

Recurrent Flooding and Social Vulnerability: A Model Ordinance

Sarah Edwards

Repository Citation

Sarah Edwards, *Recurrent Flooding and Social Vulnerability: A Model Ordinance*, 41 Wm. & Mary Envtl. L. & Pol'y Rev. 495 (2017), <https://scholarship.law.wm.edu/wmelpr/vol41/iss2/7>

RECURRENT FLOODING AND SOCIAL VULNERABILITY: A MODEL ORDINANCE

SARAH EDWARDS*

INTRODUCTION

Sea level rise is no longer a hypothetical, future problem. It is in the backyards of many coastal Virginians.¹ Recurrent flooding is becoming an everyday worry as the problem worsens.² Storm surges, precipitation, and the regular rise of the tides cause floods in the coastal regions of Virginia.³ These floods, similar to other natural disasters, expose vulnerabilities in communities that include geophysical weaknesses, but also social weaknesses.⁴ Populations with less access to resources tend to be less capable of preparing for and responding to natural threats.⁵ As a result, recurrent flooding disproportionately devastates vulnerable populations.⁶

State and federal governments already offer assistance in the recovery process after environmental hardships, but few vulnerable populations actually receive the assistance.⁷ No mechanism addresses the disparity in the effects of environmental harms, including recurrent flooding.⁸ Although many governmental agencies have emergency plans in

* J.D. Candidate, William & Mary Law School, 2017; B.A. English, University of South Carolina, 2014 *Magna Cum Laude*. The author would like to express deep gratitude for the guidance and support she received throughout the writing process. In particular, the author would like to thank Abby Riley for her editorial support, Roy Hoagland for his mentorship, as well her parents for their guidance and moral support.

¹ VA. INST. OF MARINE SCI. & CENT. FOR COASTAL RESOURCES MGMT., RECURRENT FLOODING STUDY FOR TIDEWATER VIRGINIA 4–5 (2013) [hereinafter RECURRENT FLOODING STUDY].

² ANDREW C. SILTON & JESSICA GRANNIS, STEMMING THE TIDE: HOW LOCAL GOVERNMENTS CAN MANAGE RISING FLOOD RISKS iv, 1 (2012).

³ RECURRENT FLOODING STUDY, *supra* note 1, at 13.

⁴ Robert R.M. Verchick, *Disaster Justice: The Geography of Human Capability*, 23 DUKE ENVTL. L. & POL'Y F. 23, 12, 16–18.

⁵ *Id.* at 23–24.

⁶ *Id.* at 19–21.

⁷ *Id.* at 21–22.

⁸ SILTON & GRANNIS, *supra* note 2, at 8 (calling for Virginia local governments to protect the people and property from the rising sea level within the comprehensive plans and zoning ordinances); Verchick, *supra* note 4, at 42–44 (noting that federal and local planning does not sufficiently meet the needs of the vulnerable in times of emergency, resulting in disproportionate damage compared to less vulnerable populations).

place and resources available to prepare for and recover from environmental harms, socially vulnerable communities are still at greater risk of suffering significant damage.⁹

The U.S. Environmental Protection Agency (“EPA”) defines environmental justice as “the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.”¹⁰ EPA further describes fair treatment to mean “that no group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental and commercial operations or policies.”¹¹ Finally, EPA lists standards for meaningful involvement:

1. people have an opportunity to participate in decisions about activities that may affect their environment and/or health;
2. the public’s contribution can influence the regulatory agency’s decision;
3. their concerns will be considered in the decision making process; and
4. the decision makers seek out and facilitate the involvement of those potentially affected.¹²

EPA places a strong emphasis on the ideas of fair treatment and meaningful involvement as being necessary to address the disproportionalities of environmental effects.¹³ Unfortunately, local governments have not met this goal when dealing with environmental disasters such as recurrent flooding.¹⁴

The goal of this Note is to incorporate the ideas of fair treatment and meaningful involvement into a model ordinance for localities that

⁹ Verchick, *supra* note 4, at 23, 52 (“Social scientists argue that by devoting more resources to reducing socioeconomic inequality and attending to the needs of vulnerable groups in times of disaster, government could reduce overall disaster risk.”).

¹⁰ *Environmental Justice: Basic Information*, EPA, <https://www.epa.gov/environmental-justice/> [https://perma.cc/MJ39-XRZ4] (last visited Nov. 15, 2016).

¹¹ *Learn About Environmental Justice*, EPA, <https://www.epa.gov/environmental-justice/learn-about-environmental-justice> [https://perma.cc/7NX5-F6DV] (last visited Nov. 15, 2016).

¹² *Id.*

¹³ *Id.*; ROBERT L. GLICKSMAN ET AL., CENTER FOR PROGRESSIVE REFORM, CLIMATE CHANGE AND THE PUGET SOUND: BUILDING THE LEGAL FRAMEWORK FOR ADAPTATION 19 (2011).

¹⁴ Verchick, *supra* note 4, at 42–44.

will guide the decision-making process to ensure that vulnerable communities do not suffer disproportionate harm.¹⁵ This Note uses ideal policies that will attempt to guide localities in addressing environmental justice, and puts them into a concrete solution—a model ordinance.

The model ordinance will be a guide for local governments to incorporate social vulnerability factors into their decision-making process for adaptation measures.¹⁶ Social vulnerability is a community's ability to prepare for, endure, and respond to environmental harms, such as flooding, based on the demographics of the community.¹⁷ The goal of the ordinance is to encourage governmental agencies to implement plans that best serve a vulnerable community's particular needs. The adaptation planning process should focus on preserving the community's history and culture, and avoid situations where the adaptation measures only protect the wealthy.¹⁸ To make sure the community's interests are central in the process, communication is vital.¹⁹

This Note will begin by laying out the problem of recurrent flooding, social vulnerability, and how the two interact. The Note will then introduce the model ordinance. The model ordinance first establishes a standard to determine when a geophysical area faces a high-flooding risk.²⁰ Once the local governing body establishes the flood risk, the model ordinance requires the body form an Adaptation Committee ("Committee").²¹ The model ordinance then provides a standard by which the Committee

¹⁵ See *infra* App. A.

¹⁶ J. DRONKERS ET AL., REP. OF THE COASTAL ZONE MGMT. SUBGROUP, INTERGOV'L PANEL ON CLIMATE CHANGE [IPCC], STRATEGIES FOR ADAPTION TO SEA LEVEL RISE iv (1990) (classifying adaptive measures into three categories: 1) retreat—abandoning the coastal land and allow the rising sea to take over; 2) accommodation—"continue to use the land at risk but do not attempt to prevent the land from being flooded. This option includes erecting emergency flood shelters, elevating buildings on piles, converting agriculture to fish farming, or growing flood or salt tolerant crops"; and 3) protection—"involves hard structures such as sea walls and dikes, as well as soft solutions such as dunes and vegetation, to protect the land from the sea so that existing land uses can continue").

¹⁷ Verchick, *supra* note 4, at 24.

¹⁸ ELAINE ENARSON, *Identifying and Addressing Social Vulnerabilities*, in EMERGENCY MANAGEMENT: PRINCIPLES AND PRACTICES FOR LOCAL GOVERNMENT 273–75 (William L. Waugh Jr. & Kathleen Tierney eds., 2007) (stating that environmental laws generally favor the wealthy because the wealthy communities are able to push against activity that disfavors themselves. The same is not true for less economically prosperous areas, who therefore fail to see laws or actions in their favor).

¹⁹ SHANA JONES, MAPPING COASTAL RISKS AND SOCIAL VULNERABILITY: PRINCIPLES AND CONSIDERATIONS 8 (2015).

²⁰ *Infra* App. A, Sec. 2.

²¹ *Infra* App. A, Sec. 2.

will make a social vulnerability determination.²² After the flood risk and social vulnerability determinations are made, the committee will formulate two recommendations for the local governing body: 1) a plan for education and outreach with the community; and 2) a plan for adaptation to the flood waters.²³ The ordinance also addresses the possibility of relocation and establishes methods of review to ensure accountability of the local governing body and designated committee.²⁴

I. RECURRENT FLOODING AND SOCIAL VULNERABILITY
CREATE A SUBSTANTIAL PROBLEM THAT THE LOCAL
GOVERNMENT MUST ADDRESS

A. *Recurrent Flooding*

High tides, storm surges, and precipitation all cause flooding.²⁵ Experts consider recurrent flooding to be flooding that repeatedly occurs in the same area.²⁶ Coastal Virginia experiences recurrent flooding from all three of these potential causes.²⁷ Unfortunately, flood experts expect tides, storm surges, and precipitation to increase as sea level rises, causing more frequent and more severe flooding.²⁸

To predict the future of sea level rise, scientists must include other environmental conditions and transformations that affect global warming, i.e., rates of acceleration.²⁹ The rates of acceleration include factors such as melting glaciers and ice caps; warming of the ocean causing the water to expand; and Virginia's sinking coast.³⁰ The Virginia Institute of Marine Science ("VIMS") utilized a series of trajectories on the potential global sea level rise from the National Climate Assessment, and adjusted them to include the factors that affect southeast Virginia specifically.³¹ There are four possible trajectories in total: (1) the historical projection that includes the rate of sea level rise if it continues at the

²² See *infra* App. A, Sec. 5.

²³ See *infra* App. A, Sec. 6.

²⁴ See *infra* App. A, Secs. 7–8.

²⁵ RECURRENT FLOODING STUDY, *supra* note 1, at 13.

²⁶ *Id.* at vi.

²⁷ *Id.* at 13.

²⁸ *Id.*

²⁹ *Id.* at 110.

³⁰ RECURRENT FLOODING STUDY, *supra* note 1, at 110–11.

³¹ *Id.*; NATIONAL OCEANIC AND ATMOSPHERIC RESEARCH, GLOBAL SEA LEVEL RISE SCENARIOS FOR THE UNITED STATES NATIONAL CLIMATE ASSESSMENT 3 (2012).

same rate as the past 100 years; (2) the low projection that includes a conservative prediction of the rate of acceleration; (3) the high projection that includes a higher rate of acceleration; and (4) the highest projection that includes the maximum possible rate of acceleration.³² Although scientists cannot predict an exact rate, many scientists agree that the rate of sea level rise has already exceeded any historical projection.³³ Because the current rates already surpassed this projection due to these acceleration factors, VIMS has dismissed the historical projection and focuses instead on the remaining three.³⁴ The three remaining projections (low, high, highest) vary based on the rates of accelerations.³⁵ With the three different projections in mind, VIMS predicts that Virginia will experience approximately a 1.5 foot raise in sea level in the next 20 to 50 years.³⁶ Wetlands Watch, an education and advocacy organization dedicated to protecting wetlands, predicts the rise in sea level in Virginia to be between 2.3 feet and 5.2 feet in the next 100 years.³⁷

The rise in sea level affects many coastal areas along the Chesapeake Bay and in southeast Virginia,³⁸ but the local governments have an obligation to address the disproportionate impacts that affect socially vulnerable communities.³⁹ Local governments should be aware of these disparities and be prepared to address them.

B. *Social Vulnerability*

The severity of flood damage is directly linked to a community's ability to prepare for, endure, and respond to destructive flood waters.⁴⁰ A

³² RECURRENT FLOODING STUDY, *supra* note 1, at 12–13.

³³ *See id.*; CHESAPEAKE BAY PROGRAM SCIENCE AND TECHNICAL ADVISORY COMMITTEE, CLIMATE CHANGE AND THE CHESAPEAKE BAY: STATE-OF-THE-SCIENCE REVIEW AND RECOMMENDATIONS 21 (2008) [hereinafter CLIMATE CHANGE AND THE CHESAPEAKE BAY].

³⁴ RECURRENT FLOODING STUDY, *supra* note 1, at 12–13.

³⁵ *Id.*

³⁶ *Id.*

³⁷ William A. Stiles, Jr., *A "Toolkit" for Sea Level Rise Adaptation in Virginia*, in SEA LEVEL RISE AND COASTAL INFRASTRUCTURE: PREDICTION, RISKS, AND SOLUTIONS 1 (Bilal M. Ayyub & Michael S. Kearney eds., 2012); CLIMATE CHANGE AND THE CHESAPEAKE BAY, *supra* note 33, at 5.

³⁸ Stiles, *supra* note 37, at 2 (“High rates of sea level rise in the southern Chesapeake Bay region cause the Virginia Beach—Norfolk—Newport News VA—NC Municipal Statistical Area (MSA), with 1.6 million people to stand out as the largest population center at greatest risk from sea level rise outside of New Orleans.”).

³⁹ Verchick, *supra* note 4, at 53–54 (arguing that a “multifaceted social problem like disaster risk demands a multifaceted game plan”).

⁴⁰ Susan Cutter et al., *Social Vulnerability to Environmental Hazards*, 84 SOC. SCI. Q. 242, 243 (2003); JONES, *supra* note 19, at 3.

socially vulnerable community disproportionately suffers when environmental hazards occur.⁴¹ Social vulnerability is measured by demographic factors that represent a community's ability to cope with environmental hazards such as flooding.⁴² This model ordinance focuses on the following demographics: rates of unemployment, poverty, residences that are renter occupied,⁴³ income levels, age,⁴⁴ social security, and percent of population in nursing homes. These factors represent accessibility of resources, ability to receive emergency notifications from local officials, and individuals' physical capabilities.⁴⁵ This model ordinance measures the factors based on the data of each census tract.⁴⁶ Census tracts 301 and 303 of Southeast Newport News serve as a case study for this model ordinance because those tracts are most susceptible to flooding, and a high percentage of its population are in demographics associated with social vulnerability.⁴⁷

Newport News officials will undoubtedly find that the Southeast area is socially vulnerable.⁴⁸ The average per capita income was \$12,402 for tract 301 and \$17,360 for 303 as of 2014.⁴⁹ Tracts 301 and 303 have 52.4% and 28.5% of its population below the poverty line, respectively.⁵⁰

⁴¹ George Clark et al., *Assessing the Vulnerability of Coastal Communities to Extreme Storms: The Case of Revere, MA., USA*, 3 MITIGATION AND ADAPTATION STRATEGIES FOR GLOBAL CHANGE 59, 59 (1998).

⁴² See Cutter et al., *supra* note 40, at 243.

⁴³ Verchick, *supra* note 4, at 43 ("Government assistance programs . . . tend to favor middle-class homeowners over less affluent renters or the homeless."); Cutter, *supra* note 40, at 247, tbl.1 ("People that rent do so because they are either transient or do not have the financial resources for home ownership. They often lack access to information about financial aid during recovery.").

⁴⁴ Verchick, *supra* note 4, at 45 ("Because the elderly tend to have more health problems, reduced mobility, and fixed incomes, they are often at higher risk of death or injury during disasters.").

⁴⁵ See Cutter et al., *supra* note 40, at 243.

⁴⁶ *Geographic Terms and Concepts: Census Tract*, CENSUS BUREAU, https://www.census.gov/geo/reference/gtc/gtc_ct.html [<https://perma.cc/EQT5-RBTZ>] (last visited Nov. 15, 2016) ("Census Tracts are small, relatively permanent statistical subdivisions of a county or equivalent entity. . . . The primary purpose of census tracts is to provide a stable set of geographic units for the presentation of statistical data.").

⁴⁷ See *infra* notes 49–51.

⁴⁸ See *infra* notes 49–51.

⁴⁹ *Selected Economic Characteristics: Census Tracts 301 and 303, Newport News, Virginia*, AMERICAN FACTFINDER, CENSUS BUREAU, http://factfinder.census.gov/bkmk/table/1.0/en/ACS/14_5YR/DPO3/1400000US51700030100|1400000US51700030300 [<https://perma.cc/NQ4H-P7VC>] (last visited Nov. 15, 2016).

⁵⁰ *Id.*

The Commonwealth of Virginia has an average per capita income of \$33,958, and 11.2% of its population below the poverty line.⁵¹ Comparing Virginia Beach census tracts 434 and 430, which have average incomes over \$73,000 and fewer than 2% of their population below the federal poverty line, further highlights the vulnerability of Southeast Newport News.⁵²

These factors become exacerbated when faced with recurrent flooding.⁵³ In September 2015, the area experienced flooding multiple times.⁵⁴ Ordinary events, such as minor precipitation, high tides during a full moon, and strong winds are all common events that caused flooding.⁵⁵ The lack of preparedness from the city magnified the effect of the flooding on the socially vulnerable.⁵⁶ During a flood in September 2014, residents recall waking up in the middle of the night to discover that their electricity was out and water was flooding into their cars and apartments.⁵⁷ The lack of warning indicates a breakdown in the emergency preparation and communication with residents.

The recurrent flooding and high levels of social vulnerability have the potential to devastate the Southeast community.⁵⁸ The flooding is capable of destroying houses and livelihoods, but residents of a socially vulnerable area will not have the support, guidance, or resources to recuperate, which makes the disaster much more catastrophic.⁵⁹

⁵¹ *QuickFacts: Virginia*, CENSUS BUREAU, <http://www.census.gov/quickfacts/table/RHI205210/51> [<https://perma.cc/5TP2-WBDH>] (last visited Nov. 15, 2016).

⁵² *Selected Economic Characteristics: Census Tracts 430.2 and 434, Virginia Beach, Virginia*, AMERICAN FACTFINDER, CENSUS BUREAU, http://factfinder.census.gov/bkmk/table/1.0/en/ACS/14_5YR/DP03/1400000US51810043002|1400000US51810043400 [<https://perma.cc/T924-Q2B7>] (last visited Nov. 15, 2016).

⁵³ Verchick, *supra* note 4, at 42–43.

⁵⁴ See Jane Alvarez-Wertz, *Peninsula Residents Cope with Flooding, Power Outages*, WAVY-TV, Sept. 9, 2014, <http://wavy.com/2014/09/09/peninsula-apartments-experience-flooding-power-outages/> [<https://perma.cc/5ZCA-YQWB>]; Jonathan Edwards, *Tidal Flooding Hits Hampton Roads, Will Continue into Next Week*, PILOT ONLINE, Sept. 24, 2015, http://pilotonline.com/news/tidal-flooding-hits-hampton-roads-will-continue-into-next-week/article_ff9a3ef8-f5b4-54e4-a833-07589111e580.html [<https://perma.cc/423V-3LHV>].

⁵⁵ Alvarez-Wertz, *supra* note 54; Edwards, *supra* note 54.

⁵⁶ Alvarez-Wertz, *supra* note 54 (explaining that if there had been a warning, the residents did not receive it).

⁵⁷ *Id.*

⁵⁸ Dave Ress, *Gaps Between Rich and Poor Widening*, DAILY PRESS, June 21, 2014, http://articles.dailypress.com/2014-06-21/news/dp-nws-inequality-20140621_1_food-stamps-peninsula-economic-growth/3 [<https://perma.cc/5ADH-NRD6>].

⁵⁹ See Verchick, *supra* note 4, at 43.

II. A MODEL ORDINANCE

The proposed model ordinance incorporates social vulnerabilities within a community into the local planning process for recurrent flooding.⁶⁰ This section analyzes segments of the model ordinance and emphasizes the importance of each provision.

In terms of structure, the model ordinance first establishes its purpose,⁶¹ defines critical terms,⁶² and creates a concrete basis for the establishment of the Committee that will implement educational and decision-making processes.⁶³ Then, the ordinance provides guidelines for forming two recommendations: 1) education and outreach; and 2) adaptation strategy. All components will focus on addressing the needs and concerns of the socially vulnerable community by keeping the community informed.

A. *Policy Behind the Ordinance*

Addressing the needs of a vulnerable population is not a new concept.⁶⁴ A community already expects government officials to provide special assistance to the physically disabled in planning for emergencies.⁶⁵ This ordinance incorporates social vulnerability to expand this concept to include not only the physically disabled, but also the populations that lack resources and communication with public officials.⁶⁶

The purpose of the ordinance is to offer practical, adoptable methods of incorporating social vulnerability into a local governing body's decision-making process when addressing recurrent flooding and adaptation response.⁶⁷ Government involvement is necessary because the planning

⁶⁰ See *infra* App. A, Sec. 4.

⁶¹ See *infra* App. A, Sec. 1.

⁶² See *infra* App. A, Sec. 3.

⁶³ See *infra* App. A, Sec. 6.

⁶⁴ ENARSON, *supra* note 18, at 258; see also CITY OF BALTIMORE, DISASTER PREPAREDNESS AND PLANNING PROJECT 208, http://www.baltimoresustainability.org/wp-content/uploads/2015/12/Chapter5_StrategiesandActions.pdf [<https://perma.cc/5TM9-DK86>] ("It is important to evaluate and prioritize resiliency investments for Public Housing developments to incorporate new flood resiliency measures and ensure protection of vulnerable populations. . . . Residents include seniors, low-income households, working class and other vulnerable populations.")

⁶⁵ ENARSON, *supra* note 18, at 258; see generally Americans with Disabilities Act of 1990, 42 U.S.C. § 12101.

⁶⁶ See *infra* App. A.

⁶⁷ *Infra* App. A, Sec. 1.

should be comprehensive and uniform.⁶⁸ If left to private individuals, the lack of economic incentive would severely disadvantage vulnerable populations.⁶⁹ Uniformity from the government is also a necessity because the lack of effective measures in one geographic area will likely impact the success of another.⁷⁰

The primary theme throughout the ordinance is encouraging a local governing body to build a relationship with community members. A strong relationship will lead to better communication, which will help the community to better address environmental justice concerns.⁷¹ Socially vulnerable communities often face a severe communication gap with public officials because of cultural, educational, and technological barriers.⁷² Informing affected communities, listening to their concerns, and incorporating those concerns into a comprehensive solution will be the most effective way to address environmental disparities.⁷³ A local governing body will not be able to adequately address a community's problems unless it understands the specific nature of the problem.⁷⁴ The best way to gather this understanding is through community leaders such as religious leaders, recreational leaders, or other community organizers who interact with residents and understand their needs.⁷⁵ The community leaders provide a channel of open communication to the community—one that may be difficult for the local governing body to establish from the ground up.⁷⁶ Establishing channels of communication with community leaders is vital to the success of this model ordinance because those channels will lead to meaningful participation with the affected community.⁷⁷ Meaningful participation leads to effective solutions because

⁶⁸ RECURRENT FLOODING STUDY, *supra* note 1, at 47.

⁶⁹ *Id.*

⁷⁰ *Id.*

⁷¹ Alice Kaswan, *Environmental Justice: Bridging the Gap Between Environmental Laws and "Justice,"* 47 AM. U. L. REV. 221, 225 ("A community's ability to communicate unfair treatment is an important step in increasing decisionmakers' accountability to all.").

⁷² JONES, *supra* note 19, at 10. For example, public officials may face difficulty in reaching non-English speakers, the disabled who are unable to attend community meetings, persons working non-traditional hours and therefore unavailable at normal hours, and the illiterate.

⁷³ ENV'TL PROT. AGENCY, INTRODUCING EPA'S PUBLIC INVOLVEMENT POLICY 2, <http://nepis.epa.gov/Exe/ZyPDF.cgi/100045RR.PDF?Dockey=100045RR.PDF> [<https://perma.cc/Z7TQ-KH2X>] [hereinafter EPA'S PUBLIC INVOLVEMENT POLICY].

⁷⁴ JONES, *supra* note 19, at 8–9.

⁷⁵ *Id.*

⁷⁶ *Id.*

⁷⁷ Alice Kaswan, *Seven Principles for Equitable Adaptation*, 13 SUSTAINABLE DEV. L. & POL'Y 41, 44–45 (2013).

it creates a thorough understanding of the problem and a cooperative environment for the solution to take place.⁷⁸

The main components of the ordinance are: (1) implementing a standard that establishes an Adaptation Committee;⁷⁹ (2) defining the duties of the Adaptation Committee;⁸⁰ (3) establishing standards for relocation;⁸¹ and (4) establishing methods of review⁸² to implement a high level of accountability.⁸³ The following parts discuss the main components of the ordinance in depth.

B. *The Establishment of the Committee*

Before a local governing body can address social vulnerability in a high-risk flood area, it must first establish that an area is geophysically vulnerable.⁸⁴ To do so, the local governing body will conduct a flood-risk analysis if any member of the body raises a motion, or if any community member files a petition with the board asking for such determination.⁸⁵ The local governing body will assess the flood risk based on the standard Federal Emergency Management Agency (“FEMA”) implemented for the purposes of the National Flood Insurance Program (“NFIP”).⁸⁶ Under the NFIP, a 100-year floodplain is an area that has a one percent likelihood of being flooded in any given year (i.e., will likely be flooded at least once within a 100-year period).⁸⁷ If the governing body determines that the community lies within a 100-year floodplain, the governing body is obligated to establish the Committee.⁸⁸

⁷⁸ *Id.*

⁷⁹ *Infra* App. A, Sec. 4.

⁸⁰ *Infra* App. A, Secs. 5–6.

⁸¹ *Infra* App. A, Sec. 7.

⁸² *Infra* App. A, Sec. 8.

⁸³ See Kaswan, *supra* note 71, at 273–75 (explaining that citizen suits are necessary for enforcement of environmental standards, but disadvantage poor communities who lack the resources to pursue such enforcement, thus exacerbating the inequality between wealthy and poor communities).

⁸⁴ See *infra* App. A, Sec. 3 (defining geophysical vulnerability as “[t]he risk of damage to infrastructure and/or natural resources due to its location in a High Flood Risk Area”).

⁸⁵ *Infra* App. A, Sec. 4.

⁸⁶ 42 U.S.C. §§ 4004, 4102(c) (2012).

⁸⁷ *Id.*

⁸⁸ *Infra* App. A, Sec. 4.

The Committee must be comprised of at least one local governing official,⁸⁹ one expert on local flooding,⁹⁰ and one community leader.⁹¹ It is important that each of these roles has equal influence on decisions and recommendations.⁹² In order for the community to be meaningfully involved, the process must account for the power disparities between the political forces and the community members.⁹³

Along with the establishment of the Committee, the local governing body must also appoint a Community Advocate.⁹⁴ The Community Advocate must be an attorney that is barred in the respective state, and a citizen or member of the designated community who possesses the ability to advocate in a formal court setting.⁹⁵ If the community is socially vulnerable, it is less likely that it will have access to legal or political means to assert its arguments or challenge a decision.⁹⁶ The Community Advocate will provide a method for the community to put legal force behind its concerns when the community disagrees with a decision from the local governing body. The Community Advocate is vital to ensuring accountability of the model ordinance, as discussed in Part F.

The Committee's first duty is to make a social vulnerability determination.⁹⁷ The purpose of the vulnerability determination is to accurately depict the community's lack of resiliency and need for individualized planning.⁹⁸ There are two elements of the social vulnerability determination: quantitative and qualitative.⁹⁹

⁸⁹ *Infra* App. A, Sec. 4.

⁹⁰ *See infra* App. A, Sec. 3 (defining Local Flood Expert as “[a]n individual who (i) is a certified floodplain manager by the Association of State Floodplain Managers and (ii) possesses particular knowledge of the community in which he or she would be serving on The Committee. The local flood expert may or may not be a member of the community.”).

⁹¹ *See infra* App. A, Sec. 3 (defining Community Leader as “[a] citizen of the geophysically vulnerable community for which The Committee is formed who holds a leadership position in a community organization with strong connections to other community members”).

⁹² JONES, *supra* note 19, at 8 (“Involving these communities as they are identified and including them as ‘co-producers of knowledge’ is more likely to create authentic participation and increase trust.”).

⁹³ Kaswan, *supra* note 77, at 44–45.

⁹⁴ *See infra* App. A, Sec. 4.d.

⁹⁵ *See infra* App. A, Sec. 3.c (defining Community Advocate as “[a] citizen of an at-risk community who has the ability to advocate in a formal court setting”).

⁹⁶ Kaswan, *supra* note 71, at 273–75.

⁹⁷ *See infra* App. A, Sec. 5.

⁹⁸ Verchick, *supra* note 4, at 38–39.

⁹⁹ Jeremy Abramowitz & Sarah Stafford, *An Analysis of Methods for Identifying Socially Vulnerability to Environmental Hazards: A Case Study of Tidewater Virginia* 32 (Pub. Policy Program of the Coll. of William and Mary, Working Paper Feb. 2016) (“[Q]uantitative

1. Quantitative Determination of Social Vulnerability

The quantitative element of the social vulnerability determination is based on demographic data available at the census tract level through the American Community Survey.¹⁰⁰ The ordinance has four quantitative tests that measure a community's vulnerability that capture different aspects of vulnerability.¹⁰¹ The first test measures an area's financial resources by evaluating the percent of unemployment, the percent below the federal poverty line, and per capita income.¹⁰² An area's lack of financial resources represents the difficulty residents will likely have in investing in protective measures or emergency supplies, evacuating, and repairing or replacing damaged property.¹⁰³

The second test captures the availability of financial resources and stability of housing by measuring the percent in poverty and percent renters.¹⁰⁴ Tenants are less likely to invest in adaptation measures that will protect the house if they do not own the property.¹⁰⁵ A high rate of renters and a high poverty rate indicate a lack of financial resources, poor housing quality, and lack of alternative housing options if the residence is significantly damaged during a flood.¹⁰⁶

The third test captures the lack of financial resources and physical disability by measuring a percentage on poverty and a percentage on social security. A high percentage of social security indicates a high percentage of people who may be physically impaired¹⁰⁷ since social security is distributed to retired persons, disabled persons, or the dependents of such person.¹⁰⁸

analysis can supplement but cannot substitute for proactive communication, qualitative understanding of community needs, or an equitable stakeholder process.”).

¹⁰⁰ See generally *American Community Survey*, CENSUS BUREAU, <https://www.census.gov/programs-surveys/acs/about.html> [<https://perma.cc/Z6JE-PLRE>] (last visited Nov. 15, 2016) (“The American Community Survey (ACS) is an ongoing survey that provides vital information on a yearly basis about our nation and its people.”).

¹⁰¹ See generally Abramowitz & Stafford, *supra* note 99.

¹⁰² *Id.* at 25.

¹⁰³ Verchick, *supra* note 4, at 40–42 (noting that evacuation “require[s] resources (transportation, cash, a place to stay) that are less common in disadvantaged populations.”).

¹⁰⁴ Abramowitz & Stafford, *supra* note 99, at 24–25.

¹⁰⁵ See Clark et al., *supra* note 41, at 77 (noting that the inability to “make stormproof[] adjustments to their homes” contributes to vulnerability). Being a renter rather than the owner of a property likewise inhibits the ability to make improvements that protect the occupants' livelihood).

¹⁰⁶ See Cutter et al., *supra* note 40, at tbl. 1.

¹⁰⁷ Verchick, *supra* note 4, at 40.

¹⁰⁸ See SOC. SEC. ADMIN., SOCIAL SECURITY FACT SHEET 1 (2015), <https://www.ssa.gov/news/press/factsheets/basicfact-alt.pdf> [<https://perma.cc/HG2H-5XRV>].

The fourth test captures physical disability, dependency in daily tasks, and lack of financial resources by measuring the percent of the population over the age of sixty-five, the percent in nursing homes, median income, and the percent on social security.¹⁰⁹ Elderly populations require specific kinds of assistance in emergency situations because they may be unable to install physical barriers to protect their residences (such as sand bags), may not be able to evacuate without assistance, and often rely more seriously on power supplies (such as electricity to maintain oxygen tanks), which could be compromised during a flood.¹¹⁰

The Committee would conduct the assessment under each test based on a standardization of variables.¹¹¹ The standardization process focuses on the extremes of a demographic, relative to the overall average of the state.¹¹² The alternative to using standardized variables is to draw a subjective line at a random percentage. For example, when measuring the population below the federal poverty line in a community, one would find it difficult to pick a percentage, above which would push the community to a determination of social vulnerability. However, deciding on what that percentage would be is an entirely arbitrary decision. Rather than drawing a subjective line at a random percentage, the tests here focus on utilizing standard deviations to capture populations that represent the extremes of a factor.¹¹³ The standard deviations allow the Committee to definitively identify the communities that exhibit extreme rates of each factor.¹¹⁴ The factors are clustered to identify types of vulnerabilities because the nature of social vulnerability is multifaceted.

2. Qualitative Determination of Social Vulnerability

The second element of the social vulnerability determination is a qualitative analysis. The Committee's goal of the qualitative analysis is to grasp a ground-level understanding of the major problems and concerns

¹⁰⁹ See Verchick, *supra* note 4, at 40.

¹¹⁰ See Cutter et al., *supra* note 40, at tbl.1; Verchick, *supra* note 4, at 44–45.

¹¹¹ *Infra* App. A, Sec. 5.

¹¹² See *infra* note 114 and accompanying text.

¹¹³ Abramowitz & Stafford, *supra* note 99, at 4.

¹¹⁴ *Stata FAQ: How Do I Standardize Variables in Stata*, INST. FOR DIG. RESEARCH AND EDUC., UCLA, <http://www.ats.ucla.edu/stat/stata/faq/standardize.htm> [<https://perma.cc/QDH2-CFV6>] (last visited Nov. 15, 2016) (the standardization of variables is beneficial because the calculation of the variable is based on the state average. Therefore, a vulnerability determination is based on a significant deviation from the average).

of the community.¹¹⁵ Although the quantitative measurement will provide some understanding, the value of speaking with community members who endure the flooding is irreplaceable.¹¹⁶ Therefore, the Committee is required to meet with at least two community leaders to discuss the specific issues that community members face during a flood.¹¹⁷ The meetings should highlight a deeper understanding of the vulnerabilities that affect the community and provide a concrete understanding of the significance behind the quantitative vulnerabilities. The meetings will also be the first step in opening and improving channels of communication with vulnerable populations. By including community leaders at an early stage in the decision-making process, the Committee builds trust, which will help the local governing body be more effective in its decision making process and will help the community receive the assistance it needs.¹¹⁸

The Committee must complete both the quantitative and qualitative elements of the social vulnerability determination. The Committee can find a community to be socially vulnerable based on either element, but the Committee must conduct both assessments because of the valuable data and understanding gathered in the process. The Committee must prepare a formal statement on their social vulnerability findings and distribute it to community leaders, including the Community Advocate.

C. *The First Component of the Recommendation of the Adaptation Committee: Education and Outreach*

Once the Committee determines that an area is both geophysically and socially vulnerable, the Committee will develop a recommendation to the local governing body.¹¹⁹ The recommendation will have two components: a plan for community education and outreach and an adaptation strategy to lessen the flood damage.¹²⁰ The Committee should keep the concerns of the community at the forefront of its process and maintain open forums of communication throughout the process.¹²¹

¹¹⁵ ENARSON, *supra* note 18, at 270 (“Knowing the community by walking it also enables practitioners to more realistically assess the match (or mismatch) between need and resources.”); Abramowitz & Stafford, *supra* note 99, at 3.

¹¹⁶ See ENARSON, *supra* note 18, at 271.

¹¹⁷ See *infra* App. A, Sec. 5.a.ii.

¹¹⁸ See generally EPA’S PUBLIC INVOLVEMENT POLICY, *supra* note 73; Kaswan, *supra* note 77, at 44–45; JONES, *supra* note 19, at 8–9.

¹¹⁹ See *infra* App. A, Sec. 6.

¹²⁰ See *infra* App. A, Sec. 6.

¹²¹ See, e.g., JONES, *supra* note 19, at 8 (citing Brooklyn Ctr. For Independence of Disabled v. Bloomberg, 287 F.R.D. 240 (S.D.N.Y. 2012) (“One way in which emergency planners can

Building a positive relationship and opening communication between the local governing body and local community members are the most valuable components in strengthening resiliency.¹²² A positive relationship comes from effective communication and public involvement.¹²³ The Committee will create a plan to open channels of communication that will reach the community.¹²⁴ The Committee should include strategies such as “door-to-door outreach[] and working with non-governmental organizations that are already trusted sources of information.”¹²⁵ The lack of trust between government officials and vulnerable populations often creates communication barriers,¹²⁶ so the Committee should strive to build on the trust other organizations have already established.¹²⁷ This, again, is where a relationship with community leaders will have immense value. Partnering with churches, recreation centers, and schools can be highly effective because the community already looks to these organizations for information on local concerns.¹²⁸ Shana Jones, a faculty member of the Carl Vinson Institute of Government at the University of Georgia, explains that “[l]ocal community leaders often know best how to identify site-specific information, trusted communication pathways, and understand resource needs and concerns.”¹²⁹

In the recommended outreach efforts, the Committee should encourage use of data tools such as maps and trajectory charts to provide visual representation of risks to community members.¹³⁰ Notably, the maps must be fit for layperson interpretation.¹³¹ Ideally, the maps should be accessible to the public and effectively utilized without any expert present.¹³²

help ensure that the needs of the people with disabilities are incorporated sufficiently into the emergency plans is to include people with special needs in the planning process.”)).

¹²² See generally EPA’S PUBLIC INVOLVEMENT POLICY, *supra* note 73.

¹²³ JONES, *supra* note 19, at 10.

¹²⁴ See *infra* App. A, Sec. 6.

¹²⁵ JONES, *supra* note 19, at 10.

¹²⁶ See *id.*

¹²⁷ Kaswan, *supra* note 77, at 44 (explaining that “agencies could partner with nongovernmental community organizations that could facilitate community outreach, provide information, and help organize vulnerable or impacted communities”); THE CITY OF NORFOLK, COSTAL RESILIENCE STRATEGY 7 (2014) [hereinafter NORFOLK STRATEGY] (explaining that Norfolk uses a variety of media tools to reach residents including local TV and radio stations, print media, and “presentations to businesses and civic groups”).

¹²⁸ JONES, *supra* note 19, at 10; NORFOLK STRATEGY, *supra* note 127.

¹²⁹ JONES, *supra* note 19, at 9.

¹³⁰ *Id.* at 6.

¹³¹ *Id.*

¹³² *Id.* at 3–4 (explaining that geospatial modeling is a tremendous way to illustrate vulnerabilities and draw attention to important issues related to keeping diverse populations

Channels of communication will be particularly important when flood waters threaten people's homes and force the residents to temporarily seek shelter on higher ground.¹³³ Residents need to know when evacuation orders are in place, what transportation routes are available, and how to get assistance.¹³⁴ Even before an evacuation is necessary, communication is valuable to disperse general information regarding available resources to assist community members and updates about potential flooding threats and planned response.¹³⁵ These communications should also include what steps the governing body is taking to address the recurrent flooding issue on a long-term basis, when the governing body is hosting a public question-and-answer session, and who to contact with questions and concerns.¹³⁶

D. The Second Component of the Recommendation of the Adaptation Committee: Providing Recommendations to the Governing Body on Adaptation Decisions

To begin the recommendation process, the Committee must notify the community and invite its members to submit written concerns and suggestions.¹³⁷ The Committee must deliver the notice in an effective manner, that is specific to the community, meaning that the Committee should consider the nature of the community and what forms of media are most prominent.¹³⁸ The Committee should use the most effective communication channels based on the culture of the community.¹³⁹ For

of people safe. As complicated and technically impressive as such modeling may be, however, the important and hard work of building trust, engaging all stakeholders, and creating opportunities for shared decision-making and collaboration should not be diminished by the 'wow' factor that geospatial modeling—or any technology—can create.)

¹³³ See, e.g., Alvarez-Wertz, *supra* note 54 (residents did not receive any sort of warning and were caught off guard by a flooding event in the middle of the night).

¹³⁴ See Kaswan, *supra* note 77, at 43–44.

¹³⁵ See, e.g., NORFOLK STRATEGY, *supra* note 127.

¹³⁶ *Id.*

¹³⁷ See *infra* App. A, Sec. 6.

¹³⁸ *Infra* App. A, Sec. 6.

¹³⁹ See, e.g., EPA'S PUBLIC INVOLVEMENT POLICY, *supra* note 73, at 4 ("Whenever resources allow, provide technical or financial assistance to help people who otherwise could not contribute to, understand technical issues about and be involved in environmental decision-making processes. This will likely enrich the range of views you hear and improve the quality of public involvement."); JONES, *supra* note 19, at 8 ("Engaging non-technical stakeholders . . . has great potential to improve both data quality and increase community investment in modeled results.").

example, the Committee should deliver notice through commonly used newspapers and letters mailed to active community leaders. The Committee should reconnect with the community leaders and discuss methods to effectively disperse communication with the community. If community leaders emphasized that community members heavily rely on a local recreation center, the Committee should give notice through the recreation center. The Committee will build the foundation of an open and positive relationship with the community by encouraging their participation.¹⁴⁰

To avoid expensive investments that simply will not work, a proposal must have the support of a flood expert.¹⁴¹ This concern came to light in 2007 and 2008 when a citizen committee of Hampton City recommended a \$3 million project to rebuild a sandspit that scientists and engineers insisted would be ineffective.¹⁴² During a citizen committee meeting, the committee blatantly ignored the disapproval of local engineers and scientists.¹⁴³ As a result, the city invested millions of dollars into a project that is not expected to actually be effective.¹⁴⁴ To avoid this dilemma, the flood expert of the Committee must approve the recommendation as an effective measure.¹⁴⁵

Once the Committee has received written comments and concerns and the flood expert has expressed approval, the Committee will establish a draft proposal.¹⁴⁶ The draft proposal should include a statement from the Committee explaining how it incorporated the submitted comments or why it chose not to incorporate such comments.¹⁴⁷ The Committee must notify the community and host a public question-and-answer session.¹⁴⁸ The Committee must deliver the notice, and all future communications, through prior channels that the Committee found effective. If

¹⁴⁰ JONES, *supra* note 19, at 8.

¹⁴¹ See *infra* App. A, Sec. 6.

¹⁴² Patrick Lynch, *Scientists Reject Factory Point Plan*, DAILY PRESS, Dec. 19, 2007, http://wetlandswatch.org/Portals/3/WW%20documents/sea-level-rise/factory_point.pdf [<https://perma.cc/NW7W-FSVF>].

¹⁴³ *Id.*

¹⁴⁴ David Macaulay, *Factory Point's White Beaches Prove A Draw*, DAILY PRESS, Oct. 26, 2010, http://articles.dailypress.com/2010-10-26/news/dp-nws-cp-factory-point-20101026_1_precon-marine-factory-point-grandview-nature-preserve [<https://perma.cc/3KM3-M8C2>].

¹⁴⁵ See *infra* App. A, Sec. 6.

¹⁴⁶ *Infra* App. A, Sec. 6.

¹⁴⁷ This process is important for two reasons: (1) it forces The Committee to assess the comments and make a deliberate decision regarding the comments; and (2) it continues the open channel of communication between the decision-makers and the public.

¹⁴⁸ See *infra* App. A, Sec. 6.

the prior channels were ineffective, the Committee should use improved methods based on the feedback of community leaders.

After the question-and-answer session, the Committee will make a final decision on the recommendation it will provide to the local governing body.¹⁴⁹ The factors of consideration for the Committee in establishing viable proposals should be: (1) the cultural value of the at-risk community;¹⁵⁰ (2) the extent of the social vulnerability of the community; and (3) the scientifically supported predictions of the effectiveness of the proposed solution.¹⁵¹ The goal of these factors is to find and utilize value in the community, outside of economic revenue, in order to justify the efforts to adapt to the flooding, rather than letting the floods destroy the area and force the residents to vacate.

E. Addressing Relocation

Residents of the Southeast Newport News community have reason to be concerned about the greater Newport News City's potential plans to relocate the existing community to make room for redevelopment.¹⁵² Redeveloping a shoreline area into a popular tourist venue seems like an obvious economic choice. However, the government should look beyond the revenue possibility and serve the interests of the already established community. The economic value of a community alone fails to recognize the historical and cultural value of the area.¹⁵³ Southeast Newport News, for example, is home to several historical landmarks such as the Victory Arch, the Congress and Cumberland Overlook, and the Monitor and Merrimack

¹⁴⁹ See *infra* App. A, Sec. 6.

¹⁵⁰ See *infra* App. A, Sec. 3 (defining cultural value as “[t]he significance attached to the history, practices, representations, expressions, knowledge, skills, instruments, objects, artifacts, and cultural spaces that a community recognizes as part of its cultural and/or historical heritage. Cultural value can be evidenced, e.g., by the presence of a site registered by a state, national, or international historic, educational, cultural, scientific, or similar organization (e.g., the National Park Service’s National Register of Historic Places [or as a World Heritage Site by the United Nations Educational, Scientific, and Cultural Organization]”).

¹⁵¹ See *infra* App. A, Sec. 6.

¹⁵² See, e.g., DEP’T OF DEV., CITY OF NEWPORT NEWS, GREAT THINGS ARE HAPPENING IN NEWPORT NEWS: SOUTHEAST COMMUNITY & DOWNTOWN 3–6 (2012), <https://www.nnva.gov/659/Downtown-the-Southeast-Community-PDF> [<https://perma.cc/RCP6-MHAH>].

¹⁵³ See generally CITY OF NEWPORT NEWS, CITY COUNCIL WORK SESSION, SUPERBLOCK CHARRETTE (2015). *Id.* at 36 notes the “preservation and adaptive reuse of historical properties as opportunities arise” is a “Flexible/Market-Dependent Action[.]” demonstrating that historical and cultural aspects of a community are the last priority, if a priority at all, as opposed to economic potential which absorbs the main focus.

Overlook, despite not being economically prosperous.¹⁵⁴ Governing officials have the moral obligation to address social injustices, especially those brought on by natural disasters such as recurrent flooding.¹⁵⁵

To avoid this problem, the ordinance establishes a clear standard that discourages relocation for the purpose of gentrification and commercial redevelopment.¹⁵⁶ When considering relocation, the local governing body has two options: (1) invest in protective measures that will allow the current residents of the community to remain; or (2) relocate the residents of the community and declare the property as unfit for further development and instead use the property for a public purpose.¹⁵⁷

F. *Methods of Review*

The community must have available means to hold the Committee accountable to ensure that it meets its intended standards. The first review mechanism is inherent in the structure of the Committee—the Committee’s recommendation must meet the local governing body’s approval.¹⁵⁸ The Committee is merely providing a recommendation, which has no force of law until the governing body adopts it. Ideally, the local governing body has an interest in ensuring that the Committee has

¹⁵⁴ See, e.g., *Victory Arch*, CITY OF NEWPORT NEWS, <http://www.newport-news.org/visitors/things-to-do/outdoors-and-recreation/14/victory-arch> [<https://perma.cc/U85Z-N7SH>] (last visited Nov. 15, 2016); *Congress and Cumberland Overlook*, CIVILWARALBUM.COM, <http://www.civilwaralbum.com/misc/peninsular33.htm> [<https://perma.cc/U3ZW-KUFQ>] (last visited Nov. 15, 2016); Richard Edling, *Monitor and Merrimack Overlook*, CIVILWARALBUM.COM, <http://www.civilwaralbum.com/misc/peninsular31.htm> [<https://perma.cc/6W37-FMVM>] (last visited Nov. 15, 2016).

¹⁵⁵ Verchick, *supra* note 4, at 66–67 (“Building resilience . . . entails not just good engineering, but also relieving the burdens of social vulnerability. . . . [T]he job of building resilience—and thus the job of building resilience—and thus the job of reducing social vulnerability—is more than a politician’s kind turn, more than charity; it is the obligation of a free society. To fail to provide it is an injustice”).

¹⁵⁶ See *infra* App. A, Sec. 7.

¹⁵⁷ Public purposes include flood protection strategies, such as living shorelines, as well as leisure areas such as parks or beaches designed to endure recurrent floods. For example, CITY OF NEWPORT NEWS CITY COUNCIL & CITY OF NEWPORT NEWS PLANNING COMMISSION, SOUTHEAST COMMUNITY URBAN WATERFRONT DESIGN STUDY RECOMMENDATIONS 45 (2007), <https://www.nngov.com/DocumentCenter/View/782> [<https://perma.cc/L92H-R2XY>], recognizes that raised pedestrian trails along creeks and other waterways can mitigate flood damage. ABHAS K. JHA ET AL., CITIES AND FLOODING, A GUIDE TO INTEGRATED URBAN FLOOD RISK MANAGEMENT FOR THE 21ST CENTURY 36 (World Bank, ed. 2012) notes other examples, including multi-purpose retaining basins such as parking facilities that also serve as water storage during a flood event.

¹⁵⁸ See *infra* App. A, Sec. 7–8.

provided a recommendation that sufficiently represents the community's best interest because the governing body recognizes the need to protect the vulnerable. This form of review, however, is not sufficient by itself because local governing bodies have their own interests, which often conflict with those of at-risk communities.¹⁵⁹

The ordinance includes two other forms of review: a petition for reconsideration and a citizen suit.¹⁶⁰ A community member does not have to wait until the governing body decides to adopt a recommendation from the Committee; he or she can file a petition for reconsideration with the local governing body after the Committee has submitted a proposal.¹⁶¹ If the governing body does not satisfactorily respond to the petition for reconsideration, the community member can file a citizen suit to challenge the actions of the Committee and the governing body.¹⁶² The community member may challenge the process, claiming the Committee failed to sufficiently fulfill the required steps, or may challenge the final recommendation and adoption, claiming that the recommendation and its approval contradict the needs of the community.¹⁶³

The Community Advocate is responsible for instigating and/or assisting with the petition for reconsideration and the citizen suit.¹⁶⁴ The Community Advocate must be available to meet with community members to discuss their concerns and prepare the appropriate response. The citizen suit provisions and the availability of the community advocate are vital to the effectiveness of the ordinance.¹⁶⁵

CONCLUSION

Recurrent flooding is an inevitable threat for many communities and will continue to become more prevalent as sea level continues to rise.¹⁶⁶ Some government agencies are already developing planning and investment strategies to minimize the destruction of floods.¹⁶⁷ Local governments of coastal communities, like Newport News, must make decisions

¹⁵⁹ Kaswan, *supra* note 71, at 273–74.

¹⁶⁰ *See infra* App. A, Sec. 8.

¹⁶¹ *See infra* App. A, Sec. 8.

¹⁶² *See infra* App. A, Sec. 8.

¹⁶³ *See infra* App. A, Sec. 8.

¹⁶⁴ *See infra* App. A, Sec. 8.

¹⁶⁵ *See* Kaswan, *supra* note 71, at 273–74 (noting that the Community Advocate helps to level the disparity in ability to enforce environmental laws).

¹⁶⁶ SILTON & GRANNIS, *supra* note 2, at 1.

¹⁶⁷ *See, e.g.*, NORFOLK STRATEGY, *supra* note 127.

about how to respond to recurrent flooding that is damaging residential property, infrastructure, and commercial areas. But the governing officials must do so in a manner that protects the communities within the jurisdiction that are disproportionately suffering because of social vulnerability. Through the decision-making process, it is necessary for agencies to conduct their analysis by incorporating the social vulnerability of a community to account for their unique needs during a flooding emergency.¹⁶⁸ This model ordinance offers a starting place to evaluate and establish concrete standards for local governing bodies to follow.

A local government within Virginia that seeks to implement the model ordinance must confront the Dillon Rule.¹⁶⁹ Because of the Dillon Rule, local governments have no authority beyond the power expressly delegated to them by the General Assembly.¹⁷⁰ In Virginia, the General Assembly has delegated authority to localities sufficient to support this model ordinance.¹⁷¹ For example, the General Assembly has required each locality to develop 20-year land use plans, which include water quality protection measures for tidal areas.¹⁷² The General Assembly also encourages localities to restrict development of shorelines by offering tax credits for shoreline buffers, and by authorizing the transfer of development rights.¹⁷³ On the federal level, FEMA provides localities with another source of authority by requiring hazard mitigation planning, including floodplain management, in order to qualify for FEMA programs.¹⁷⁴ The Dillon Rule is not likely to be an impossible hurdle, but local governments should note this legal factor.¹⁷⁵ Furthermore, a state could implement similar standards in the Comprehensive Plan in order to delegate the authority to local governments.

¹⁶⁸ Clark et al., *supra* note 41, at 75.

¹⁶⁹ Stiles, *supra* note 37, at 8.

¹⁷⁰ See, e.g., SILTON & GRANNIS, *supra* note 2, at 2.

¹⁷¹ Stiles, *supra* note 37, at 10–15.

¹⁷² *Id.* at 10.

¹⁷³ *Id.* at 12.

¹⁷⁴ *Id.* at 10.

¹⁷⁵ See, e.g., SILTON & GRANNIS, *supra* note 2, at 2 (“The General Assembly specifically authorized local governments to regulate development in floodplains”).

APPENDIX A

1. **Purpose:** The purpose of this ordinance is to ensure the resiliency of at-risk communities. This ordinance seeks to accomplish this purpose by promoting the adoption of adaptation measures resulting from educational outreach to affected citizens within an at-risk community; inclusive dialogue with community members, community leaders, and local governing officials of an at-risk community as well as with local flood experts; and the best scientific evidence available at the time of the adoption of adaptation measures.
2. **Summary of ordinance framework:** The Committee shall be established once the jurisdiction's governing body decides that a community is geophysically vulnerable. The Committee members are independent of the jurisdiction's governing body and economic influences. The Committee's first task is to determine whether a geophysically vulnerable community is at risk due to its social vulnerability. If the community is not at risk, the Committee may disperse. If the community is at risk, the Committee shall make a recommendation to the governing body as a response to the geophysical and the social vulnerability. The recommendation shall contain a plan for education and outreach to the at-risk community, as well as a plan for adaptation.
3. **Definitions:**
 - a. **At-risk community.** A portion of a locality that the Committee determines is both geophysically and socially vulnerable within the meaning of this ordinance. It may be a subsection, neighborhood, or town within the jurisdiction.
 - b. **The Committee.** The Response to Flooding Committee established in accordance with this ordinance.
 - c. **Community advocate.** A citizen admitted to the Virginia State Bar who has the ability to advocate in a formal court setting; when possible, the advocate may be a resident of the at-risk community.
 - d. **Community leader.** A citizen of the geophysically vulnerable community for which the Committee is formed who holds a leadership position in a community organization with strong connections to other community members.

- e. Community member. A citizen or resident of a community.
 - f. Cultural value. The significance attached to the history, practices, representations, expressions, knowledge, skills, instruments, objects, artifacts, and cultural spaces that a community recognizes as part of its cultural and/or historical heritage. Cultural value can be evidenced, e.g., by the presence of a site registered by a state, national, or international historic, educational, cultural, scientific or similar organization (e.g., the National Park Service's National Register of Historic Places).
 - g. Geophysically vulnerable. The risk of damage to infrastructure and/or natural resources due to its location in a High Flood Risk Area.
 - h. High Flood Risk Area. The land in the flood plain within a community subject to a 1 percent or greater chance of flooding in any given year, or land area that would be inundated by the 1-percent-annual-chance (100-year) flood based on future-conditions hydrology (i.e., the same standard as that defined by the Federal Emergency Management Agency's National Flood Insurance Program).
 - i. Local flood expert. An individual (i) certified as a floodplain manager by the Association of State Floodplain Managers, and (ii) possessing particular knowledge of the geophysically vulnerable community; the local flood expert may or may not be a member of the community.
 - j. Relocation. A systematic plan adopted by a jurisdiction in which it determines to move individuals and/or businesses out of a geophysically vulnerable area.
 - k. Social vulnerability. That part of a community's susceptibility to harm that can be attributed to a set of demographic characteristics as determined by the process described in Section 5 of this ordinance.
- 4. Establishment of the Committee:**
- a. The governing body shall make an identification of a community's geophysical vulnerability whenever any member of the governing body raises a motion

or any citizen files a petition with the governing body seeking the identification. Upon receipt of the motion or the petition, the governing body shall make an explicit determination about the community's geophysical vulnerability, and, if it determines such exists for any community within the jurisdiction, shall establish the Committee.

- b. The geophysically vulnerable community must be notified once the Committee has been established. Notification may be delivered through means commonly used by the governing body.
- c. The Committee shall be comprised of at least one member of the jurisdiction's governing body, one local flood expert, and one community leader. Although additional members can be included, members of the jurisdiction's governing body shall not fill more than two times the number of positions that local flood experts or community leaders fill.
- d. When the Committee determines that a geophysically vulnerable community is socially vulnerable, the Committee shall simultaneously designate a Community Advocate. The Community Advocate will be independent from the governing body and the Committee, and has the responsibility of ensuring a complete and fair process. The governing body shall solicit members of the bar, and provide reasonable remuneration to the selected Community Advocate. The Community Advocate's primary purpose can be found under Section 8, Methods of Review.

5. Determining Social Vulnerability:

- a. The Committee shall make a determination of the geophysically vulnerable community's social vulnerability using the criteria identified below. The Committee shall find the community to be socially vulnerable if it finds one or both subsections indicate vulnerability for any portion of the community.
 - i. Social Vulnerability Determination based on demographic data. A community is socially vulnerable if any one of the following

combination of factors is fulfilled.¹⁷⁶ All factors are based on a standardized calculation.¹⁷⁷

- (1) Percent of unemployment and percent in poverty are each greater than 1, and per capita income is less than -1.
 - (2) Percent in poverty and percent renters are each greater than 1.
 - (3) Percent in poverty and percent on social security are each greater than 1.
 - (4) Percent over 65 years old and percent in nursing homes are greater than 1, income is negative and percent on social security is positive.
- ii. Social Vulnerability Determination based on subjective determination.
- (1) The Committee shall meet with at least two community leaders to discuss the concerns and the difficulties in preparing for and responding to flooding.
 - (2) After the Committee finds that the geophysically vulnerable community is also socially vulnerable, it shall proceed to creating its recommendations.

¹⁷⁶ The formation of these factors is based on the work of Dr. Sarah Stafford in Sarah Stafford & Jeremy Abramowitz, *An Analysis of Methods for Identifying Socially Vulnerability to Environmental Hazards: A Case Study of Tidewater Virginia* (2015) (working paper) (on file with author).

¹⁷⁷ INST. FOR DIG. RESEARCH AND EDUC., *supra* note 114 (“A standardized variable (sometimes called a z-score or a standard score) is a variable that has been rescaled to have a mean of zero and a standard deviation of one. For a standardized variable, each case’s value on the standardized variable indicates its difference from the mean of the original variable in number of standard deviations (of the original variable). For example, a value of 0.5 indicates that the value for that case is half a standard deviation above the mean, while a value of -2 indicates that a case has a value two standard deviations lower than the mean. Variables are standardized for a variety of reasons, for example, to make sure all variables contribute evenly to a scale when items are added together, or to make it easier to interpret results of a regression or other analysis.”). The standardized calculation of these factors will be available for the state of Virginia through the Virginia Institute of Marine Science in early 2016.

6. Forming a Recommendation:

- a. After the Committee has identified an at-risk community, the Committee shall provide the governing body with a recommendation. The recommendation has two primary objectives. The first is an education and outreach plan; the second is an adaptation plan.
 - i. Education and Outreach:
 - (1) The Committee shall develop proposals for an education and outreach plan for adoption and implementation by the governing body. The education and outreach effort shall inform the at-risk community about the following matters:
 - (a) Community flood risks (general awareness about the status of sea level rise, elevation levels in the at-risk community, highlighting the most vulnerable communities, the future projections, etc.)
 - (b) Evacuation plans and available resources during an evacuation
 - (c) Available funding to assist with damage costs
 - (2) The flood expert of the Committee should use his/her expertise to help shape the content of the education and outreach plan.
 - (3) Education methods should vary based on the unique aspects of the at-risk community, including the size of the community. The following requirements apply as the minimum level of outreach to every identified community:
 - (a) The Committee shall designate educators to reach out

- to at least three established community organizations /groups with at least 20 participating members. Possible organizations/groups include churches, recreation centers, farmers markets, etc.
- (b) The Committee shall designate educators to coordinate with community leaders and arrange at least three small group conversations designed to present information and encourage questions.
- ii. Adaptation
- (1) The Committee shall create proposals for adaptation measures to be considered for adoption and implementation by the jurisdiction's governing body. The proposals shall be based on the available scientific evidence. The Committee shall, in creating its proposals, give due consideration to proposals from the at-risk community and its citizens.
- (2) The Committee should place the greatest emphasis on the following factors, and treat these factors with the utmost concern in developing the proposals. These factors will also be known as "high priority factors."
- (a) Cultural value within the at-risk community, consistent with the definition of cultural value provided above;
- (b) Severity of the vulnerability of the at-risk community, and the specific needs that became prevalent through the social vulnerability determination;

- (c) The effectiveness of the proposed solutions to the long-term needs of the at-risk community, with consideration for the cost of the proposed solution in relation to its permanency; and
 - (d) A qualitative assessment of the most significant values of the at-risk community, as determined by community leaders.
- iii. The Committee must open a public comment period by notifying the at-risk community of the proposals and inviting responses. The public comment period must offer sufficient time for parties to file written responses to the proposal.
- iv. The Committee shall sponsor at least one public meeting in an open forum that invites questions, answers, and concerns, where it will present the proposals regarding education and outreach, as well as adaptation to the community members.
- v. The Committee shall prepare and provide to the governing body a summary of the received responses and the conversations from the public meeting. The Committee shall include an explanation of how the concerns and comments were incorporated, or why they were not incorporated into the final proposal.

7. Relocation

- a. If the Committee's proposal contains a recommendation for strategic relocation of residents of the at-risk community, the Committee shall simultaneously create a plan for the newly abandoned area.
 - i. Plans for the abandoned area must be designed to prevent further destruction to the environment/water quality and be of public benefit.

- ii. The local governing body may not allow relocation for the purposes of redeveloping the land and investing resources into preserving the property for more profitable or higher socio-economic development.
- b. The Committee shall not recommend relocation absent an affirmative finding by the Committee that alternatives to relocation are not feasible.
- c. Any recommendation for relocation must include a recommendation on the future public use of the abandoned area.

8. Methods of Review

- a. The governing body shall receive the Committee's final proposal and review and approve, modify, or disapprove it.
- b. Upon receipt of the final proposal, any person may file a petition with the governing body to challenge the decision of the Committee, alleging a failure of the Committee to fulfill its duties in accordance with this ordinance, and seeking a remand by the governing body to the Committee for reconsideration.
- c. After the governing body acts on the proposal, any person can file a suit against the jurisdiction's governing body challenging the approval, modification, or disapproval.
- d. The governing body shall ensure the availability of a Community Advocate to provide counsel to any citizen of the at-risk community expressing to the governing body an interest in filing a petition or suit.
- e. A court may issue an injunction, and/or an order to the governing body or the Committee to reconsider its decisions.