Heckman

2024

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## ABSTRACT OF THE THESIS

Resistance to Coastal Climate Adaptation and Mitigation in New Jersey:

A Case Study of Coastal Sand Dunes after Hurricane Sandy

by

Jessica Christine Heckman

Master of Science in Environment and Sustainability

University of California, Los Angeles, 2024

Professor Elizabeth C. Koslov, Chair

Coastal areas of the United States utilize many strategies to adapt to the effects of climate change, such as sea level rise and strong storms. These strategies can include hard infrastructure, like sea walls, or nature-based solutions, such as coastal sand dunes. After Hurricane Sandy hit, the state of New Jersey aimed to utilize coastal sand dunes to prevent damage from future storms. However, this decision created contention among residents as to whether dunes were the best solution for the Jersey Shore. This thesis utilized media analysis of news articles published in the years after Sandy to identify the root and the motivations behind the resistance to dunes cited in

news articles and understand how media covered these dune “battles.” Ultimately, the resistance as it was covered in the media had a varied array of motivations, including aesthetic concerns and apprehension from residents regarding government seizure and use of their properties. Exclusion and violent language played vital roles in the reporting done surrounding these dune battles and Sandy recovery, which potentially shaped residents’ experiences and feelings towards dunes as a coastal protection solution. These findings will help guide future dune implementation efforts in response to growing coastal, climate-related concerns.

The thesis of Jessica Christine Heckman is approved.

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2024

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## **Introduction**

### ***Significance***

Coastlines are among the most densely populated, heavily developed, urbanized, and economically critical areas on the planet (do Carmo et al., 2010; Sutton-Grier et al., 2015). As of 2018, 40% of the US population lived at the coast and coastal counties produced over \$9.5 trillion in goods and services as well as employed 58.3 million people (NOAA, 2022). Tourism is an important part of the economy for areas with sandy beaches and is also one of the main destabilizing forces of coastal environments via degradation of habitats due to the construction of hotels/recreation areas, construction of visitor paths, and beach raking/cleaning activities (Curr et al., 2000; Sapkale & Rathod, 2016; Nordstrom et al., 2000). While these activities may increase tourism revenue in the short term, they ultimately lead to degraded coastal environments and “unnatural” coastal landscapes which can negatively impact coastal tourism revenue in the future and leave coastal visitors with a potentially altered view of coastal environments (Nordstrom et al., 2000; Lithgow et al., 2019).

Beaches have a number of uses for both human and non-human visitors and inhabitants and serve as modern economic hotspots for tourism and recreation. With this development, however, comes a long, complicated history with coastal management and protections. Additionally, beaches and coastal wetlands serve as a habitat for birds, terrestrial animals, and invertebrates, along with other marine and aquatic organisms. As beaches on developed coasts face an increase in destruction from storms and flooding as well as accelerating sea level rise over the past two centuries, officials have struggled with finding the appropriate measures for keeping beach faces wide both for



tourism and protection of inland development from storm surge. There is consistent debate among stakeholders about the “best” (what is best for some is not always the best for others) forms of coastal protections. There are many different methods to protect coastlines, including hard structures like sea walls, jetties, and groins as well as natural or “soft” structures like coastal sand dunes, living shorelines, and mangrove forests. Nature-based infrastructure like coastal sand dunes is, in most cases, more adaptable and resilient to shocks and stressors associated with coastal climate change (Sutton-Grier et al., 2015). However, the policy surrounding the existence, repair, and building of dunes has proven controversial.

Coastal sand dunes, however taken-for-granted they may be, are interesting and rather enigmatic forms of coastal protection. They can form naturally, without human intervention, developing over centuries into well-established ecosystems that are critical to the coastal landscape. The New Jersey coast, for example, is spotted with multiple different dune systems, each at different levels of maturity. Over the years, more dunes have been planted and fortified to augment their ecosystem services<sup>1</sup>, mainly their coastal protection benefits for inland structures. Dunes are a common and inconspicuous part of the Jersey Shore and are so unremarkable that even I, someone who lived near the shore for 20 years of my life, frequently forget that dunes are present on beaches I regularly visit.

After Hurricane Sandy struck the coast, however, the dunes were transformed from their usual, modest existence into a battleground for coastal protection advocates and coastal property owners. These dunes become extremely visible once their coastal

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<sup>1</sup> While the definition of ecosystem services varies, in this case, ecosystem services refer to any benefits humans receive from certain parts of the natural environment.

protection abilities are put to the test. Restoring dunes was a high-priority task in the immediate wave of repairs that took place after Sandy after state officials observed their impressive performance in protecting development at the coast. Yet residents in some coastal towns that experienced the damage first-hand were reluctant and, in some cases, actively hostile towards rebuilding their town's dune systems. In fact, many coastal property owners detested their existence *despite* the protection they offer and resisted their rebuilding in the hopes of obtaining ground-floor views of the Atlantic Ocean from their beachfront homes and avoiding potentially diminished property values.

This contention over the existence of dunes provides a novel lens on how coastal decisions are made in New Jersey (and potentially in other coastal states), a deep understanding into the attitudes and power of coastal property owners, and insight into knowledge exchange in the coastal decision-making arena. Unlike many other coastal features, dunes are in a unique position in which they provide an interesting intersection of most of the ecosystem services provided by the shore. The boundaries between the human, coastal, and hydrological realms all blur and blend at the dunes and as a result, their presence and services impact a wide array of systems, organisms, and people. Why is it that many residents rejected the rebuilding or construction of dunes while in other cases (Solecki and Michaels, 1994; Nordstrom et al., 2002; Nordstrom et al., 2000), storms have typically convinced coastal residents of the importance of coastal protection mechanisms. This thesis used media analysis of news coverage during the recovery period after Hurricane Sandy struck the New Jersey Coast to examine what created this battleground over dunes in New Jersey and what contributed and continues to contribute to coastal residents' views on dunes. By examining news coverage of dune

battles in New Jersey, I also provide insight into how coastal decisions are made in the state and how equity was considered in this case and in coastal decision-making more broadly.

### ***Goals and Objectives***

The primary objective for this research is as follows:

1. To determine how news media portrays the motivations of New Jersey residents to resist the implementation and restoration of coastal sand dunes as a coastal protection mechanism after Hurricane Sandy.

Additionally, there are four smaller objectives:

1. To examine the perceived root of New Jersey property owners' resistance to dune repairs and rebuilding as it is portrayed in news articles and how this resistance affects waterfront communities beyond oceanfront homeowners.
2. To extract common themes in news articles reporting about dune resistance, including how residents report their resistance to coastal sand dunes through the use of media analysis of news coverage of dunes after the storm.
3. To identify any external factors reported in news articles that may have played a role in the post-Sandy case and may impact the implementation of coastal sand dunes and other coastal, nature-based infrastructure aimed to adapt to and mitigate the effects of climate change.

Through the use of media analysis of news articles published in the years following Hurricane Sandy, this thesis used these objectives as guides to create a cohesive picture of print/digital news coverage of coastal management roadblocks in New Jersey after the storm. Ideally, government officials and planners will use the lessons learned to guide educational and informative efforts geared towards residents in order to effectively and equitably implement and garner support for climate adaptation and mitigation strategies like dunes in the future.

### ***Thesis Overview***

This thesis addressed resistance to coastal climate adaptation and disaster mitigation strategies, specifically coastal sand dunes, in New Jersey using a single case study approach. The review of the literature builds on the significance of coastal spaces and shed light on the unique challenges faced by these areas including the threats to coasts as a result of climate change. Next, I will present important background information including some factors of the New Jersey/Sandy case that impacted the findings.

I will then discuss the methodology and limitations and bias concerns of media analysis, the primary research method. Lastly, I will present and discuss the findings of the media analysis, key takeaways, and how these findings may impact the implementation of future dune plans as coastal climate change adaptation strategies.

## **Review of the Literature**

### ***Contention in Coastal Spaces***

#### *Coastal Squeeze*

An observed phenomenon which is a result of the increased development on the coast is coastal squeeze. Coastal squeeze is the limitation in area for coastal ecosystems to migrate and adapt to changing conditions. This squeeze is caused and exacerbated by development (especially for tourism) on the landward side and sea level rise on the seaward side (Everard et al., 2010). Where there is coastal squeeze, there typically exists the risk of flooding and the risk of any coastal protection features to “backfire” and cause negative effects on the development they are intended to protect. In some cases, these unintended consequences can result in disasters by exacerbating and amplifying the effects of natural hazards (Kittinger & Ayers, 2010; Satyanarayana et al., 2017; Lithgow et al., 2019). Given this phenomenon, how do we determine how much coastal space humans are allowed and how much space we should allot for coastal environments to move and adapt or if this balance is achievable (Martinez et al., 2013)? From an economic perspective, how do we place value on the benefits these ecosystems provide and compare that with the economic benefits of tourism and other coastal activities (Mendoza-González et al., 2013)?

With the intense development and urbanization of coastlines worldwide and the following ecological and geomorphological damage, natural hazards become disaster situations and regularly cause catastrophic damage and loss of life at the coast (Sutton-Grier et al., 2015). In response to disasters like storms and other hazards like sea level rise, coastal populations constantly struggle with how to best protect inland

development and in some cases try to balance protection with ecological health. The question of which coastal protections are beneficial for people and the economy and what will benefit the ecosystem has challenged coastal managers for decades.

### *Hard vs Soft/Nature-Based Coastal Protections and Infrastructure*

One of the forefront issues facing coastal managers is the use of “hard” or “soft” coastal protection mechanisms — a spectrum that is mirrored in other areas of natural resources management. “Hard” coastal protections include engineered structures such as seawalls, jetties, groins, and bulkheads and are usually made to either prevent flooding or retain sediment. Some of these hard structures are typically favored by coastal property owners because of their immediate protection once constructed. As of 2010, about 50% of coastlines in coastal-tourism-reliant states like California, Maryland, and Virginia have constructed hard coastal protection structures (Bulleri & Chapman, 2010). In North Carolina, hard erosion control structures have been banned since 1985; however, some structures still remain as enforcement is lax, so shoreline protection is extremely inconsistent (Kittinger & Ayers, 2010). In Hawaii, the construction of hard coastal infrastructure is left to property owners to prove that they are in significant danger without these structures (Kittinger & Ayers, 2010).

Numerous studies (Pilkey & Wright III, 1998, 1988; Gillie, 1997; Berry et al., 2013) have shown the detriments of some of these structures in the long term. Where the problems with these hard structures begin is that their developers failed in thinking the dynamism of the beach could be contained and controlled. Hard structures can result in changes in sediment availability, altering of sediment transport, increased beach erosion (by reflecting wave energy instead of absorbing it), loss of beach area

(including loss of useable habitat for coastal invertebrate and bird species) and altering of the natural landscape (Kraus & McDougal, 1996; Fletcher et al., 1997; Kraus & Pilkey, 1988; do Carmo et al., 2010; Everard et al., 2010; Kittinger & Ayers, 2010; Hanley et al., 2013; Berry et al., 2013; Pérez-Maqueo et al., 2016; ). Once these structures are built, they have a set lifetime and result in high maintenance costs and the inability to adapt to changing beach conditions such as sea level rise (Temmerman et al., 2013; Sutton-Grier et al., 2015). These structures are the tangible results of a clear decision to protect industry and development over ecosystems (Berry et al., 2013). In addition to the direct, negative effects of hard coastal structures, they can also provide a “false sense of security” for the communities they protect; communities become increasingly complacent towards coastal hazards, thinking the structure will protect them in the case of a disaster (Sutton-Grier et al., 2015). This was the case before the Japanese tsunami of 2011 (Onishi, 2011; Parker, 2012; Sutton-Grier et al., 2015).

One of the main alternatives to hard structures is to build new or bolster existing beach landforms that offer some level of inherent protection. These are typically referred to as “soft” or “green” coastal infrastructure, as they utilize and integrate natural structures, such as dunes or salt marshes, into existing coastal landscapes to both create a longer lasting, adaptive protection mechanism and to blend aesthetically with the surrounding ecosystems (NOAA, 2021). This dichotomy between hard and soft coastal protections is in reality more of a spectrum, with many cases of coastal protections blending these two types, such as dunes with fortified, man-made bases to prevent erosion.

### *Coastal Nature-Based Infrastructure*

Nature-based infrastructure (NBI), or “soft” or “green” infrastructure at the coast, has been gaining popularity in recent years as an alternative to the hard coastal structures that are now beginning to degrade and fail. Examples of NBI include coastal sand dunes, wetlands, mangrove forests, offshore coral reefs, living shorelines, and barrier islands systems. Along with their growing popularity in the coastal management sphere, there is a growing body of evidence in the literature that supports the idea that coastal NBI provides significant protection from coastal hazards, erosion prevention and a suite of other social and economic benefits (Hanley et al., 2013; Sutton-Grier et al., 2015). One of the reasons for this boost in interest and popularity was the success of sand dunes and barrier islands, in protecting the New Jersey coast during Hurricane Sandy (Sutton-Grier et al., 2015). Is this increased interest solely on behalf of scientists and coastal researchers? Or do coastal managers and residents share the same interest?

Along with the coastal protection benefits, coastal NBI requires lower initial investments and cheaper maintenance costs than hard infrastructure in the long term (Temmerman et al., 2013; Arkema et al., 2017; Sutton-Grier et al., 2018). Cost-wise, coastal NBI habitats have estimated benefits that have been valued at about \$100 billion annually that helped save over \$625 million in damage during Hurricane Sandy (Sutton-Grier et al., 2018). Additional benefits include habitat creation, preservation of biodiversity, aesthetic improvements, improved water quality, and the potential to adapt to sea level rise (Arkema et al., 2017; Sutton-Grier et al., 2018). These benefits can



directly impact economic activity in the area as storm protection and preservation of aesthetics and recreation areas for tourism (Mendoza-González et al., 2018).

As with any coastal protection, NBI also faces limitations. The first is that although research on NBI is growing, there is still a need for more rigorous assessments and monitoring studies to fully understand how beneficial and cost effective coastal NBI can be and how NBI can persist in a variety of conditions (Morris et al., 2017). Coasts can also vary greatly in their habitat types, sizes, sediment type and size, and wave activity, among other characteristics, so more research needs to be done to understand how NBI can be effectively implemented in a wider range of environments (Langridge et al., 2014). It is also important to note that we are not starting from scratch; many coastal areas have already been altered, in some cases, to a point where NBI is potentially no longer a viable option, with more research needed on how to implement NBI on developed coasts (Bulleri & Chapman, 2010; Sutton-Grier et al., 2015). Coastal NBI is more effective when it is continuous along the shore and has room to migrate in response to sea level rise, but on developed coasts, these factors that contribute to the success of NBI are not present (Temmerman et al., 2013; Berry et al., 2013; Sutton-Grier et al., 2015).

On the management side, NBI implementation faces limitations in conforming to permit and zoning regulations that were not created with NBI in mind (Sutton-Grier et al., 2018). Additionally, the implementation and funding for NBI projects necessitates the approval of multiple government entities and a variety of stakeholders, such as engineers, coastal managers, policymakers, the public, and property owners (Nesshöver et al., 2017; Morris et al., 2017; Sutton-Grier et al., 2018). One

recommendation provided by Temmerman et al. is to use a stepwise implementation, starting with smaller pilot projects and building up after monitoring assessments can be completed (2013). However, many of the more bureaucratic limitations to NBI implementation also apply to hard structures. Given the promising results regarding coastal protection (and other ecological and social benefits) from NBI, why do many communities, specifically oceanfront property owners, continue to prefer and favor hard structures?

Along with the institutional and bureaucratic difficulties of implementing NBI for coastal protection, there are added barriers to implementation from members of the community. Literature examining the attitudes toward coastal environments with flood, stormwater, and/or erosion control shows that people living in areas vulnerable to water-related hazards are concerned with a number of NBI associated factors, including changes in home value and the aesthetics, effectiveness, and maintenance of NBI (Venkataramanan et. al., 2020). Awareness of NBI and its benefits plays a large role in whether residents prefer NBI over traditional hard structures. Awareness increases with proximity to areas with NBI benefits like salt marshes and wetlands as well as when these ecosystems are more “physically obvious” (Gray et. al., 2017; McKinley et. al., 2020). Other factors that affect public support for coastal NBI include but are not limited to gender, education level, age, proximity to coast, homeownership, income, employment status, perceived effectiveness of NBI compared to hard structures, preservation of coastal identity and culture, and awareness and perception of risks and hazards (Abuismail et, al., 2024; Gray et. al., 2017; Spahr et al., 2021; Rahman et. al., 2023).

The literature agrees that education and other concentrated efforts to increase awareness of the coastal protection/flood control benefits of NBI are needed for the public to embrace the implementation of NBI as a climate adaptation strategy (Abuismail et al., 2024; McKinley et al., 2020). The public perception surrounding NBI and other climate adaptation strategies is a relatively new field of study and more research is needed to further existing understands and barriers in order to provide more targeted recommendations (Abuismail et al., 2024). While it is critically important to understand the barriers, it is also important to understand if and how public concerns regarding NBI compare in magnitude to people's perceived risks of climate change and its associated effects in their communities.

## **Case Study: Hurricane Sandy & Coastal Sand Dunes**

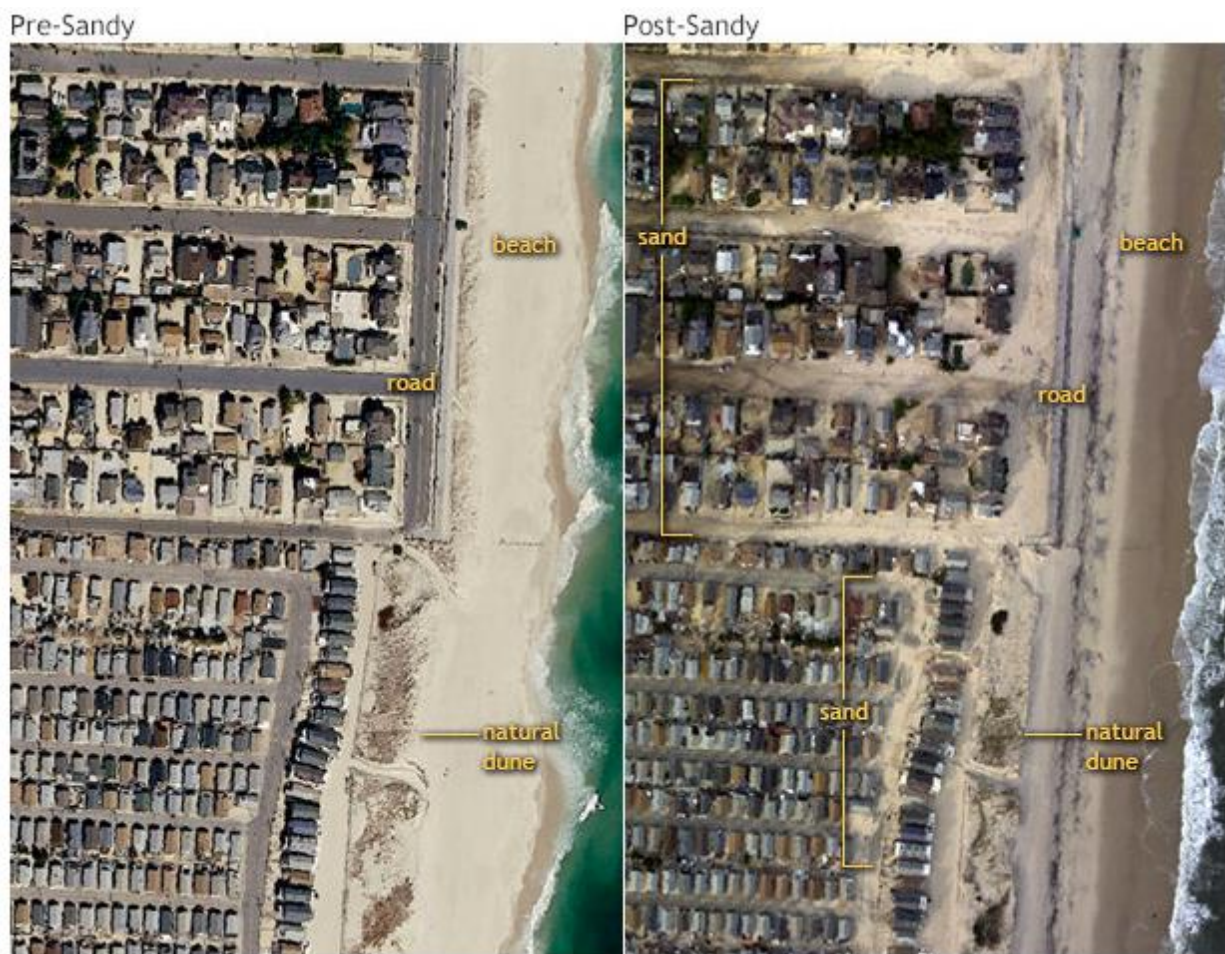
### ***Background***

#### *New Jersey Dunes after Sandy*

Along with their coastal protection benefits, coastal sand dunes are critically important features of New Jersey's coastal environments. They serve as nesting grounds for endangered species such as the Piping Plover (*Charadrius melodus*), grounds for specifically adapted plant species, refuge areas, migration pathways, and habitat for invertebrates (Elko et al., 2016). They also provide ecosystem services in addition to coastal protection measures, such as recreation, aesthetics, carbon sequestration, and sediment accretion/retention, among others. After Hurricane Sandy, communities in New Jersey that had a dune system as part of their coastal protection

infrastructure (e.g., Seaside Park and Sea Girt) suffered less damage from wave energy and storm surge than surrounding areas without dunes and less sediment volume loss than in areas where dunes were “low or narrow” (Barone et al., 2014; Elko et al., 2016; Burger & Gochfeld, 2017).

However, even with the impressive performance of dunes during Sandy, shown in Figure 1, residents were not convinced they needed to protect dunes and rejected the statewide mandate to repair and build dunes along the entire coast. Prior to Sandy,



**Figure 1.** Aerial images taken before Hurricane Sandy hit (left, Spring 2012) and after (right, November 2012). The photos show areas that were protected by a dune system on the bottom of each image. The post-Sandy image on the right shows sand transported by storm surge and damage to development stretching further inland in areas not protected by dunes. (NJ Office of Information Technology, Office of GIS; USGS Hazards Data Distribution Center).

Solecki & Michaels (1994) found that residents were more likely to support dune repair

(and other coastal protection measures) directly following storms, as this was the case after damaging storms that struck the New Jersey coast in 1962 and 1984 (Nordstrom et al., 2000; Nordstrom et al., 2002). Outside of this “post-disaster window,” however, it becomes difficult to persuade coastal homeowners to support dune building because building new, higher dunes means loss of ocean views (Solecki and Michaels, 1994, as cited in Nordstrom et al., 2002). After Hurricane Sandy, many towns along the Jersey Shore saw a very negative reaction from residents regarding dune projects along the coast.

New Jersey has a history of rejecting dune building, however, and this contention over dunes was not a unique case. In 1980, the state tried to pass the Dune and Shorefront Protection Act in response to a number of strong storms in the late 1970's. It was brought to and eventually dropped by the New Jersey State Assembly because of negative public reaction, mainly because it prohibited the repair and reconstruction of severely damaged (more than 50% destroyed by storms) buildings along the coast (Gares, 1989; Halsey, 1984). Similar policies were proposed in the state in the following four years but lost traction due mainly to lack of support from stakeholders (Halsey, 1984). In 1987 and 1993, the New Jersey Department of Environmental Protection (NJDEP) finally acted upon the state's need for dunes and nourished and built-up existing dunes to protect development from storm surge. In 1999, coastal homeowners in Ocean City, NJ sued the town for loss of views after a dune nourishment project and in some cases the city was required by the courts to pay up to \$37,000 for loss of views or access to the beach to homeowners (Nordstrom et al., 2002). If people are supposed

to be accepting and advocating for coastal protections like dunes after storms, why was this not the case in New Jersey, particularly after Sandy?

In New Jersey, there is the additional complicating factor of fragmented governance. Fragmentation matters in the case of dunes in New Jersey because of the nature and connectedness of dunes. The Jersey shore consists of many small towns with vastly differing demographics, development, cultures, and varying degrees and mechanisms of coastal protection. Dunes do not naturally follow the same municipal



**Figure 2.** Map of the New Jersey oceanfront coastline highlighting municipalities where dune battles and newsworthy dune-related stories were set.

lines that towns do and if human development did not interfere, the dune system in the state might be more cohesive, leading to greater protection. It will be important to consider how fragmentation has impacted dune systems and their resilience and resultant ability to protect development. New Jersey's historically fragmented governance impacts coastal decision-making and likewise impacts dunes.

## ***Complicating Factors***

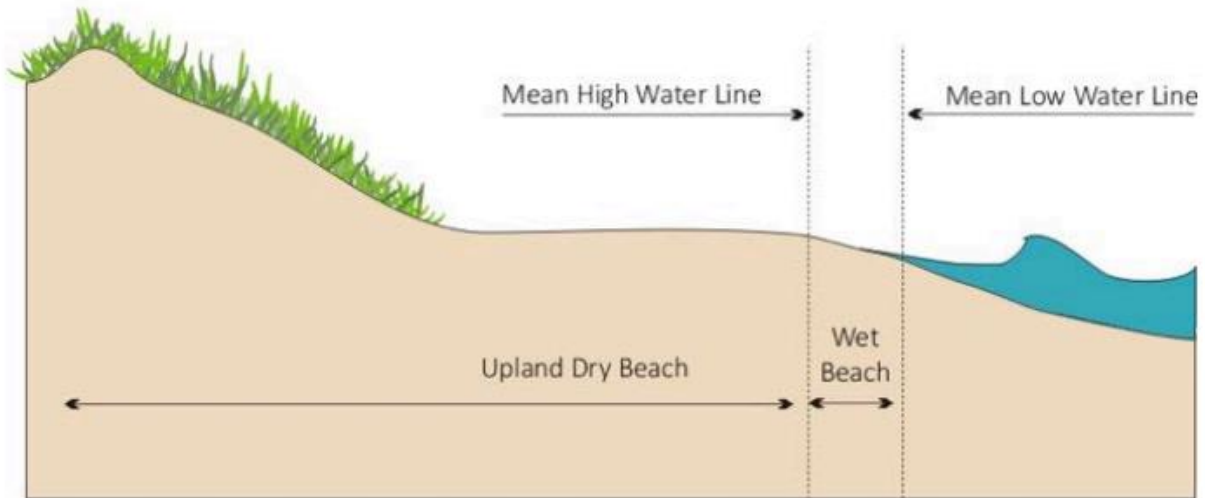
### *Public Trust Doctrines*

New Jersey's coastline, like many others in the US and abroad, is partially governed by a public trust doctrine, which ensures public access to natural resources, specifically water-related resources or land. This type of document dates back to the Byzantine Empire which recognized the "public values of water" and today, these values are still upheld and ensured to the public (Rose, 1986 as cited in Araiza, 2011). New Jersey's Public Trust Doctrine was built upon the same values; it was established with the settlement of the original settler colonies and has been slightly modified by more recent policy and legal action (NJDEP, 2024). Areas that are included under the doctrine are the tidelands and submerged lands (also referred to as the "wet beach") below the mean high water line as well as "a reasonable amount of dry sand lands," landward of the mean high water line with a "reasonable amount" being enough to enjoy the tidelands and submerged lands (NJDEP, 2024). Delineations of these areas can be found in Figure 3.

This language, while based on actual tidal data, is still ambiguous. It is unclear how much land must be dedicated as public space to provide "enjoyment" to the public. Coastal areas, and especially tidal areas, are incredibly dynamic as well as extremely vulnerable to climate threats like increased storm surge and sea level rise. There have been a few legal precedents set by litigation between municipalities, residents, and local



organizations regarding which actors have rights to alter or utilize the lands preserved by the public trust doctrine (NJDEP, 2024).



**Figure 3.** Delineations of the upland beach area and “wet beach” which is, according to the Public Trust Doctrine of New Jersey, owned by the public (Kennedy, 2017, p. 3).

Presently, the terms of the doctrine are evoked in equitable access issues and coastal climate protections. For example, some towns, like Spring Lake and Sea Girt, prohibit bringing coolers and food onto the beach. Some argue that this spurs visitors to patronize local businesses while they are spending time at the shore. However, the case can also be made that this covertly limits the use of the beach to nearby residents who can walk or bike home for food, excluding visitors who travel a considerable distance to visit the beach and plan to visit for the entire day before returning home. The question remains of how these doctrines are evoked in the case of building coastal climate protections, such as dunes, in areas that border but protect public lands. Should dune areas be included in the “reasonable amount” of dry sand lands given their ability to build up the beach face, provision of habitat for organisms that add to the recreational



and aesthetic value of the beach, and the protection of landward development beyond oceanfront properties during storm events?

### *Cultural Connections to the Shore*

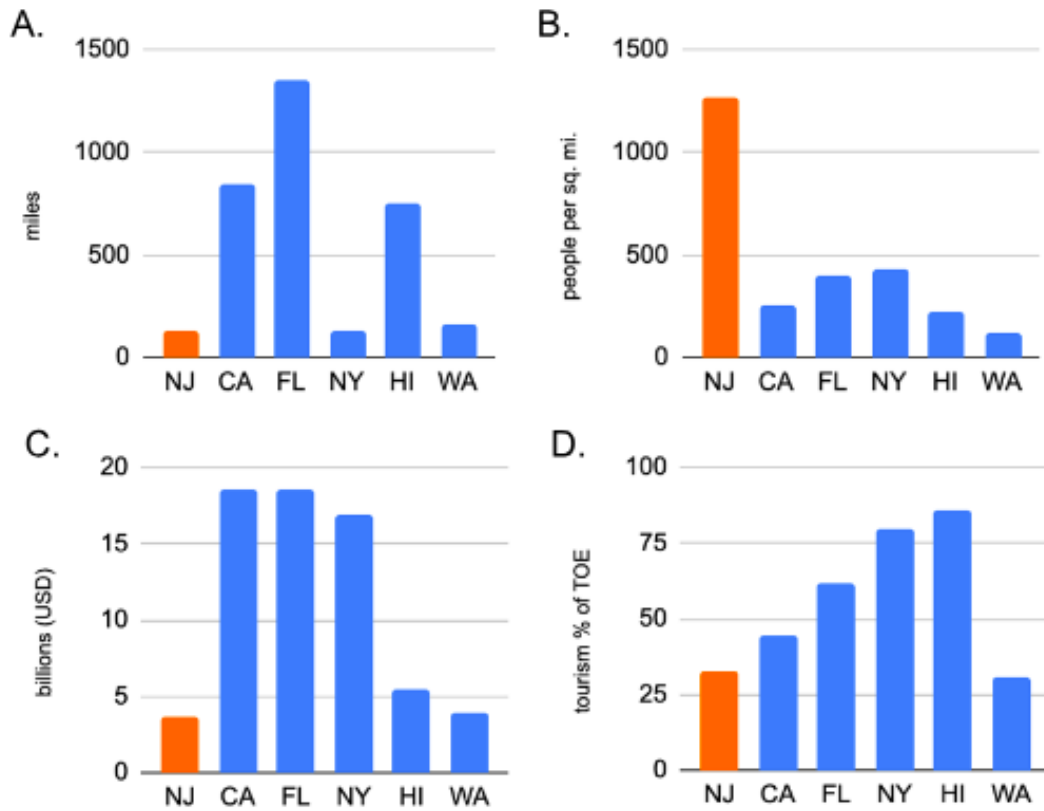
As previously touched upon, New Jersey has a long and ongoing cultural connection with the shore which adds a layer of complexity and emotion when making decisions that affect coastal areas. This history begins with the Lenni-Lenape peoples who cared for and utilized coastal lands for their rich resources. Around the Civil War and into the Victorian Era is when coastal areas in New Jersey became commercially popular as recreation areas and tourism hubs. Around this time, the first boardwalk in the US opened in Atlantic City and quickly became a popular coastal feature for visitors. Later on, fishing piers and amusement parks were built on or adjacent to boardwalks and became a cultural staple (Dube, n.d.).

This strong cultural connection of both those who live and those who visit the Jersey Shore can affect coastal decision making in the state in two ways. The first is that many New Jerseyans hold this cultural connection sacred and are wary of anyone who tries to change or disrupt the current way of life at the shore. Many residents have grown up going to the boardwalk with their families and still visit them today, making them a nostalgic staple and an important part of daily life. With this desire to live at and visit the Jersey Shore comes dense coastal development which attracts a large number of people to a relatively small geographic area and introduces debates over who “belongs” in this space and which uses are and are not desirable.

### *Tourism and Economic Services*

The last, and possibly most influential external factor at play is the economic importance of beaches and coastal areas for tourism. As previously mentioned, many New Jersey towns charge for beach access and in some cases, parking near the beach as well. This means it is in the state's best interest to maintain the size and the quality of its beaches. With more visitors comes more spending at local businesses and stimulation of local economies.

Tourists and visitors spent \$45.4 billion in 2022, with this number reaching 98% of pre-pandemic rates and projected to rise by the end of 2023 (Tourism Economics, 2023). While this number represents all tourism in the state, not just visits to the beach, visitor-based GDP accounted for 2.9% (21.8 billion) of the state's GDP in 2022 (Tourism Economics, 2023). Of the 30 coastal US states, New Jersey has the sixth largest coastal GDP - which includes all coastal economic activity happening in the state - behind California, Florida, New York, Hawaii, and Washington. After New York (which may be skewed due to New York City's geographic location), New Jersey has the highest ratio of coastal GDP (in USD) to miles of coastline and is the most densely populated state out of these top six states (NOAA Office for Coastal Management, US Census Bureau, 2020). While it is widely known that coastal areas are economic hotspots, these data show that New Jersey, while relatively small in area and coastline length, is one of the highest earning and producing coastal states in the US.



**Figure 4.** A. Total coastline length by state measured using large-scale nautical charts (US Department of Commerce & NOAA, 1975). B. Population Density by state (US Census Bureau, 2020). C. Gross Domestic Product (GDP) for all economic activities occurring in coastal areas (NOAA Office for Coastal Management, 2023). D. Percentage of Total Ocean Economy represented by tourism by state (NOAA Office for Coastal Management, 2023).

## Methods

### Site & Case Selection

Coastal sand dunes provide a suite of both ecosystem and cultural ecosystem services (CES). Ecosystem services provided by dunes include water purification, sediment accretion and retention, provision of habitats for many animal species (including endangered species), ecological niches for certain plant species which have adapted to dynamic ecosystems, filtration of pollutants, substrate for invertebrates, wildlife refuge, nesting habitats, food sources, stabilization of the shoreline, and shoreline protection (Carter, 1991; Everard et al., 2010; Keijsers et al., 2015; Arkema et

al., 2017; Sutton-Grier et al., 2018; Nordstrom & Jackson, 2018). However, as a result of dune destruction or spatial restrictions, these services are under-appreciated and under-valued, especially in developed areas (Nordstrom & Jackson, 2018). In efforts to augment and retain these critical ecosystem services, especially shoreline protection, some natural dunes are reinforced or completely man-made by state agencies like the NJDEP, local sectors of federal agencies like the Sea Grant Consortium, and local volunteer organizations.

Along with ecosystem services, dunes and other coastal ecosystems provide a number of CES - “non-material” or intangible benefits to society and culture (Martin et al., 2016). These services include aesthetic value (which adds to tourism value), cultural heritage, educational opportunities, benefits to human mental health and wellbeing, positive experiences, and recreation (Keijsers et al., 2015; Martin et al., 2016; Elko et al., 2016; Nordstrom & Jackson, 2018). Minimal attention is paid to the CES of dunes in both research and management spheres (Martin et al., 2016; Garcia Rodrigues et al., 2018).

This neglect has two major impacts: creation of a bias towards certain types of activities in these areas (such as beach raking to keep beaches clean for tourism) and a lack of understanding of the relationships people have with these environments, which can in turn affect their involvement and choices regarding coastal and environmental decisions (Nordstrom et al., 2000; Martin et al., 2016). More attention is paid to services that result in either visible or economic services and benefits since assessment of CES is both difficult and under-researched (Everard et al., 2010; Garcia Rodrigues et al., 2018).

## ***Media Analysis***

This thesis utilized media analysis of local, regional, and news articles to evaluate and gauge coastal residents' attitudes towards the rebuilding and repairing of coastal sand dunes in New Jersey after Hurricane Sandy. News articles were chosen as the primary data source for this thesis because they provide a time-stamped view into the popular discourse around a given issue, in this case dune battles. Articles are especially useful for this thesis because they feature quotes and summaries of viewpoints about dune restoration during the immediate and later stages of disaster recovery after Hurricane Sandy. Many of these quotes and perspectives are from important actors who may not be able to provide the same information now, almost twelve years after the storm.

Searches for articles primarily took place via Google News and the newspaper archives via newspapers.com. Examples of terms used to search for articles on Google news were variations and combinations of the phrase "New Jersey sand dunes Hurricane Sandy." For the newspaper.com newspaper archives, I looked at every instance of the word "dune" published in the Asbury Park Press, the primary local publication in Monmouth and Ocean Counties, in November and December of 2012 and all of 2013. This particular newspaper was chosen because of its popularity and because many residents in these areas had their papers delivered daily to their homes so it was the main source of local news at the time. The archive documents were scans of printed copies of the newspaper so after reviewing each of the search results I downloaded and merged the scans to produce whole articles.

In order for an article to be included in this study, each article met the following criteria:

1. Published after Hurricane Sandy made landfall in New Jersey (October 29, 2012) and before 2020 (when this study began).
2. Focused on dunes themselves or the state-level plans to rebuild dunes on the coast after Sandy.
3. Pertained to dune battles and recovery operations in coastal Monmouth and Ocean counties only.
4. Focused on the social dimensions of dune restoration (rather than technical or engineering details)
5. Easily accessed, downloadable, and readable.

Ideally, articles contained quotes from actors involved in or impacted by dune battles. These quotes provided timely, first-hand accounts from the recovery period after the storm. I also chose to include articles that were less about dunes and more about the recovery period of other waterfront areas in order to draw comparisons between the recovery experiences of those who had influence and/or political power in the decisions regarding dune restoration in the months to years following Hurricane Sandy.

After this search process, there were 32 articles total which were each close-read. All articles were analyzed using content and thematic analysis. The content analysis was performed using ATLAS.ti to code the articles identified the commonalities and patterns in language surrounding dune battles. It guided the thematic analysis that drew out common themes in the discourse.

The thematic analysis also aided in identifying illustrative quotations from government officials and residents affected by the storm. Thematic analysis allowed me to uncover patterns and themes that may contribute to resistance towards dunes and dune building projects. For this research, the analysis was consistent across all news articles; however, this was a very iterative process beginning with the first set of articles for document analysis, triangulated using the information I extracted from all sources, then repeated with additional articles as key themes emerged. Below are the details of how media analysis was conducted at different stages of the research process.

### *Contextualizing Local Residents' Experiences*

Through the analysis of a combination of articles from major news outlets (i.e. Associated Press, The New York Times, CBS New York) and local newspapers and websites (i.e. NJ.com, New Jersey Herald, NJ Spotlight News) published addressing dune issues in New Jersey (between when Sandy hit and the present, though most articles were written within five years of the hurricane), I established the context and actors involved in dune battles that happened in many areas along the New Jersey shore after Hurricane Sandy. The storm itself received massive media attention and battles over dunes along with resident accounts of recovery efforts were featured in local news (and some larger outlets in high-profile cases) for months to years after the storm. In these documents, I looked for specifics on the dune battles, including:

1. Who was involved and what roles were played by which actors
2. How language played a role in representation and reporting

3. Opinions on the New Jersey Dune Plan and other alternate solutions proposed by residents
4. Factors that made this case unique
5. How equity comes into play in important policy decisions about dunes

Knowing the answers to these questions helps in making future recommendations to navigate the conflicts and tradeoffs of coastal protection measures and their associated challenges as the east and gulf coasts of the US and the Caribbean confront the effects of climate change.

### ***Limitations***

While media analysis has many advantages, there are a few factors to consider that may limit its effectiveness including limited details within documents, difficulty with retrieving documents, and the potential for a biased document selection (Bowen, 2009). Media analysis provided a lens into how a subset of the public received information about important events and can provide insight into how the public sees themselves fitting into the larger fabric of these events. However, the ways that news circulated is different to how it is circulated today with printed newspapers being less popular. Digital news was available but unevenly accessed and used. This transitional period between print and digital news raised challenges in identifying all the appropriate articles for this study and also created some difficulty in weeding out duplicate articles that were originally printed and digitized later. Some articles, for instance, consisted of transcriptions of live news videos that were later published to the network's website.



Even with a set of appropriate articles, it is important to acknowledge that the quotes used in the analysis are influenced by the journalistic process of reporting and publishing. News organizations may have certain political and ideological biases that dictate what information is solicited and prioritized for publication. Additionally, news organizations and staff make decisions on which topics they report on, whom they interview and quote, and what information they choose to include or exclude in their stories. It is important to note that the information and quotes that reporters and editors choose to include in articles pass through many people before making it onto the page. Additionally, it is important to consider if and how people respond to reporters, who is most vocal, whose voices are heard, and how those voices have been influenced by the traumatic events of Sandy. Some people may be quoted in multiple articles from different publications and have the potential to dominate the narrative or act like a representative for a group of people when that may not be the case behind the scenes. Many reporters also strive to reduce their own biases in reporting by interviewing people with differing viewpoints on the same issue. However, there are commonly more than two sides of the story, and it may be nearly impossible to represent every perspective and viewpoint in the news article format. In this case, I focused more on the resistance “perspective” and more broadly on who is included and quoted to understand the specific nuances of this perspective.

## Findings

### *Media Coverage*

The media analysis identified a total of 32 news articles written for print or online publication between December of 2012 and 2019 of relevance to dune battles. 24 were specifically about dune battles and how these battles emerged and played out locally, looking at each town's specific challenges with rebuilding and reconstructing dunes after Sandy. Three articles focused on the difficulties that inland waterfront residents faced after Sandy compared to their oceanfront counterparts. Seven of the articles discussed Sandy more broadly and provided important context about the recovery process. Using the research objectives as guides for the content analysis, the findings focus on three aspects of dune battles: the nuances of the resistance from holdouts towards dunes, the role that exclusion played in dune restoration as a result of dune battles and unequal aide, and lastly, the influence of violent language in New Jersey's Sandy reporting and recovery.

This selection of articles is a small subset of the media coverage after Hurricane Sandy and the quotes featured in this section reflect an even smaller set of people that pushed to have their voices heard or were readily available to provide quotes to reporters. These findings solely reflect the prevailing public discourse as depicted in information that was reported following Hurricane Sandy in New Jersey. It is likely there are more dimensions and voices that were not included in the articles examined and therefore, in this thesis. This is further discussed in the *Exclusion* subsection.

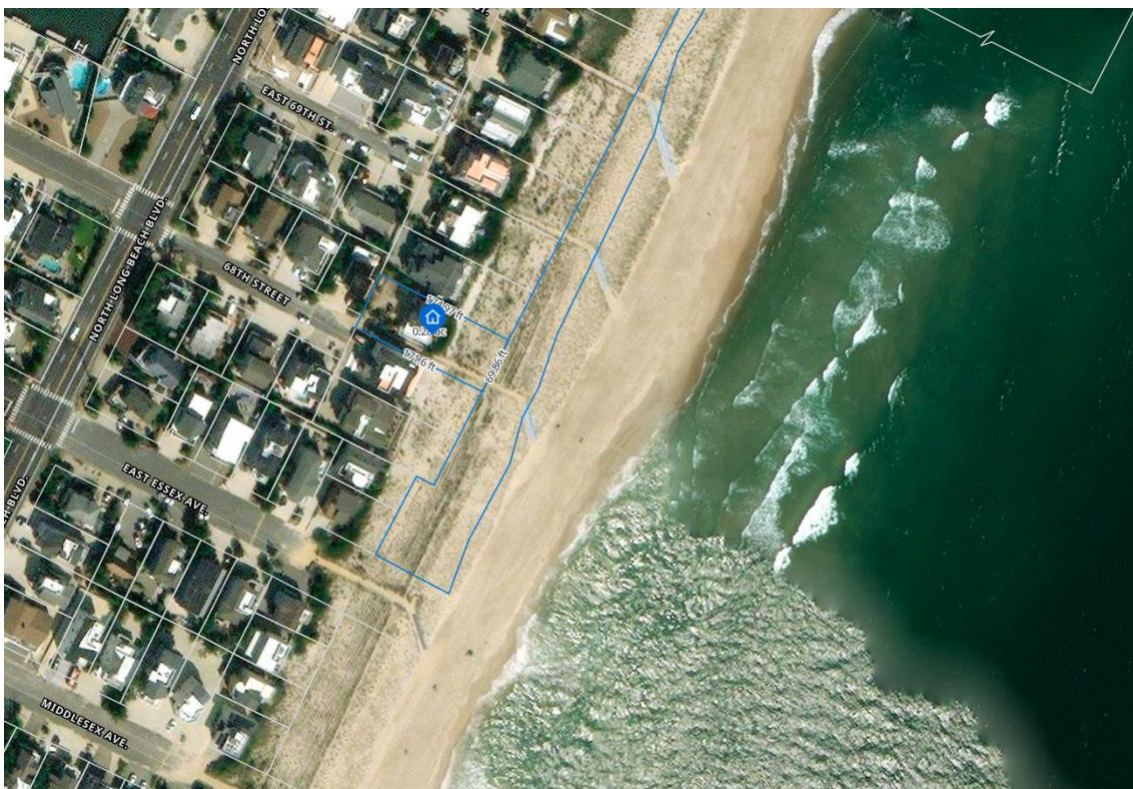
### *Nuances of Dune Resistance*

The media analysis of articles published in the years after Sandy illuminated some nuances of the resistance towards dunes. One of the more talked-about and highlighted sources of dune resistance was the worries over the obstruction of ocean views on the ground floors of beachfront homes due to taller new or repaired dunes. Homeowners claimed this loss of aesthetic value would lead to decreased property value but were not as concerned about their property value in regard to storm damage and vulnerability. This was the main source of concern with the Karan's case in Harvey Cedars, where Harvey and Phyllis Karan sued the town for the decrease in their property value as a result of the loss of the ocean view on the first floor of their home. They were originally granted \$375,000 before the decision was overturned by the New Jersey Supreme Court. In this case and others, the complaints offered by residents were accompanied by requests for "fair" compensation for the loss of property value. In the Karan's case, the town of Harvey Cedars offered them \$300, which is what the town deemed as fair compensation ("Dunes vs. property rights...", 2013).

The loss of aesthetic value was another common theme in dune resistance as reflected in the media coverage, however aesthetic value was applied more broadly to the beach itself rather than just to homes. Many residents and officials quoted expressed concern that the new and repaired dunes would take up too much space on the beach and the dunes "altered the look of the beachfront," as the former mayor of Belmar, Matt Doherty put it (Associated Press, 2019). Some residents, like Dorothy and Ted Jedziniak of Long Beach Island, spoke of their concern that the aesthetics and

privacy of their beachfront property would be compromised by the construction of high-traffic infrastructure like boardwalks, bathrooms, and amusement parks (Bello, 2013).

Even though officials repeatedly assured that the easements did not equate to a “government takeover,” (Zernike, 2013) some holdouts, like Dorothy Jedziniak, claimed, “This is a land grab...We want to preserve the ambience of the island” (as quoted in Bello, 2013). Still some officials did not take these concerns seriously, like Toms River mayor Thomas Kelaher, who said of the holdouts, “They worry we might put a merry-go-round or a hot dog stand in their front yard...People are crazy not to sign it.” (as quoted in “Dunes vs. property rights...,” 2013). But this concern was nested within the overall resistance to government control of private land. Upon agreeing to sign the easement to



**Figure 5.** Aerial image of the Karan’s property boundaries in Harvey Cedars, NJ. The blue house icon and surrounding property line is the private property the Karans own while the vegetated area in the blue boxes parallel (directly behind the Karan’s property) to the shoreline is public property (New Jersey Property Records, 2024).

allow dune construction, Dorothy Jedziniak said "OK, we give in, we're not going to fight anymore...Just so long as the home rule and owning property is respected, and they assured us it was. So that's it!" (as quoted in Beeler, 2015).

Many residents quoted in media coverage based their resistance (to dune builds and repairs on the public land between their homes and the beach face) on their aversion to the government seizing their land via eminent domain or because they presumed the government was granting access to their private property by building dunes. While in some cases some private land was needed for the construction of a robust, continuous dune system like the one planned in New Jersey, in some cases residents resisted granting access to their land during the construction process even if their land was not actively being built upon:

Rumors started to spread. Objectors said the easements would pave the way for a boardwalk, even public bathrooms for tourists. The easements call for the right of way to be granted to the Corps in 'perpetuity' - a powerful word homeowners thought was tantamount to a government seizure. (Moore et al., 2012)

The common theme discussed among residents was that by signing easements to allow dunes to be built, they would be signing away their land and therefore, favored restricting the government's access to their land.

Another recurring theme among holdouts was reluctance to "give up" their American Dream, which is rooted in differential access to property and homeownership. Residents, some of whom had owned their beachfront property for decades, recounted

that they “scrimped and saved” to purchase their homes and viewed the construction of new, higher dunes as an infringement on the rights to their dream, home, and land (Bello, 2013). Even if homeowners did not agree on whether to build dunes, they shared the sentiment that, as working-class citizens, whose homes, bought with their hard-earned money, equated to a “badge of achievement” (Bello, 2013).

The last theme among dune holdouts and resisters is favoring other coastal protection solutions, like seawalls or rock revetments, in place of dunes. However, there was a lack of consensus among this specific group of holdouts in terms of their reasoning. Some had more direct line of thinking, believing that seawalls and revetments (the former being a vertical wall usually made of steel, cement, or wood and the latter a sloping wall made of rocks or boulders) are simply “better” solutions compared to dunes regarding coastal protection. The only reasoning found in the articles is that they are more permanent (Gurian, 2014). Others, however, did not immediately dismiss dunes but cited the need for further research into other solutions. Seaside Heights Mayor William Akers said:

We need some type of protection...If it turns out someone shows me a dune and a berm is the best thing, I’m not a stupid man. But I think alternatives need to be explored before we get to that point (as quoted in Bernstein, 2013).

Along with sea walls, another alternative solution that gained favor among residents and some local government officials was widening the beach face with beach nourishment - or placing large quantities of either dredged sand from offshore or sand

transported from somewhere else on the beach or tidal areas to increase beach width. This is currently a common practice for many New Jersey beaches, but it is a costly and temporary solution.

Lastly, some residents, including Thatcher Brown of Bay Head, took issue with the use of tax dollars to pay for coastal protections like dunes that they claim only benefit those living in beachfront homes:

We prefer to take care of our problems with our own money as opposed to wasting taxpayer money...We, along with 14 neighbors — there were 15 of us — put in a rock revetment, and we then covered those rocks with several feet of sand, and we covered the sand with dune grass...The government wants to take a perpetual interest in our beaches, which are privately owned even though we allow the public on them<sup>2</sup>. (Brown, as cited in Beeler, 2015)

Homeowners like Mr. Brown were staunch in their belief that the projects they paid out-of-pocket for (like the rock wall for which Bay Head homeowners paid over \$5 million) were better suited for protection of their property than any plan enacted by the state. These views were linked to the “hands-off” approach favored by some residents regarding government coastal protection projects. Kenneth Porro, a lawyer representing oceanfront holdouts in Long Beach Island spoke about the feelings of his clients:

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<sup>2</sup> As previously mentioned, sandy beaches in New Jersey are publicly owned, making Mr. Brown’s statement incorrect regarding “allowing” the public access to their presumed private property.

“What cannot be minimized is that a number of remaining oceanfront holdouts have healthy dunes<sup>3</sup> and do not want ‘big government’ involved with their private property,” Porro said. “Also if a private property owner is willing to pay for the repair and maintenance of their private dune isn't that a good thing?” (Mickle & Huba, 2013)

It should be noted that these were the reasons collected from a few people chosen to be published in national news. While not an exhaustive list of reasons why people resist dunes, it reveals the dominant narratives that justify resistance and further analysis is needed to expand on this set of grievances. As discussed in the methods section, there is certainly room for bias from journalists in whom they interview and quote and who is willing and able to give time and energy to journalists, especially in the recovery period after a natural disaster.

### *Exclusion*

Another trend apparent in the articles were the disparities in attitudes and recovery between wealthier beachfront communities and inland/bay/riverfront communities. Residents that live in the latter were more vulnerable to begin with as mainly working-class communities of color, who also had greater difficulty obtaining the funds they needed to make repairs to their homes and avoid becoming unhoused while

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<sup>3</sup> The health and effectiveness of these dunes was not discussed in the media coverage or confirmed by any scientific source.



those repairs were being done. Some spent years trying to rebuild, some abandoned their homes altogether after running out of funds, all while watching wealthier, whiter beachfront communities build back faster and stronger. One Union Beach resident stated, "I blame the Christie Administration for putting funnel cakes before families," referring to the prioritization of aid for oceanfront tourist areas over less visible inland communities (as quoted in Yates, 2014).

Many residents also reported that the programs that were specifically designed to facilitate grants and aid payments to residents in need were exhausting, difficult to navigate, and in some cases led to dead ends. Marie McQuarrie, Union Beach, said, "We have insurance, but they don't want to give us the money, like we don't have enough to finish rebuilding. We hired an attorney," (as quoted in Yates, 2014). Another Union Beach resident, Andrea Kassimatis, discussed the timeline of the aid payments and repairs: "We're going on over 18 months out of the house. It's been grueling between navigating insurance, the grant programs, it's just, we are all tired," (as quoted in Yates, 2014). For these residents, the debates over dunes in the media felt like a distraction from the more urgent needs of their communities.

These differences come into play in future storm planning and preparation, including efforts like building dunes to increase resilience for all communities, not just on the oceanfront coast. Increases in flood insurance rates made it unattainable to purchase for the most vulnerable communities. Additionally, these were the only communities to participate in buyout programs after the storm. People in these communities, like Kurt Framhein of Ocean Beach, were not the only ones to recognize the difference between oceanfront residents resisting the implementation of protection

measures while inland communities suffered the consequences: "It does seem crazy that a handful of people can put thousands of people in jeopardy" (as quoted in Bello, 2013). Carol Stehlgens, an inland resident, said "We need those dunes. Not just for the houses here, but for ours on the mainland" (as quoted in Racciopi & Huba, 2013). Even Chris Christie echoed the need for dunes to help more than just oceanfront homeowners although he was criticized by inland waterfront communities for ignoring them during the recovery after Sandy:

We can no longer be held back from completing these projects by a small number of owners who are selfishly concerned about their view while putting large swaths of homes and businesses around them at risk. (as quoted in Racciopi & Huba, 2013)

Exclusion was also a common tactic used by residents, business owners, and government officials to shame dune holdouts in dune battle sites, like Long Beach Island. The articles featured accounts of the names and addresses of residents who refused to sign easements being posted on town websites and in local newspapers, as well as being displayed on road signs (Zernike, 2013). A local business on Long Beach Island, Anchor Produce Market, even put up a sign with the names of local holdouts indicating that they were not allowed to patronize the shop (Zernike, 2013). This led to some residents contacting and even threatening holdouts to sign easements with the

motivation that rebuilding and repairing dunes “protect[s] everybody” according to the owner of Anchor Produce Market, Mike Nichols (as cited in Zernike, 2013).



Nichelle Tate, 43, describes damage to the first floor of her condo. DAN RADEL/STAFF PHOTO

*"It's third-world country living."*

NICHELLE TATE LONG BRANCH



Judy Richardson stands outside her Manasquan beach home, holding her shih tzu, Toby.

**Figure 6.** Photos featured in digital and print news articles of people involved in or interviewed about dune battles after Hurricane Sandy. *Top left:* Linda and Kurt Framhein of Ocean Beach (Photo by Jack Gruber, featured in Bello, 2013). *Top right:* (from left to right) Karen and Danny Picard of Point Pleasant Beach, Rachel Gardener (photo by Peter Ackerman, featured in Mullen, 2013). *Middle left:* Ted and Dorothy Jedziniak of Ship Bottom (Photo by Jack Gruber, featured in Bello, 2013). *Bottom left:* Thatcher Brown of Bayhead (photo by Wayne Parry/AP, featured in Beeler, 2015). *Middle and bottom right:* (Radel, 2013).

These actions were supported and sometimes encouraged by government officials, including former governor Chris Christie, who requested the state attorney general's office "coordinate legal action to acquire the necessary easements to build dunes" and local mayors Joe Mancini and Stephen Acropolis, who both said something along the lines of "sign the easements or else" to threaten holdouts (Racciopi & Huba, 2013; Hutchins & Augenstein, 2019; Mickle & Huba, 2013).

This exclusion and bullying of holdouts led to harsh feelings and broken relationships within these small shore towns. Cease and desist letters sent by holdouts' lawyers claiming these residents were exercising their right to free speech were outright ignored by town officials (Zernike, 2013). While it is clear that holdouts had a number of reasons to resist signing easements, Peter Hartney, a city council member in Surf City, Long Beach Island said of those on the other side of the debate spectrum, "People came down to look at their houses after the storm and said, 'Where do we sign?'" (Zernike, 2013). The decision to build up dunes seemed overwhelmingly like the "right" decision for some but seemed like an insane idea to others, which fueled this exclusion and harassment amongst neighbors and local officials.

The last forms of exclusion found in the media analysis are seen in the reporting and discourse about the storm itself. The articles commonly featured quotes from the same people, some of whom served as representatives for other groups. Some examples of this are Kenneth Porro, a lawyer representing holdouts who commonly spoke on behalf of his clients, or officials like Mayor Joe Mancini (Long Beach Island), Mayor Thomas Keleher (Toms River), and former Governor Chris Christie. The

overwhelming majority of people quoted and pictured in these articles (residents and officials) were white people, and almost all either home or business owners.



**Figure 7.** Photos of officials and professionals interviewed and quoted in digital and print news articles. *Top:* (Moore et al., 2012). *Middle right:* George Kasimos of Toms River, founder of Stop FEMA Now, (Photo by Associated Press, featured in Sission, 2019). *Middle left:* Mayor Ken Farrell of Sea Girt and Former Governor Chris Christie (featured in Spahr, 2013). *Bottom right:* Former Governor Chris Christie (Racioppi & Serrano, 2012)

There was also a lack of connections made between the severity of the storm and actions taken to prevent catastrophic damage from future storms exacerbated by climate change. In the Hurricane Sandy case, because climate change was not the widely discussed topic it is today and was actively denied by former governor Christie, few connected the need for dunes (or any other coastal protection strategies) to protect against the effects of a changing climate. One of the main reasons many supported the building of dunes was to protect against “future storms” and there was some mention that storms had the potential to become stronger in the future, the last “step” of tying these outcomes to anthropogenic climate change was only discussed in the articles a handful of times and surprisingly, mainly in the print news articles published in the months after Sandy made landfall.

### *Violent Language*

The language used in the articles to describe Hurricane Sandy’s impacts on New Jersey’s coastal communities as well as the language used by elected officials regarding holdouts was notably violent, targeted, and in some cases, explicit. The use of violent language to describe the destruction left in a storm’s wake is not unique to the New Jersey case. Along with the naming of storms, the language elicits images of war and battle, and suggesting a battle against nature. Below are three examples of this language:

- 1) “After Superstorm Sandy **whacked** New Jersey, most shore towns had to build or rebuild protective sand dunes,” (*New Jersey Herald*, 2019)
- 2) “But years after the storm **pummeled** New Jersey’s coastline, Sandy is part of the present, not the past, for many of the residents,” (Sisson, 2019)
- 3) “The question for this tiny barrier island town **slammed** by Hurricane Sandy is whether an 18-foot-high sand dune would save it or kill it,” (Berstein, 2013)

Language that is reminiscent of war coupled with harsh language from government officials frequently quoted in news articles paints an aggressive picture of the state after Sandy to outsiders. This use of more colloquial or familial style is common from elected officials in New Jersey both past and present. Below is a selection of illustrative quotes from government officials:

Chris Christie, promised to ‘start calling names out of the selfish ones who care more about their view than they care about the safety and the welfare of their neighbors’...’I have no sympathy for your view, no sympathy,’ he said (Berstein, 2013)

There are some people who will be screaming and going down with the drum and fife...But anybody who really thinks about things and considers the alternative

will see: they want this, they're going to do it. Your choice is sign, or face the consequences (Cangialosi, as quoted in Zernike, 2013)

Some of this language was extremely targeted to shame and criticize holdouts:

'There's no more of this crap if they want their homes protected, otherwise they're going to fall down,' said Mayor Joe Mancini, whose municipality includes 12 of the island's 18 miles. 'I am dead serious; they sign their easement or, at this stage in the game, we'll send them a proposal.... If you want us to condemn it, we'll condemn it now,' he said, adding that it would 'cost more to fix your property than what it's worth.' (Hutchins & Augenstein, 2012)

Joe Mancini's words were accompanied by actions described as "Gestapo-like" by one of the lawyers, Kenneth Porro, representing residents who refused to sign easements. He felt, "It's not only a scare tactic but a violation of their civil rights" when talking about the words and actions from officials like Mancini and claimed that officials were "discriminating" against holdouts. (Moore et al., 2012).

Here is another example of targeted language towards residents:

Speaking at that town hall meeting on LBI last year, Gov. Christie called them 'knuckleheads,' and he made fun of those who feared the state intended to build roads, showers, hotdog stands, or anything other than protective dunes on their



easements. 'Let me use a word that is indelicate,' he said, telling parents to cover their children's ears... 'Bullshit! That's what that is ... That's the excuse they use, cause here's why they're really concerned: They don't want their view blocked.'  
(Gurian, 2014)

It should be noted that these quotes may represent a small subset of what was said by these officials but because the wording is jarring to some, these are quotes that are featured and published in the articles.

## **Discussion**

### *Resistance to Dunes*

On the surface, much of the literature and personal accounts from the media analysis cite the loss of views and consequential property value decreases as the main complaint of oceanfront homeowners when discussing the resistance towards the building of new or repairing of current coastal sand dunes. In my personal experience as someone who experienced the storm and the recovery firsthand, this reasoning dominated the discourse surrounding holdouts and how we were supposed to protect our communities from future storms. According to the media analysis, these holdouts specifically were seen as selfish and were harshly criticized and ridiculed for their actions. The media analysis also revealed that while the loss of views is certainly a concern for holdouts, there were other reasons cited by the holdouts themselves as to why they pushed back.

In the same vein of aesthetics, some were concerned about how the look and beauty of the beach would be impacted by large coastal sand dunes and other coastal protection structures, contradicting the literature which claims that one of the many ecosystem services coastal sand dunes provide to their surrounding ecosystems is aesthetic value (Garcia Rodrigues et al., 2018; Sutton-Grier et al., 2018; Martin et al., 2016; Nelson & Bigger, 2021; Nordstrom & Jackson, 2018). Additionally, the literature supports that some of the other ecosystem services provided by dunes - including sediment accretion and retention, erosion protection, and providing a habitat for all types of organisms from insects and invertebrates to birds and foxes - also indirectly contribute to the aesthetic value of the sandy beach environment. These added benefits of dunes, one may argue, have the potential to increase the property value for oceanfront homes, though this is not directly supported in the literature.

When asked by reporters why some holdouts were not in favor of New Jersey's dune plans, some did not outright oppose dunes but preferred other coastal protection mechanisms. These preferences for alternative solutions discussed in the articles, however, are not based on specific scientific information. The current understanding in the literature is that hard structures can actually increase erosion over time and do not absorb or baffle and dissipate wave energy as well as green or soft structures like dunes (Pilkey & Wright III, 1998, 1988; Gillie, 1997; Berry et al., 2013). Even after the impressive performance of dunes in Hurricane Sandy in places like Sea Girt and Seaside Park in protecting property and weakening storm surge, there are still residents who claimed dunes were not an effective solution.

An alternative solution - beach nourishment - or widening the beach face using sediment deposited directly on the beach face, is and has been an extremely popular practice in New Jersey, where a larger beach area equates to more tourists able to purchase beach passes to enjoy the shore. While in theory, a larger beach face can play a part in weakening storm surge by increasing the physical area the surge has to cover before it meets development, beach nourishment is a temporary and volatile protection measure, not to mention one that can be potentially detrimental to the coastal environment depending on the source of the sand used. If sand is dredged off the coast and pumped onto the beach face, benthic communities face significant damage (Greene, 2002). If sand is trucked in and spread over the beach, careful attention needs to be paid to the grain shape, size, and origin to ensure it will not detrimentally affect the coastal ecosystem by increasing turbidity or affecting water quality (Manning et al., 2014; de Schipper, et al., 2021).

Even if care is taken to cause minimal damage to surrounding coastal environments during beach nourishment operations, it is still incredibly costly, with \$50 million set aside for beach renourishment projects in 2023 and almost \$3 billion spent on projects throughout the state since 1936 (Rodas, 2023; Project for the Study of Developed Shorelines, n.d.). Frequently, these projects result in the sediment being washed offshore with the rougher waters that the winter brings and for this reason, towns that use nourishment as a strategy must repeat operations anywhere from yearly to every few years.

Some holdouts were also nervous about signing easements and what it would entitle the government to do to their land and homes that they worked hard to buy and

are very proud to own. They feared that allowing the government access to their properties to build dunes equated to developing on the land adjacent to their homes and potentially opened the door to compromising their privacy by building boardwalks, amusements, and bathrooms. Although the easements clearly stated this would not be the case, both holdouts and residents that signed the easements were wary of government intervention leading to the loss of their “American Dream.”

By contrast, homeowners did not acknowledge or miss the potential loss of the wide range of benefits dunes provide for entire coastal communities, not just those who live in beachfront properties. From the outside, this dune resistance resembles the “Not in My Backyard” or NIMBy phenomenon of rejecting development or the implementation of certain infrastructure near one’s property but not in other communities. However, the articles do not provide much insight as to whether holdouts that feared government influence on their property rejected dunes solely on their own properties or as a coastal protection strategy. The articles also did not mention any specific discussion or quotes from holdouts regarding their stance on how coastal sand dunes would provide protection for neighboring communities, homes, and businesses. However, the articles frequently quoted officials and neighbors who criticized holdouts for “ignoring” these collective coastal protection benefits.

### *Exclusion*

When decisions on how to manage the coast are being made, the economic and environmental aspects and outcomes are at the forefront, but it is critical to include diverse sets of values and perspectives into coastal management to increase efficiency

and efficacy (Adger et al., 2003). The data show that coastal hazards do not affect all types of coastal residents (ocean/bay/riverfront) equally and additionally, climate change adaptations may actively marginalize and increase the vulnerabilities of certain communities through a lack of inclusion (Bennett, 2018).

Beyond decision-making, caring about dunes and plans to construct or repair them as someone who does not live in an oceanfront home is in itself a privilege. Disaster and climate change mitigation literature has found that people experiencing economic difficulty or people with historically marginalized identities often do not have the capacity to think about mitigation strategies to prevent damage from future disasters and climate effects (Ferdinand et al., 2012; Thompson, 2015). They find themselves in a constant state of rebuilding and working to become financially stable again after disasters only to face the same problems when the next disaster strikes. The resources they do have go towards meeting their and their families' and communities' daily and immediate needs instead of having the luxury of planning ahead to better protect themselves from future threats.

This phenomenon aligns with what the results show for the New Jersey/Sandy case with residents of the inland/other waterfront communities still struggling to get back into their homes a year after the storm due to delays in repairs and aid payments. Meanwhile, their oceanfront counterparts were participating in these dune battles and in some cases fighting the government to let them self-fund their own resilience efforts in place of state and federally funded dune plans. There is a clear difference in the timelines to get basic needs met between these two types of communities which may

explain why certain groups were not properly represented in these debates and decisions.

Additionally, the same inland/back-bay communities were also the most vulnerable before the storm hit, with those inequities being amplified by disaster response and recovery efforts. These communities are not only vulnerable to storms and other “shocks,” but also to long-term stressors exacerbated by climate change, like sea level rise and frequent flooding. By failing to discuss anthropogenic climate change as a contributing factor to inequities experienced during and after coastal hazards, the vulnerability of at-risk communities increases. While climate change and its associated effects are more of a commonly discussed topic today, they were not as popular in local media accounts at the time. While some residents and officials quoted in the articles discussed the potential for “bigger, badder” (Bello, 2013) storms in the future, there was still no clear connection made between future storms and anthropogenic climate change.

The last level of exclusion was seen in the reporting itself, specifically who was interviewed and quoted and the mostly absent discussion of how Hurricane Sandy gave New Jerseyans a look into future storms affected by anthropogenic climate change. It is difficult to draw conclusions about the feelings of a group of people when the same group of (mostly white) people are being interviewed and quoted in the coverage of dune battles. The method of media analysis when used alone, is limited by the “middleman” of the news outlets the articles are being reported from. Ideally, media analysis would be complemented by other qualitative research methods like surveys and interviews to further capture more perspectives on dune battles. This therefore

provides more data to guide recommendations for how to inform and educate locals on the coastal protection benefits of dunes.

It is unclear, however, if the climate ignorance observed in the media both from people quoted in the articles and within the reporting itself is a result of a general public ignorance or if it is an active strategy to further climate denial discussions. While the idea that New Jersey and other parts of the Atlantic coast of the US will face more strong storms in the future was frequently mentioned, more research is needed to see how this outcome connects to climate change in the eyes of residents who play influential roles in how coastal communities plan to increase their resilience (e.g. by building coastal sand dunes) for said storms. There may be significant implications if reporting continues to follow the climate ignorance trend as it has ripple effects on the working knowledge vulnerable communities use to plan for their future.

### *Violent Language*

Using violent language to report on disasters is not unique to New Jersey, however, it does serve a unique role in New Jersey's governance and is a role that has persisted through the years as leadership and elected officials changed. Additionally, many of the articles also play on the mafioso/wise-guy trope to discuss Governor Christie's actions and to describe the storm's force and destruction. Even if we see this language as familial or part of the New Jersey vernacular or a way to add embellishment to hook readers for the articles, it adds an unnecessarily violent tone which can inadvertently amplify the conflict among readers and residents. Research done in the medical community has found that using military or war-related language as

metaphors for treatment and care can perpetuate “unintended harms” and ongoing violence as well as undermine the suffering of historically marginalized groups and the commitment from medical professionals to humanize healthcare (Nie et al., 2016).

Media have a long-standing history of sensationalizing news to attract and keep readers’ attention which, in this case, may also influence readers and/or residents of communities being reported on that they need “harder” coastal infrastructure, like sea walls, to protect their property from future storms’ potentially violent effects. Even if the effectiveness of dunes is not called into question explicitly, this language may guide readers away from seeing dunes as an effective solution because they are categorized as “soft” or natural infrastructure.

In the New Jersey/Sandy case, this violent but all-too-familiar language may lead to two outcomes: it can offer a degree of comfort and familiarity for some residents or horrify them to the point of rejecting any aligned officials, policies, or discussions. We are more likely to listen and agree with information when we receive it from people similar to ourselves, whether the information they give is based on scientific knowledge or not (Dolan et al., 2012, Kochnowier et al., 2015). However, there did not seem to be any distinct correlation between who delivered information and who accepted or rejected it. In the *Nuances of Dune Resistance* section, we can see that there are several reasons people rejected post-Sandy dune plans but none of those reasons were obviously associated with a particular political affiliation (in the articles) or how and by whom the information about the benefits of dunes was given to residents.

The effect of language extended beyond just discussing storms; militarized and violent language was used to frame the different aspects of dune “battles,” including



protecting the environment and addressing climate change. It is common to refer to efforts to mitigate climate change as “fighting,” “combating,” or “battling” climate change. If these metaphors can be harmful in healthcare scenarios and have the potential to perpetuate violence through the “legitimization and glorification of war and violence” (Nie et al., 2016) the same may be true for environmentalism. Similarly to the efforts to humanize healthcare, there may be benefits to shifting focus towards the effect of climate change on humanity rather than framing it as a fight.

When implementing protections like dunes at the coast as a coastal climate adaptation strategy, the use of this violent language and its ability to further polarize communities can impede or prevent this implementation. This can leave frontline communities vulnerable and ill-equipped to handle the effects of future storms, flooding, and sea level rise in the long term.

## **Conclusion**

A changing climate means more strong storms like Sandy are expected to hit the Jersey Shore and without advancements in protections, we will see the same catastrophic damage time and time again. Warming sea surface temperatures contribute to the increased frequency of strong storms and may also extend the length of the Atlantic hurricane season. In New Jersey, we expect to see a two to five times increase in heavy and more intense precipitation events compared to the previous century (Walsh et al., 2014; Huang et al., 2017; NJDEP, 2020) In addition, as sea level rises (anywhere from 0.9 to 2.1 feet by 2050) at an increasing pace, the impacts of storm surge will begin to impact more of the waterfront population (NJDEP, 2020).

Through the analysis of the New Jersey case, we are able to more deeply understand the issues facing coastal and other waterfront (including river-front and bay-front communities) and linked inland communities and learn how to make more effective and equitable decisions to protect the coast from the negative effects of climate change. Results from this research may also be applied more broadly in climate adaptation and other spaces that require equitable coordination and collaboration of stakeholders.

The reporting on dune battles after Hurricane Sandy in New Jersey served as an effective way to tease out why some residents vehemently opposed coastal sand dune repair and rebuilding projects in the state. The loss of views from oceanfront homes and a general concern for the depreciation of aesthetic value leading to an inferred decrease in property value because of dune construction were among the concerns of residents but were not the sole reason for the resistance. In addition to the loss of views, some residents were particularly worried about the state using the land adjacent to their property to build amusements, boardwalks, and bathrooms for beach visitors. Some preferred alternative coastal protection solutions and strategies (e.g. seawalls and beach nourishment) altogether and believed so staunchly that these were better paths forward that they were willing to foot the bill.

These findings, while directly applicable to coastal sand dune implementation efforts, may also be informative in the planning and implementation of other types of coastal climate change mitigation strategies like offshore wind. Governor Murphy introduced plans for offshore wind off the coast of New Jersey in 2020 as part of the Energy Master Plan, a collection of climate mitigation and adaptation measures which aimed for 100% clean energy by 2050. These ambitious plans to install offshore wind

turbines in the Atlantic Ocean have faced pushback from members of the public, local conservation groups, and elected officials that are convinced the benthic surveying required to begin work on the wind turbines directly caused the widely publicized strandings and deaths of marine mammals, though scientists attributed the increased deaths to ship strikes, entanglements, and disease (State of New Jersey, 2024; Lewis, 2023). This thesis illuminated the nuances to the loss of views argument and revealed that there were many reasons, many much more personal to residents, that resulted in the vehement resistance to dunes from some coastal residents. The same may be true for the uproar about mammal strandings; the turmoil may be suggestive of other covert reasons to protest offshore wind projects.

The media analysis also revealed that exclusion played a major role in the recovery of coastal communities after Hurricane Sandy. This exclusion, however, came in many different forms, including the bullying of those who refused to sign easements and other waterfront communities who were forgotten and left without sufficient aid while the oceanfront communities argued about dunes. While the former may have burned neighborly bridges and left holdouts feeling ostracized, the latter has serious effects on the already increased vulnerability of the other waterfront communities who suffered during and after Hurricane Sandy hit.

Research shows that places with more affluent homeowners and high tourism rates and potentials got the aid necessary to rebuild while aid was sometimes unavailable and unattainable for a year and longer after the storm for coastal areas that abut bays and rivers that could not pay out of pocket for their repairs. In some cases, this led to some families and residents being displaced for years or permanently. An

aspect of the post-Sandy recovery in New Jersey that requires additional research and attention is how the decisions and action on the oceanfront coast affects those living on the other waterfronts and if and how the latter are involved in decision-making and the public debate surrounding dunes.

The final theme observed in the media analysis is the frequent use of violent language both in news articles to describe the effects and impacts of Hurricane Sandy and by officials (and some residents) to berate, ridicule, and threaten holdouts. There are direct detriments to using violent language or language reminiscent of war or battle, like perpetuating violence or minimizing the suffering of certain historically marginalized groups. However, when this language is used by officials, it can have a two-pronged effect; constituents may recognize this language as familiar and be more likely to listen and agree with what is being said or may be completely put off by what is being said and who is saying it. This information is helpful for future situations in which coastal climate change adaptation strategies, like coastal sand dunes, are being implemented and where this type of language can have direct impacts on signing easements and garnering support for future dune projects.

Future work on the impact and psychology of the language of disasters is needed to further understand how the use of violent and militaristic language can affect the implementation of future coastal climate change adaptation and mitigation strategies. There is also an opportunity to address the impact of the “white male effect,” a well-documented phenomenon of lower perceived risk which is observed in disaster (and other) scenarios (Finucane et al., 2000). In the New Jersey/Sandy case, future work on how the primarily white, male politicians and officials who were quoted using aggressive

language towards constituents may have impeded their own efforts to get holdouts to sign easements and therefore impeded efforts to build dunes.

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