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# COME HELL OR HIGH WATER: REEXAMINING THE TAKINGS CLAUSE IN A CLIMATE CHANGED FUTURE

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## I. INTRODUCTION

By the end of this century climate change will cause a global rise in sea level that is unprecedented in American history. Thousands of square miles of land, and several major cities, are at risk of becoming submerged under ocean waters.<sup>1</sup> This large-scale sea level rise will cause a collision between two fundamental doctrines of property law—the public trust doctrine and the takings clause of the Fifth Amendment. The public trust doctrine will require the states to assert control over vast amounts of private lands that are submerged by the ocean and have become tidal lands and waters subject to the public trust. Yet, if this act is considered a taking it may impose a significant financial burden on the states to provide adequate compensation, and perhaps even be impracticable given the substantial amounts of land and large number of private property owners threatened by large-scale sea level rise.

This large-scale sea level rise caused by climate change will present a new and unique challenge to current takings jurisprudence. For the past century, many of the most difficult and contentious issues arising out of the takings clause involved determining whether a government regulation of private property constituted a taking.<sup>2</sup>

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1. Jeremy Weiss & Jonathan Overpeck, University of Arizona Department of Geosciences Environmental Studies Laboratory, *Climate Change and Sea Level* (2006), [http://www.geo.arizona.edu/dgesl/research/other/climate\\_change\\_and\\_sea\\_level/sea\\_level\\_rise/sea\\_level\\_rise.htm](http://www.geo.arizona.edu/dgesl/research/other/climate_change_and_sea_level/sea_level_rise/sea_level_rise.htm); see also *Rising Seas Will Reshape the U.S.*, L.A. TIMES, Sept. 23, 2007, at A16.

2. The Supreme Court first held that a government regulation could violate the takings clause in *Pennsylvania Coal Co. v. Mahon*, 260 U.S. 393, 416 (1922). In a series of cases over the

Traditionally, the state action implicated by climate change and large-scale sea level rise—where the government either takes title to private land or subjects it to the public trust—has been considered an undisputed taking that requires compensation.<sup>3</sup> While this *per se* takings rule is one of the most stable and uncontroversial aspects of current takings jurisprudence,<sup>4</sup> the unprecedented nature of large-scale sea level rise caused by climate change requires a reexamination of whether it should *always* be a taking any time the government appropriates or occupies private land.

This Note examines how climate change and the resulting sea level rise will place new tensions on the interaction of the public trust doctrine and the takings clause. It argues that it should not be considered a taking when a state takes title or asserts control over private lands submerged due to climate change and large-scale sea level rise, even if the government takes the entire property interest of a private property owner. Part II explains the basics of climate change and sea level rise. Part III explores the public trust doctrine as it applies to coastal lands and waters, the common law doctrine of erosion and accretion, and the takings clause. Part IV considers the tension that climate change will create between the public trust doctrine and the takings clause. Finally, Part V reexamines the takings clause in light of our climate changed future and argues for a narrow exception to the *per se* possessory takings rule.

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past thirty years, the Court has continually refined its regulatory takings jurisprudence. *See, e.g.*, *Lucas v. S.C. Coastal Council*, 505 U.S. 1003, 1032 (1992) (holding that a regulation which deprives a property owner of all economically beneficial use of the land is a categorical taking unless it regulates a common law nuisance); *Penn Cent. Transp. Co. v. New York City*, 438 U.S. 104, 124 (1978) (noting factors the Court will consider when determining whether a regulation is a taking).

3. *See, e.g.*, *Lingle v. Chevron U.S.A. Inc.*, 544 U.S. 528, 537 (2005) (“The paradigmatic taking requiring just compensation is a direct government appropriation or physical invasion of private property.”); *Palazzolo v. Rhode Island*, 533 U.S. 606, 607 (2001) (“The clearest sort of taking occurs when the government encroaches upon or occupies private land for its own proposed use.”).

4. While the determination whether an action is a taking may be uncontroversial, other aspects of the takings analysis for possessory takings can produce substantial controversy. One recent example is the public outcry following the Supreme Court’s holding in *Kelo v. City of New London*, 545 U.S. 469, 490 (2005), that economic and commercial development is a valid “public use” for which the government may condemn private property. *See* Leonard C. Gilroy, *KELO: ONE YEAR LATER* (2006), [http://www.reason.org/commentaries/gilroy\\_20060621.shtml](http://www.reason.org/commentaries/gilroy_20060621.shtml).

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## II. CLIMATE CHANGE AND SEA LEVEL RISE

### A. *The Basics of Climate Change*

The concentration of greenhouse gases in the atmosphere has increased significantly since the 18th century and the dawning of the industrial revolution.<sup>5</sup> The four principal greenhouse gases emitted by anthropogenic activities are carbon dioxide, methane, nitrous oxide and halocarbons.<sup>6</sup> The atmospheric concentration of carbon dioxide has increased from a pre-industrial value of 280 ppm (parts per million) to 379 ppm in 2005, primarily because of the burning of fossil fuels and changes in land use.<sup>7</sup> The atmospheric concentrations of methane and nitrous oxide have similarly increased, mainly due to increased agriculture.<sup>8</sup> The current atmospheric concentrations of these greenhouse gases now “far exceed” the atmospheric concentration levels measured in ice cores spanning thousands of years.<sup>9</sup>

This increase in the atmospheric concentration of greenhouse gases alters the energy balance of the climate system by trapping heat near the Earth’s surface.<sup>10</sup> As a result, there has been an “unequivocal” warming of the Earth.<sup>11</sup> The average global surface temperature today is 0.76°C warmer than it was in 1850-1899, and eleven of the last twelve years have been the warmest on record since 1850.<sup>12</sup> This warming trend is gaining speed, as “[t]he linear warming

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5. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *Summary for Policymakers*, in CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS. CONTRIBUTION OF WORKING GROUP I TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 2 (S. Solomon et al. eds., 2007) (hereinafter SUMMARY FOR POLICYMAKERS).

6. Piers Forster et al., *Changes in Atmospheric Constituents and in Radiative Forcing*, in CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS, *supra* note 5, at 135.

7. SUMMARY FOR POLICYMAKERS, *supra* note 5, at 2.

8. *Id.* at 3. The atmospheric concentration of methane has increased from a pre-industrial value of 715 ppb (parts per billion) to 1774 ppb in 2005. The atmospheric concentration of nitrous oxide has increased from 270 ppb to 319 ppb during this same time period. *Id.*

9. *Id.* at 2. In the ten thousand years before 1750, atmospheric concentrations of carbon dioxide stayed within the range of 280 ppm ± 20 ppm. Herve Le Treut et al., *Historical Overview of Climate Change Science*, in CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS, *supra* note 5, at 100.

10. Le Treut et al., *supra* note 9, at 115-16.

11. SUMMARY FOR POLICYMAKERS, *supra* note 5, at 5.

12. *Id.*

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trend for the last 50 years . . . is nearly twice that for the last 100 years.”<sup>13</sup>

If humans were to eliminate *all* future greenhouse gas emissions there would still be warming in this century and beyond due to the length of time that greenhouse gases remain in the atmosphere.<sup>14</sup> Under an extremely optimistic scenario in which the concentration of greenhouse gases is kept constant at year 2000 levels, there would still be an additional 0.6°C rise in temperature by the end of this century.<sup>15</sup> The Intergovernmental Panel on Climate Change (“IPCC”) predicts a temperature increase of between 1.8°C and 4.0°C by the end of this century, based on modeling of six likely scenarios for future greenhouse gas emissions.<sup>16</sup>

### *B. Sea Level Rise*

An increase in the average global surface temperature causes sea level to rise through two processes—thermal expansion and the melting of land-based ice.<sup>17</sup> First, thermal expansion occurs as the temperature of the ocean rises, because water expands as it warms.<sup>18</sup> Second, when land-based ice in glaciers and ice sheets melts, additional water is transferred to the ocean and sea level rises.<sup>19</sup> To illustrate the large quantities of water stored in land-based ice, a complete melting of the Greenland Ice Sheet would raise sea level by approximately seven meters (22.97 feet), while a complete melting of the West Antarctic Ice Sheet would cause a sea level rise of five to six meters (16.4 to 19.7 feet).<sup>20</sup>

The current 0.76°C increase in temperature from the late 19th century has already caused oceans to warm and sea level to rise. The average global ocean temperature has risen by 0.10°C from 1961 to

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13. *Id.*

14. Gerald A. Meehl et al., *Global Climate Projections*, in CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS, *supra* note 5, at 824-25. Approximately twenty percent of emitted carbon dioxide will remain in the atmosphere for many millennia, while more than half will remain in the atmosphere for less than 100 years. The lifetime of a molecule of methane in the atmosphere is about twelve years, while the lifetime for nitrous oxide is about 110 years. *Id.* at 824.

15. SUMMARY FOR POLICYMAKERS, *supra* note 5, at 13.

16. *Id.*

17. Nathaniel L. Bindoff et al., *Observations: Oceanic Climate Change and Sea Level*, in CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS, *supra* note 5, at 408.

18. *Id.* at 409.

19. *Id.* at 408.

20. Meehl et al., *supra* note 14, at 819.

2003.<sup>21</sup> After thousands of years of stability, sea level gradually rose during the 20th century and is now rising at an increased rate.<sup>22</sup> Since 1993, the rate of annual sea level rise has been 3 mm per year.<sup>23</sup> Thermal expansion and land-based ice melting have each accounted for approximately half of this recent rise in sea level.<sup>24</sup>

In this century, the rate of sea level rise will increase.<sup>25</sup> The Fourth Assessment Report of the IPCC estimates that by 2100 sea level will rise by 0.6 meters (1.97 feet) or more, and that sea surface temperatures will rise by up to 3°C.<sup>26</sup> However, there is a possibility that sea level rise could be substantially larger than these estimates because the IPCC's projection for this century is based on a minimal contribution to sea level rise from melting of the Greenland Ice Sheet.<sup>27</sup> The IPCC acknowledges that there is some evidence that points to a quicker collapse of the Greenland and West Antarctic Ice Sheets than their sea level rise projections assume.<sup>28</sup> Indeed, recent research shows that the Greenland Ice Sheet is melting more rapidly than scientists expected.<sup>29</sup> In addition, while the IPCC sea level rise projection assumes that the West Antarctic Ice Sheet's net contribution to sea level rise in the coming centuries will be

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21. Bindoff et al., *supra* note 17, at 387.

22. *Id.* at 409.

23. *Id.*

24. *Id.*

25. *Id.*

26. Robert J. Nicholls et al., *Coastal Systems and Low-Lying Areas*, in CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY. CONTRIBUTION OF WORKING GROUP II TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 317 (2007).

27. Meehl et al., *supra* note 14, at 752 ("The Greenland Ice Sheet is projected to contribute to sea level after 2100 . . . . The contribution would be greater if dynamical processes omitted from the current models increased the rate of ice flow, as has been observed in recent years.").

28. *See id.* at 821 ("Further accelerations in ice flow of the kind recently observed in some Greenland outlet glaciers and West Antarctic ice streams could increase the ice sheet contributions substantially . . . ."); *id.* at 819 ("Recent satellite and *in situ* observations of ice streams behind disintegrating ice shelves highlight some rapid reactions of ice sheet systems. This raises new concern about the overall stability of the West Antarctic Ice Sheet . . . .").

29. *See, e.g.*, Eric Rignot & Pannir Kanagaratnam, *Changes in Velocity Structure of the Greenland Ice Sheet*, 311 SCIENCE 986, 988 (2006) ("Greenland's mass loss therefore doubled in the last decade, well beyond error bounds. Its contribution to sea-level rise increased from  $0.23 \pm 0.08$  mm/year in 1996 to  $0.57 \pm 0.1$  mm/year in 2005."); Richard A. Kerr, *A Worrying Trend of Less Ice, Higher Seas*, 311 SCIENCE 1698, 1698 (2006) (noting recent studies showing the Greenland and Antarctic Ice Sheets melting quicker than predicted and stating that "[s]ome of the glaciers draining the great ice sheets of Antarctica and Greenland have sped up dramatically, driving up sea level and catching scientists unawares").

negative,<sup>30</sup> current research shows that the ice sheet has been losing mass since 2002 at a rate that already contributes 0.4 mm per year to sea level rise.<sup>31</sup>

### C. Sea Level Rise in the United States

A rise in sea level caused by climate change threatens to inundate substantial amounts of coastal property in the United States in the coming century and beyond. A one meter (3.28 feet) rise in sea level would submerge approximately 25,000 square miles of American soil in the lower 48 states.<sup>32</sup> The Eastern and Gulf coasts will be the hardest hit, with Louisiana, Texas, Florida, North Carolina, and South Carolina projected to lose the most land.<sup>33</sup> Over 20% of the United States' remaining coastal wetlands could be inundated by the end of this century.<sup>34</sup> With a one meter rise in sea level, most of Miami, virtually all of New Orleans, and parts of Boston would be underwater.<sup>35</sup>

Population, property values, and investment along the coasts continue to grow rapidly in spite of the threat posed by rising seas.<sup>36</sup> While affluent nations such as the United States will very likely attempt to mitigate the impacts of sea level rise using techniques such as bulkheads or beach nourishment projects, these mitigation measures will be costly and limited by the vast scope of coastline threatened by large-scale sea level rise.<sup>37</sup> For example, protecting the

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30. Meehl et al., *supra* note 14, at 752.

31. Isabella Velicogna & John Wahr, *Measurements of Time-Variable Gravity Show Mass Loss in Antarctica*, 311 *SCIENCE* 1754, 1755 (2006).

32. *Rising Seas Will Reshape the U.S.*, *L.A. TIMES*, Sept. 23, 2007, at A16. This number does not account for the loss of land in Hawaii and Alaska. *Id.*

33. *Id.*

34. Christopher B. Field et al., *North America*, in *CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY*, *supra* note 26, at 630.

35. Weiss & Overpeck, *supra* note 1.

36. See Field et al., *supra* note 34, at 630 (stating that an additional 25 million people will live in coastal regions over the next 25 years); Matt Woolsey, *Most Expensive ZIP Codes in the U.S.*, *FORBES*, Sept. 13, 2007, [http://www.forbes.com/realestate/2007/09/12/zip-expensive-list-forbeslife-cx\\_07zip\\_mw\\_0913realestate.html](http://www.forbes.com/realestate/2007/09/12/zip-expensive-list-forbeslife-cx_07zip_mw_0913realestate.html) (noting that the list of zip codes with the highest property values in the United States is "heavy with ZIPs along the coasts" and "dominated by ZIPs in the nation's coastal states" because of the lack of land to develop along the coasts).

37. The United States has 95,439 miles of shoreline. National Oceanic and Atmospheric Administration, <http://www.noaa.gov/coasts.html> (last visited January 29, 2008). Some have claimed that large-scale sea level rise caused by climate change does not represent a significant threat to the United States because we will be able to protect vulnerable and valuable coastal areas from this rise in sea level. *E.g.*, BJORN LOMBORG, *COOL IT: THE SKEPTICAL ENVIRONMENTALIST'S GUIDE TO GLOBAL WARMING* 61 (2007) ("[W]ith sea-level changes

beaches in Florida from a 0.5 meter (1.64 feet) rise in sea level using sand replenishment has an estimated cost range of \$1.7 to \$8.8 billion.<sup>38</sup>

In summary, climate change will cause a rise in sea level in the future that is unprecedented in American history. The current IPCC estimate projects a 0.6 meter (1.97 feet) rise in global sea level by 2100.<sup>39</sup> At one meter of sea level rise (3.28 feet), over 25,000 square miles of land would disappear and several major cities would be mostly underwater.<sup>40</sup> However, there is a possibility that we could experience a much greater rise in sea level because the Greenland and Antarctic Ice Sheets appear to be melting at rates not accounted for in our current sea level rise projections.<sup>41</sup> Even if aggressive measures are taken to cut future greenhouse gas emissions there will still be a substantial future rise in sea level.<sup>42</sup> Despite the inherent uncertainties in projecting sea level rise far into the future, we can be certain that an increasing amount of private coastal land and property will become inundated and submerged by the ocean due to the effects of climate change.

### III. PRIVATE AND PUBLIC PROPERTY INTERESTS IN COASTAL LANDS AND THE TAKINGS CLAUSE

#### A. *The Public Trust Doctrine*

The states possess title to most tidal lands and waters below the mean high-tide line through the public trust doctrine. The public trust doctrine, which dates back to early English common law and Roman law, provides that the state holds title to coastal lands and

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occurring slowly throughout the century, economically rational foresight will make sure that protection will be afforded to property that is worth more than the protection costs.”). Notwithstanding the costs and quantities of coastline that would have to be protected, such extensive artificial protections may be undesirable as they would have devastating ecological consequences and would result in the loss of beaches. *See, e.g.,* Carol M. Rose, *The Story of Lucas: Environmental Land Use Regulation Between Developers and the Deep Blue Sea*, in ENVIRONMENTAL LAW STORIES 237, 261-62 (Richard J. Lazarus & Oliver A. Houck eds., 2005) (discussing how erosion control devices and beach armoring accelerate and add to the overall loss of beaches, sand, and dunes).

38. Field et al., *supra* note 34, at 634.

39. *See supra* note 26 and accompanying text.

40. *See supra* notes 32-35 and accompanying text.

41. *See supra* notes 27-31 and accompanying text.

42. *See* Nicholls et al., *supra* note 26, at 317 (“Sea-level rise has substantial inertia and will continue beyond 2100 for many centuries.”).

waters below the mean high-tide line in trust for the public.<sup>43</sup> The public trust doctrine initially developed to ensure unimpeded public rights of navigation, commerce, and fishing in the tidal lands and waters.<sup>44</sup> In addition to these traditional public rights, courts have expanded the public trust doctrine to include other public rights in the coasts such as swimming, recreation, and conservation.<sup>45</sup> Any private use or right in these tidal lands and waters is necessarily subordinate to the public rights.<sup>46</sup> While there has been active scholarly debate on the extent and nature of the public trust doctrine,<sup>47</sup> since the 19th century the Supreme Court has repeatedly upheld the validity of the public trust doctrine as applied to state control over tidal lands and waters.<sup>48</sup>

After the American Revolution, the original thirteen states took title to tidal lands as inheritors of the English Crown; and later states admitted into the Union were vested with these same rights in tidal waters through the equal footing doctrine.<sup>49</sup> Each individual State then has the “authority to define the limits of the lands held in public trust and to recognize private rights in such lands as they see fit.”<sup>50</sup> As a result, the extent of public ownership of tidal lands varies among

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43. JOSEPH J. KALO ET AL., *COASTAL AND OCEAN LAW* 2-3 (3d ed. 2007).

44. *See, e.g.*, *Ill. Cent. R.R. Co. v. Illinois*, 146 U.S. 387, 452 (1892) (“It is a title held in trust for the people of the State that they may enjoy the navigation of the waters, carry on commerce over them, and have liberty of fishing therein freed from the obstruction or interference of private parties.”).

45. KALO ET AL., *supra* note 43, at 45.

46. *See Shively v. Bowlby*, 152 U.S. 1, 57 (1894) (“[The] improvement [of tidal public trust lands and waters] by individuals, when permitted, is incidental or subordinate to the public use and right.”).

47. *Compare* Joseph L. Sax, *The Public Trust Doctrine in Natural Resource Law: Effective Judicial Intervention*, 68 MICH. L. REV. 471, 556-57 (1970) (arguing that the public trust doctrine is broader than the historical scope of public trust law), *with* James L. Huffman, *Speaking of Inconvenient Truths: A History of the Public Trust Doctrine*, 18 DUKE ENVTL. L. & POL’Y F. 1 (2007) (criticizing contemporary efforts to expand the public trust doctrine as distorting and misrepresenting the historical foundations of the doctrine).

48. *See, e.g.*, *Phillips Petroleum Co. v. Mississippi*, 484 U.S. 469, 476-77 (1988) (“Petitioners do not deny that broad statements of public trust dominion over tidelands have been included in this Court’s opinions since the early 19th century.”); *Ill. Cent. R.R. Co.*, 146 U.S. at 435 (“It is the settled law of this country that the ownership . . . over lands covered by tide waters . . . belong to the respective States . . .”).

49. *See, e.g.*, *Phillips Petroleum*, 484 U.S. at 473-74 (“Upon the American Revolution, these [public trust] rights . . . were vested in the original States . . . . The new States admitted into the Union . . . have the same rights as the original States in the tide waters, and in the lands under them . . . .”); Robert L. Fischman, *Global Warming and Property Interests: Preserving Coastal Wetlands as Sea Levels Rise*, 19 HOFSTRA L. REV. 565, 577 (1991) (“The ‘equal footing’ doctrine gives all other states the same rights as the original thirteen.”).

50. *Phillips Petroleum*, 484 U.S. at 475.



the states. For example, most states have kept the traditional mean high-tide line as the boundary between public and private property.<sup>51</sup> However, there is public ownership of the dry sand above the mean high-tide line in some states, while other states only hold title to the land below the mean low-tide line.<sup>52</sup> There is a limit to a state's authority to redefine or dispose of its public trust lands. A state cannot divest itself of its public trust responsibilities, and the interests of the public must be served.<sup>53</sup>

*B. The Common Law Doctrine of Erosion and Accretion*

Coasts are dynamic ecosystems that present a unique problem for property law because any property boundary based on the mean tide line will fluctuate and vary over time. The common law doctrine of erosion and accretion developed for situations when erosion causes the shoreline to move inland, or when accretion causes the shoreline to move toward the sea.<sup>54</sup> The general rule is that the public/private property line will shift with the mean tide line.<sup>55</sup> When there is erosion of the coast the public/private property line moves inland and a littoral owner will lose land.<sup>56</sup> Conversely, when accretion occurs the public/private property line will move toward the sea, and a littoral owner acquires title to the accretions.<sup>57</sup>

There are qualifications to the general rule that property lines move with the mean tide line. The doctrine of erosion and accretion only applies to gradual and imperceptible changes. Sudden alteration of the shoreline through avulsion will not change the property line.<sup>58</sup> In addition, any change to the shoreline that is not natural may modify this general rule. A majority of states allow the littoral owner to take title to unnatural accretions, so long as they are caused by a third party without the influence or consent of the littoral owner who

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51. *E.g.*, James G. Titus, *Rising Seas, Coastal Erosion, and the Takings Clause: How to Save Wetlands and Beaches Without Hurting Property Owners*, 57 MD. L. REV. 1279, 1292-93 (1998).

52. *Id.* at 1293.

53. *Ill. Cent. R.R. Co.*, 146 U.S. at 453.

54. *See, e.g.*, *Ford v. Turner*, 142 So. 2d 335, 342 (Fla. Dist. Ct. App. 1962) (stating that due to the dynamic nature of shorelines “[p]ublic policy demands a definite standard of quieting title to these areas despite the fact that occasionally some hardship may occur”).

55. *KALO ET AL.*, *supra* note 43, at 50.

56. *Id.*

57. *Id.*

58. *Id.*

will gain title to the accretions.<sup>59</sup> In other states, the state takes title to any artificially-created accretions.<sup>60</sup>

### C. *The Takings Clause*

The takings clause of the Fifth Amendment provides that “private property [shall not] be taken for public use, without just compensation.”<sup>61</sup> The takings clause places a condition upon the government interfering with private property rights, by requiring compensation if that interference amounts to a taking.<sup>62</sup> The Supreme Court has stated that one purpose of the takings clause is to prevent the government from “forcing some people alone to bear public burdens which, in all fairness and justice, should be borne by the public as a whole.”<sup>63</sup> The “paradigmatic” taking occurs with possessory takings when the government directly appropriates or physically invades private property.<sup>64</sup> In addition, government regulation of private property may constitute a taking if it “goes too far,” so that the effect of the regulation is equivalent to that of a “direct appropriation or ouster.”<sup>65</sup>

The question of whether a taking has occurred has been straightforward in the possessory takings context, when the government directly appropriates or physically invades private property for a public use. In these cases, the government’s action is undisputedly a taking and the contested issue is typically whether the taking was for a “public use”<sup>66</sup> or what “just compensation” is due to the private property owner.<sup>67</sup>

The Supreme Court has developed an extensive takings jurisprudence that guides the inquiry into whether a government regulation will be deemed a taking. One fundamental principle is that

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59. Titus, *supra* note 51, at 1368-69.

60. *Id.* at 1369.

61. U.S. CONST. amend. V. While the Fifth Amendment only directly applies to the federal government, the takings clause is applied to the states through its incorporation into the due process clause of the Fourteenth Amendment. *Chicago, Burlington and Quincy R.R. v. Chicago*, 166 U.S. 226, 241 (1897).

62. *See, e.g., Lingle v. Chevron U.S.A. Inc.*, 544 U.S. 528, 536-37 (2005).

63. *Armstrong v. United States*, 364 U.S. 40, 49 (1960).

64. *Lingle*, 544 U.S. at 537.

65. *Id.* (quoting *Pa. Coal Co. v. Mahon*, 260 U.S. 393, 415 (1922)).

66. *See, e.g., Kelo v. City of New London*, 545 U.S. 469 (2005); discussed *supra* note 4.

67. In general, the fair market value of the property taken is considered just compensation. However, this is a deceptively simple summary and “the law of just compensation is busy and complex.” JESSE DUKEMINIER ET AL., *PROPERTY* 958 (6th ed. 2006).

a regulation that controls a nuisance is never a taking, as the government should not have to pay to regulate behavior or land use that is harmful to the public health and safety.<sup>68</sup> In addition, there are two other categories of government regulation that are considered to be *per se* takings. First, *any* permanent physical occupation is considered a *per se* taking, regardless of the degree of the physical occupation or the existence of an important public purpose that is served by the physical occupation.<sup>69</sup> Second, a regulation that deprives a property owner of all economically beneficial use of the property is also considered a *per se* taking.<sup>70</sup> If the regulation does not prevent a nuisance and does not fall within either of the narrow *per se* takings categories then a court will conduct a balancing test that considers factors such as the character of the government action, the economic impact of the regulation on the property owner, and the property owner's investment-backed expectations.<sup>71</sup>

#### IV. THE IMPENDING COLLISION OF THE PUBLIC TRUST DOCTRINE AND THE TAKINGS CLAUSE

As sea level rises in the coming century and beyond an unprecedented amount of private property will become submerged beneath the ocean waters. On one hand, the public trust doctrine seemingly mandates that the states take title or assert the public trust over these private lands as they become tidal lands and waters. On the other, the takings clause seemingly requires the state to provide compensation if it takes these properties. When one considers the possibility that tens of thousands of square miles of land containing valuable coastal properties and entire cities such as Miami and New Orleans could become submerged, it seems impracticable for the states to protect and extend the public trust if they are required to

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68. *See generally* Hadacheck v. Sebastian, 239 U.S. 394 (1915) (holding that a city ordinance prohibiting the operation of brickyards was not a taking of an existing brickyard owner's property because the operation of brickyards was a nuisance that endangered the public health and safety).

69. *Loretto v. Teleprompter Manhattan CATV Corp.*, 458 U.S. 419, 435 (1982) (holding that a state law allowing cable companies to install permanent cable facilities on apartment buildings was a taking, and noting that a permanent physical invasion of property is "perhaps the most serious form of invasion of an owner's property interests").

70. *Lucas v. S.C. Coastal Council*, 505 U.S. 1003, 1026-32 (1992) (holding that any regulation that deprives a property owner of all economically beneficial uses of the property is a *per se* taking, except to the extent that "background principles of nuisance and property law" independently restrict the use of the property).

71. *See generally* Penn Cent. Transp. Co. v. New York City, 438 U.S. 104 (1978).

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provide full compensation to all private property owners. Thus, it appears that one effect of climate change will be a collision between two fundamental doctrines of American property law—the public trust doctrine and the takings clause.

*A. States Must Assert the Public Trust*

The public trust doctrine regarding state control over coastal lands and waters has been a relatively stable legal doctrine that dates back to Roman times.<sup>72</sup> The continuing durability of the public trust doctrine across varied nations and legal regimes implies that public control over coastal lands and waters better serves society's interest than granting full private property interests in these lands and waters. Climate change will not alter this, and the societal interest in public control of tidal lands and waters will be as applicable in our climate changed future as it has been since Roman times. As a result, one could expect states to protect the public's interest in commerce, navigation, fishing, recreation, and other resources by asserting the public trust over private lands that have become inundated due to climate change.

In addition to a state's interest in controlling coastal lands and waters, the public trust doctrine likely *requires* a state to take title or assert control on behalf of the public over submerged private lands. In the seminal public trust case of *Illinois Central Railroad*, the Supreme Court held that a state could not divest itself of its public trust responsibilities, and that any transfer of public trust lands to a private party was void if it violated the public's interest.<sup>73</sup> The Court stated that:

[t]he trust devolving upon the State for the public . . . cannot be relinquished by a transfer of the property. The control of the State for the purposes of the trust can never be lost. . . . The State can no more abdicate its trust over property in which the whole people are

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72. See *supra* notes 43-46 and accompanying text.

73. Ill. Cent. R.R. Co. v. Illinois, 146 U.S. 387, 453-54 (1892). *Illinois Central Railroad* has been criticized as “badly misunderstood and its holding distorted” for its use as a foundation for an expansive public trust doctrine. Huffman, *supra* note 47. In addition, the scope of the public trust doctrine is a matter of state law so the Court's reasoning in *Illinois Central Railroad* is not necessarily binding upon the states. *Id.* Despite these criticisms and limits to *Illinois Central Railroad*, the Court's language and reasoning remain a powerfully illustrative exposition on the importance of public control over public trust resources which state courts routinely rely upon. See, e.g., Owsichek v. Guide Licensing and Control Bd., 763 P.2d 488, 496 (Alaska 1988) (calling *Illinois Central Railroad* “the lodestar of American public trust law”); City of Berkeley v. Superior Court, 606 P.2d 362, 365 (Cal. 1980) (stating that *Illinois Central Railroad* “remains the primary [public trust doctrine] authority even today, almost nine decades after it was decided”).

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interested, like navigable waters and soils under them, so as to leave them entirely under the use and control of private parties . . . than it can abdicate its police powers in the administration of the government and the preservation of the peace. . . . So with trusts connected with public property, or property of a special character, like lands under navigable waters, they cannot be placed entirely beyond the direction and control of the State.<sup>74</sup>

The Court's language and reasoning in *Illinois Central Railroad* illustrates the importance of public control over public resources. This reasoning, which prohibits a state from fully divesting itself of public trust lands, would still be applicable in the climate change context and would likely require a state to fully assert the public trust over any newly created public trust lands and waters. It should be as impermissible for a state to allow private individuals to retain control over the use of recently created tidal lands and waters as it is for a state to divest itself of control over existing tidal lands and waters. Each state will have full discretion in choosing how to assert public control over the recently created public trust lands and waters.<sup>75</sup> Some states may decide to take title to submerged private lands; while others might merely subject the private land to the public trust.

*B. Climate Change—Beyond the Scope of the Doctrine of Erosion and Accretion*

The common law doctrine of erosion and accretion recognizes that coasts are naturally dynamic ecosystems with property boundaries that shift over time.<sup>76</sup> Given the transitory nature of coastal property boundaries, the courts have reasoned that a rigid application of the takings clause is unworkable, and have consistently ruled that a taking does not occur when a private property owner loses land to the state due to erosion.<sup>77</sup>

Large-scale sea level rise due to climate change should be considered beyond the scope of the common law doctrine of erosion and accretion. First, this sea level rise will be unprecedented in American history, and the common law erosion and accretion doctrine was not developed for such a large loss of coastal land to the sea. In addition, there is a fundamental difference in the localized

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74. *Ill. Cent. R.R. Co.*, 146 U.S. at 453-54.

75. *See, e.g., Shively v. Bowlby*, 152 U.S. 1, 26 (1894) (stating that each State may utilize "the tide waters within its borders according to its own views of justice and policy").

76. *See supra* notes 54-60 and accompanying text.

77. *See supra* notes 54-57 and accompanying text.

physical forces that cause erosion and the global rise in sea level caused by climate change. Second, one justification for the erosion and accretion doctrine is that there is a rough proportionality and symmetry to the doctrine, so that a coastal property owner may either gain or lose land by its application.<sup>78</sup> If sea level rise causes the doctrine to consistently work to the detriment of private property owners then there is no longer any implicit fairness or symmetry to the doctrine. Third, the erosion and accretion doctrine typically only applies to natural changes in the tide line.<sup>79</sup> The question of whether sea level rise that is caused by climate change is “natural” is not easily answered.<sup>80</sup> Should anthropogenic changes to the Earth’s climate be considered “natural”? Fourth, large-scale sea level rise may submerge properties far inland of the current coastline and it seems inequitable to apply the erosion and accretion doctrine to property owners whose property did not initially abut the public trust lands and waters. If the erosion and accretion doctrine is premised upon the reasonable expectations of coastal property owners regarding the natural movement of the tide line<sup>81</sup> and a rough sense of equity in that these owners stand to either gain or lose land through the operation of the doctrine,<sup>82</sup> then it is questionable whether the doctrine should apply to property owners who took title to land not initially abutting the ocean.

### *C. A Unique and Novel Challenge to Current Takings Jurisprudence*

If a state takes title or asserts control over private lands and the common law doctrine of erosion and accretion does not apply, then the concise language of the takings clause—“private property [shall not] be taken for public use, without just compensation”<sup>83</sup>—clearly

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78. See KALO ET AL., *supra* note 43, at 51 (stating that one justification for the general rule that littoral owners take title to accretions is that “if the waterfront owner is to lose land to erosion, then it seems only fair to allow her to benefit from the reverse process of accretion”).

79. See *supra* notes 58-60 and accompanying text.

80. For example, among the definitions of “natural” are “existing in or caused by nature; not artificial . . . in the course of nature; not exceptional or miraculous.” THE OXFORD AMERICAN DICTIONARY AND THESAURUS 992 (American ed. 2003). The effects of climate change could reasonably be considered to be “existing in nature,” but it seems problematic to state that these effects are “in the course of nature” and are not “exceptional.”

81. Only natural changes to the shoreline are within the scope of the erosion and accretion doctrine; avulsion and sudden changes to the shoreline are excluded and will not result in a change to the prevailing public/private ownership of coastal lands. See *supra* notes 58-60 and accompanying text.

82. See *supra* note 78 and accompanying text.

83. U.S. CONST. amend. V.

seems to require compensation to the private landowners. The Supreme Court has stated that “[t]he *clearest* sort of taking occurs when the government encroaches upon or occupies private land for its own proposed use.”<sup>84</sup> The power to exclude others has been described as “one of the most treasured strands in an owner’s bundle of property rights,”<sup>85</sup> and an occupation of private property destroys this important property right. Even if a state did not take title to submerged private lands, but instead subjected it to the public trust, it would still be considered the “functional equivalent” of a government occupation because the private property owner would lose the right to exclude the public from the property.<sup>86</sup>

However, despite the seemingly unambiguous language of the takings clause the judiciary’s inquiry into abstract questions such as, what is “property”, when is it “taken”, has led to a complex doctrine in which the Court has attempted to balance private property interests against the government’s ability to modify property law in light of technological and social change.<sup>87</sup> Climate change, and the resultant unprecedented rise in sea level, presents a unique challenge to our current takings jurisprudence.

#### V. A REEXAMINATION OF THE TAKINGS CLAUSE IN A CLIMATE CHANGED FUTURE

It should not be considered a taking under the Fifth Amendment when the public trust doctrine compels a state to take title or assert control on behalf of the public over private lands that have been permanently submerged by the rise in sea level caused by climate change. Despite extensive and unambiguous precedent that the government’s physical occupation or appropriation of private

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84. *Palazzolo v. Rhode Island*, 533 U.S. 606, 617 (2001) (emphasis added).

85. *Loretto v. Teleprompter Manhattan CATV Corp.*, 458 U.S. 419, 435 (1982).

86. *See Lingle v. Chevron U.S.A. Inc.*, 544 U.S. 528, 539 (2005) (noting that the Court’s regulatory takings jurisprudence “aims to identify regulatory actions that are functionally equivalent to the classic taking in which government directly appropriates private property or ousts the owner from his domain”). *See also* Frank Michelman, *Property, Utility, and Fairness: Comments on the Ethical Foundations of ‘Just Compensation’ Law*, 80 HARV. L. REV. 1165, 1184 (1967) (“The one incontestable case for compensation (short of physical expropriation) seems to occur when the government deliberately brings it about that . . . the public at large, ‘regularly’ use, or ‘permanently’ occupy, space or a thing which theretofore was understood to be under private ownership.”).

87. *See, e.g.,* Barton H. Thompson, Jr., *Judicial Takings*, 76 VA. L. REV. 1449, 1454 (1990) (discussing the “normative pulls and counterpulls that have shaped our takings jurisprudence”).

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property is the “paradigmatic,”<sup>88</sup> “classic,”<sup>89</sup> and “clearest sort”<sup>90</sup> of taking, the remainder of this Note presents arguments and justifications for a deviation from this *per se* possessory takings rule. In short, climate change and the resulting sea level rise present exceptional circumstances that warrant a narrow exception to the general possessory takings rule. It must be stressed that this exception is quite narrow, as it would only be applicable in the context of private lands submerged by the ocean due to climate change. This exception to the takings clause will allow property law to adapt to a climate changed future, while still providing the protections that private property owners enjoy today.

#### A. *An Unprecedented Event in American History*

The drafters of the Fifth Amendment did not intend to protect private property owners from climate change and its effects. When the Fifth Amendment was ratified in 1791, the physics of greenhouse gas emissions and climate change were unknown and the idea that human activity was altering the Earth’s climate was still over one hundred years away.<sup>91</sup> It would likely have been inconceivable to the drafters of the takings clause that thousands of square miles of American land and private property would become submerged by the ocean because human activity altered the Earth’s climate and caused sea level to rise to then unfathomable levels.

However, because climate change and large-scale sea level rise were not threats to private property interests when the Fifth Amendment was ratified, it should not necessarily follow that the takings clause does not provide protection against a governmental taking whose cause was unanticipated. Instead, the protections provided by the takings clause, as with other provisions in the Bill of Rights, should be carefully reexamined when technological or societal change recasts the nature of the right, freedom, or liberty that is protected.<sup>92</sup> Despite extensive Supreme Court precedent clearly

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88. *Lingle*, 544 U.S. at 537.

89. *Id.* at 539.

90. *Palazzolo*, 533 U.S. at 617.

91. In 1859, the British physicist John Tyndall identified the greenhouse effect of heat trapping gases such as carbon dioxide and methane. Elizabeth Kolbert, *The Climate of Man – I*, THE NEW YORKER, Apr. 25, 2005, at 7-8. In 1895, the Swedish chemist Svante Arrhenius presented his theory that humans could alter the Earth’s climate by emitting greenhouse gases to the Royal Swedish Academy of Sciences. *Id.* at 8.

92. For example, with technological advancements such as automatic, nuclear, and biological weapons it becomes necessary to determine what “Arms” are protected by the



holding that it is a taking when the government physically invades or appropriates private property,<sup>93</sup> the effects and challenges of climate change and large-scale sea level rise will require a reexamination of the takings clause. Some may find this reexamination to be reactionary and extreme because of the long-standing *per se* possessory takings rule.<sup>94</sup> However, the rule's stability and longevity illustrate the truly unique threat that climate change and large-scale sea level rise pose to private property owners and American property law. Reexamining what protections are provided by the takings clause is not itself an unprecedented undertaking. When the Fifth Amendment was ratified the takings clause was understood to provide protection against possessory takings, but not against a diminution of property resulting from government regulation.<sup>95</sup> Thus, the creation of regulatory takings in *Pennsylvania Coal Co. v. Mahon* can be viewed as a reexamination and evolution of the takings clause

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Second Amendment. In 1939, the Supreme Court held that only weapons that have a "reasonable relationship to the preservation or efficiency of a well regulated militia" are protected by the Second Amendment. *United States v. Miller*, 307 U.S. 174, 178 (1939); *see also* *District of Columbia v. Heller*, 128 S. Ct. 2783, 2814, 2816 (2008) (noting that "[l]ike most rights, the right secured by the Second Amendment is not unlimited[.]" and affirming *Miller's* holding that "the Second Amendment right, whatever its nature, extends only to certain types of weapons"). The advent of the Internet and the challenges it poses to First Amendment jurisprudence provide a contemporary example of the inherent struggle as protections in the Bill of Rights must evolve in light of technological change. *See, e.g.*, Dawn C. Nunziato, *The Death of the Public Forum in Cyberspace*, 20 BERKELEY TECH. L.J. 1115, 1118 (2005) (noting that private entities not subject to the First Amendment typically control speech on the Internet, which has led to a lack of a requisite public forum; and that "Congress and the courts have declined to take the steps necessary to update First Amendment jurisprudence"); Todd G. Hartman, *The Marketplace vs. the Ideas: The First Amendment Challenges to Internet Commerce*, 12 HARV. J.L. & TECH. 419, 425 (1999) (noting that "federal policy regarding the development of the Internet has been criticized for its 'complete absence of the First Amendment'" and arguing that a successful e-commerce policy must be "guided by the internet's First Amendment parameters").

93. *See supra* notes 83-86 and accompanying text.

94. Despite ideological efforts to frame property rights as inviolate and sacrosanct, even Justice Holmes—the revered creator of regulatory takings—stated of property rights: "[All rights] in fact are limited by the neighborhood of principles of policy which are other than those on which the particular right is founded, and which become strong enough to hold their own when a certain point is reached." *Hudson County Water Co. v. McCarter*, 209 U.S. 349, 355 (1908).

95. *See* *Lucas v. S.C. Coastal Council*, 505 U.S. 1003, 1114 (1992) ("Prior to Justice Holmes's exposition in *Pennsylvania Coal Co. v. Mahon* . . . it was generally thought that the Takings Clause reached only a 'direct appropriation' of property . . ."); *see also* John F. Hart, *Land Use Law in the Early Republic and the Original Meaning of the Takings Clause*, 94 NW. U. L. REV. 1099, 1133 (2000) (arguing that the Framers intended the takings clause to be a confirmation of the status quo, where diminution of property caused by government regulation was not compensated unless physical appropriation of property occurred).

that was necessitated by increasingly burdensome government regulations.<sup>96</sup> An additional reexamination of the takings clause will be necessary as a result of climate change and large-scale sea level rise.

*B. Distinct From the Typical Possessory Taking*

The Supreme Court has stated that “[w]hile scholars have offered various justifications for [the takings clause], we have emphasized its role in ‘barring Government from *forcing* some people *alone* to bear public burdens which, in all fairness and justice, should be borne by the public as a whole.’”<sup>97</sup> Thus, one primary purpose of the takings clause is to prevent the government from actively singling out individual private property owners and forcing them to forfeit their property for the public good without just compensation. The government taking that will arise from climate change and large-scale sea level rise is unique and can be distinguished from the usual possessory taking, where the government singles out individuals and forces them to cede property rights to the government. First, with climate change induced sea level rise the government action is passive, in that the government is not actively forcing or causing the loss of private property. The loss of private property rights to the government is merely a response to the complex and uncontrollable effects of global climate change. Second, the government is not singling out individuals. The government will have little or no control over which lands become submerged, and all coastal property owners will share in the risks and losses posed by large-scale sea level rise.

1. *Passive v. Active Takings*

The nature of the government action that results in a potential taking here is passive, as states will only take title or assert the public trust over submerged land in response to a large-scale rise in sea level that is beyond the state’s control. This passive nature of the government action stands in contrast to the usual possessory taking,

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96. 260 U.S. 393 (1922). In *Pennsylvania Coal*, the Court expressed concern that “[w]hen this seemingly absolute protection [of the Fifth Amendment] is found to be qualified by the police power, the natural tendency of human nature is to extend the qualification more and more until at last private property disappears.” *Id.* at 415. The Court then warned that “[w]e are in danger of forgetting that a strong public desire to improve the public condition is not enough to warrant achieving the desire by a shorter cut than the constitutional way of paying for the change,” *id.* at 416, and that as a result government regulation that went “too far” in diminishing the value of property would be “recognized as a taking,” *id.* at 415.

97. *Lingle v. Chevron U.S.A. Inc.*, 544 U.S. 528, 537 (2005) (emphasis added).

which involves a government decision to take private property that is wholly subject to the government's discretion. Common examples of the typical active possessory takings include government decisions to condemn specific land in order to build a road, expand an airport, or construct a military facility. In such cases the government action clearly causes the loss of private property, and whose property is taken is subject to the government's discretion. Conversely, with the passive taking resulting from large-scale sea level rise the government action is not the direct cause of the loss of private property, and the government will exercise no discretion regarding whether to subject a given property to the public trust.

This distinction between passive and active takings is consistent with a seemingly similar line of cases finding a taking under the Fifth Amendment when private property is flooded as the result of a dam built or permitted by the government.<sup>98</sup> When the government builds or permits a dam that floods private lands it is actively causing the loss of private property. In contrast, with climate change the private lands will be submerged regardless of the government's action or inaction.

The proposition that climate change induced large-scale sea level rise will result in a passive government taking that is distinct from the typical active possessory taking raises two issues regarding causation. First, is it proper to construe the government taking as a passive reaction to the uncontrollable effects of global climate change? Government activities emit substantial quantities of greenhouse gases which contribute to climate change.<sup>99</sup> In addition, it could be argued that the government's failure to effectively regulate greenhouse gas emissions is also a cause of climate change.<sup>100</sup> If the government has partially caused the climate change that leads to large-scale sea level rise then perhaps this is not properly characterized as a passive

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98. See, e.g., *United States v. Kansas City Life Ins. Co.*, 339 U.S. 799, 809 (1950) (“[T]he destruction of privately owned land by flooding is ‘a taking’ to the extent of the destruction caused.”); *United States v. Lynah*, 188 U.S. 445, 470 (1903) (“[W]here the government by the construction of a dam or other public works so floods lands belonging to an individual as to substantially destroy their value there is a taking within the scope of the Fifth Amendment.”).

99. See *Massachusetts v. Env'tl. Prot. Agency*, 127 S. Ct. 1438, 1457-58 (2007) (noting that motor vehicle emissions substantially contribute to global warming, the United States government uses a large number of motor vehicles every year).

100. In *Massachusetts v. EPA*, the petitioners argued that the EPA's failure to regulate carbon dioxide emissions from automobiles was one cause of climate change. *Id.* at 1457-58 (2007) (“Judged by any standard, U.S. motor-vehicle emissions make a meaningful contribution to greenhouse gas concentrations and hence, according to petitioners, to global warming.”).

taking, but is instead a form of the typical, active, possessory taking. One problem with this line of argument is that state governments, not the federal government, will assert the public trust over submerged lands.<sup>101</sup> As the Supreme Court noted in *Massachusetts v. EPA*, federalism principles, and Clean Air Act preemption specifically, prevent the states from enacting some forms of stringent greenhouse gas emission regulations in an attempt to mitigate climate change and sea level rise.<sup>102</sup> In addition, even if we were to assume that a state has partially caused climate change, that state would continue to lose coastal land to sea level rise even if it were to reduce greenhouse gas emissions to zero, so long as other states or other nations continue to emit greenhouse gases.<sup>103</sup> Thus, a state should not be considered to have actively caused the large-scale sea level rise that results in a loss of private property because the extent of any state's causation is minimal, states are preempted from taking some measures to aggressively reduce greenhouse gas emissions, and there will be continued rise in sea level even if a state were to eliminate all greenhouse gas emissions.

A second issue is whether it should be considered a passive taking if a state regulates or prohibits coastal property owners from defending their land from the rising sea level. For example, in North Carolina a permit is required to erect a bulkhead in certain estuarine waters,<sup>104</sup> and bulkheads are prohibited in ocean hazard areas.<sup>105</sup> In addition, there have been proposals to further limit the use of bulkheads and other erosion control devices within the state because

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101. One interesting possibility beyond the scope of this Note might be raised if a state did not take title or assert the public trust over submerged private lands. Could a private property owner whose land was submerged then bring a claim of inverse condemnation, alleging that the government's actions or failure to effectively regulate greenhouse gas emissions took their property? Cf. *United States v. Causby*, 328 U.S. 256 (1946) (holding that it was a taking by inverse condemnation when the noise of low-flying military aircraft interfered with the private property they flew directly over).

102. *Massachusetts v. EPA*, 127 S. Ct. at 1454 (noting that “[w]hen a State enters the Union, it surrenders certain sovereign prerogatives. Massachusetts cannot invade Rhode Island to force reductions in greenhouse gas emissions, it cannot negotiate an emissions treaty with China or India, and in some circumstances the exercise of its police powers to reduce in-state motor-vehicle emissions might well be pre-empted”).

103. In *Massachusetts v. EPA*, the Court noted that while predicted greenhouse gas emission increases from China and India would likely offset any domestic reduction in greenhouse gas emissions that the petitioners sought, a minimal reduction in greenhouse gas emissions is still a reduction. The Court then rejected the EPA's argument that this created a lack of redressability and hence a lack of standing. *Id.* at 1457-58.

104. 15A N.C. ADMIN. CODE 7H.1101 (2007).

105. 15A N.C. ADMIN. CODE 7H.0308 (2007).

of their adverse ecological impacts.<sup>106</sup> State prohibition or regulation of erosion control devices that could protect land from the rising sea level raises legitimate questions of whether a state has actively caused the loss of private land.<sup>107</sup> However, the extent of the large-scale sea level rise that is projected is so great that it will likely submerge many coastal lands despite the use of erosion control devices. Thus the regulation of bulkheads and erosion control devices should not be considered the cause of the loss of most coastal private property inundated by climate change. Assuming that the regulation or prohibition of erosion control devices is intended to protect coastal ecology, and not to thwart private landowners' efforts to retain their land, the taking could still be considered a passive reaction to effects of climate change that are beyond the state's control.

## 2. *No Singling Out*

The Supreme Court has stated that one purpose of the takings clause is to prevent the government from singling out individuals and forcing them to bear public burdens.<sup>108</sup> This protection against singling out individuals is well-justified in the usual possessory takings context, such as when the government must decide which of two neighboring tracts of land to condemn for public development. However, this protection against discrimination is less compelling in the context of climate change and sea level rise. The chemistry and physics of greenhouse gas emissions, climate change, and sea level rise will ultimately determine what land will become submerged by the ocean. The government action taking these lands is merely a response to these physical forces of nature, and the states will not

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106. See, e.g., BONNIE M. BENDELL ET AL., RECOMMENDATIONS FOR APPROPRIATE SHORELINE STABILIZATION METHODS FOR THE DIFFERENT NORTH CAROLINA ESTUARINE SHORELINE TYPES 1-1 (2006) ("The current [estuarine erosion] management strategies need stronger consideration of the estuarine habitats, impact of the erosion control structures and migration of wetlands in response to rising sea level . . . . [I]t is becoming apparent that some stabilization methods are not necessarily appropriate for all shoreline types and the shore zone as a whole."), available at <http://dcm2.enr.state.nc.us/Hazards/EWG%20Final%20Report%20082106.pdf>.

107. Courts have held that a state may prohibit activities adverse to the public trust, such as erecting bulkheads, without committing a taking. See *McQueen v. S.C. Coastal Council*, 580 S.E.2d 116, 120 (S.C. 2003), cert. denied, 540 U.S. 982 (2003) (stating that the "reversion to tidelands effected a restriction on [plaintiff's] property rights inherent in the ownership of a property bordering tidal water" and that the plaintiff's "ownership rights do not include the right to backfill or place bulkheads on public trust land and the State need not compensate him . . .").

108. See *supra* note 97 and accompanying text. See also *Rose, supra* note 37, at 261 (stating that "political 'singling out'" is the "usual gravamen of takings claims").

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decide which individual private property owner's lands will become subject to the public trust. *All* coastal property owners face the risks from climate change and will lose property to the state if their land becomes inundated by a rise in sea level.

This distinction between an active government taking and a passive taking is similar to the constitutional due process distinction between adjudication and legislation. The Supreme Court has held that the Fourteenth Amendment requires greater procedural due process protections when the government has the power to single out individuals.<sup>109</sup> This reasoning is similar in the takings context here. If one purpose of the takings clause is to protect individual private property owners from being singled out by the government to bear public burdens, then the protection is unnecessary when the government does not single out individuals for a taking.

### C. Reasonable Expectations

One central tenet of the Supreme Court's takings jurisprudence is that the Fifth Amendment protects private property owners' reasonable expectations regarding what constitutes "property."<sup>110</sup> This protection of reasonable expectations has played a prominent role in many of the Court's landmark opinions on regulatory takings. For example, in *Penn Central* the Court stated that one factor to be considered in determining whether a government regulation was a taking was its interference with "distinct investment-backed expectations."<sup>111</sup> In addition, the "background principles of nuisance and property law" that form an exception to the Court's categorical takings rule in *Lucas* are premised upon the reasonable expectations of private property owners.<sup>112</sup> Yet, it is important to appreciate that reasonable expectations are not static. As the *Lucas* Court noted,

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109. Compare *Londoner v. Denver*, 210 U.S. 373 (1908) (holding that the Fourteenth Amendment requires procedural due process for adjudications) with *Bi-Metallic Inv. Co. v. State Bd. of Equalization of Colo.*, 239 U.S. 441 (1915) (holding that no procedural due process is required by the Fourteenth Amendment for legislation and rulemaking, in part because no individuals are singled out). See also RICHARD J. PIERCE, JR. ET AL., *ADMINISTRATIVE LAW AND PROCESS* 251-52 (3d ed. 1999) (stating that when the government action affects a large number of people "there is much less need for due process protection than when the government singles out an individual for particularly disadvantageous treatment").

110. See, e.g., Thompson, *supra* note 87, at 1524 ("The Court has frequently suggested that the immediate goal of the takings protections is to protect settled expectations of property holders.").

111. *Penn Cent. Transp. Co. v. New York City*, 438 U.S. 104, 124 (1978).

112. *Lucas v. S.C. Coastal Council*, 505 U.S. 1003, 1030 (1992).

what is considered a reasonable expectation of private property owners may change and evolve over time.<sup>113</sup>

Determining the reasonable expectations of a private property owner whose land is inundated by a rise in sea level that is caused by climate change should be a major factor in the takings analysis. On one hand, the threat of large-scale sea level rise that submerges substantial amounts of private land does not seem to be a reasonable expectation of most coastal property owners today. After all, a rise in sea level that is *unprecedented* in American history would seem by its very nature to be beyond the scope of reasonable expectations. It is quite doubtful that an individual purchasing real estate in Miami today would reasonably expect that the property could be under the ocean waters by the end of this century. Similarly, while the common law erosion and accretion doctrine may impute reasonable expectations regarding transitory property boundaries to littoral owners on the coastline, it seems problematic and inequitable to apply the doctrine to a property owner whose land is currently not abutting the ocean.<sup>114</sup> If an individual took title to property when it was a substantial distance from the ocean, did they acquire the property with the reasonable expectation that they may later lose the property to the state via the public trust doctrine? If losing property to the government because of climate change and rising sea level is not considered to be within the reasonable expectations of private property owners, it would lend support for finding a taking that requires just compensation.

However, there is still a strong argument that large-scale sea level rise will be within the reasonable expectations of private property owners. In *Lucas*, the Court acknowledged that property owners' reasonable expectations are not static, but can evolve over time.<sup>115</sup> If that is so, then a large-scale rise in sea level could be a paradigmatic example of a change in reasonable expectations because this rise in sea level will occur over a relatively long time-frame.<sup>116</sup>

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113. *Id.* at 1031 (noting that “changed circumstances or new knowledge may make what was previously permissible no longer so”); *id.* at 1035 (Kennedy, J., concurring) (“The State should not be prevented from enacting new regulatory initiatives in response to changing conditions, and courts must consider all reasonable expectations whatever their source. The Takings Clause does not require a static body of state property law, it protects private expectations to ensure private investment.”).

114. *See supra* notes 76-79 and accompanying text.

115. *Lucas*, 505 U.S. at 1031, 1035.

116. For example, the IPCC projects a 0.6 meter (1.97 feet) rise in global sea level by 2100. *See supra* note 26 and accompanying text.

Property owners anywhere near the ocean should be considered to have constructive notice that their property may be threatened by sea level rise. The potential effects of climate change have been well documented in the national media.<sup>117</sup> On November 5, 2007, NBC's *Today Show* even broadcast live from on top of the Greenland Ice Sheet and documented its unexpectedly rapid rate of melting.<sup>118</sup> It would be reasonable to consider coastal property owners' expectations to have evolved to incorporate this threat considering that it will be years until sea level rise results in the loss of substantial amounts of land. Because of the slow and continuous nature of sea level rise, coastal property owners will have adequate time to adjust their expectations as their property slowly disappears under the waters—inch by inch, year after year. No property owner will face the sudden surprise that their land has unexpectedly become submerged by the ocean and is now subject to the public trust. If large-scale sea level rise is considered to be a reasonable expectation of all property owners near the ocean, then when the state takes title to these lands after they are submerged it supports a finding that no taking occurred, as no reasonable property expectations were upset.

*D. Inefficiencies and Administrative Difficulties in Providing Just Compensation*

Providing an efficient system of compensation will be exceedingly difficult if it is considered a taking when a state takes title or asserts the public trust over submerged private lands. A host of factors will complicate structuring an efficient system: the amount of compensation that must be paid to private landowners will likely be relatively low, the landowners affected will be great in number and geographically dispersed, and the private lands will be taken at a slow and continuous pace. First, the amount of just compensation due to a private property owner would likely be relatively low if the state action affecting said property is considered a taking. This is despite the fact that today there is immense wealth in the coastal areas that

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117. As just one example of the national media coverage of climate change, *Time Magazine* has recently devoted extensive cover stories to the threats posed by climate change. Jeffrey Kluger, *What Now?*, TIME, Apr. 9, 2007, at 50; Jeffrey Kluger, *Global Warming Heats Up*, TIME, Apr. 3, 2006, at 35.

118. See Richard Huff, *'Today' Show Will Go to North Pole & South Pole*, N.Y. DAILY NEWS, Oct. 17, 2007, available at [http://www.nydailynews.com/entertainment/tv/2007/10/17/2007-10-17\\_today\\_show\\_will\\_go\\_to\\_north\\_pole\\_south.html](http://www.nydailynews.com/entertainment/tv/2007/10/17/2007-10-17_today_show_will_go_to_north_pole_south.html) (noting that Matt Lauer would broadcast from the Greenland Ice Sheet in programming "designed to enlighten viewers about the state of the Earth").



are threatened by climate change.<sup>119</sup> The general rule is that the compensation that must be paid to a private property owner is the fair market value of the taken property.<sup>120</sup> Just as the long-term, slow rate of sea level rise will allow coastal property owners' reasonable expectations to adjust to the climate changed future,<sup>121</sup> this slow and predictable pace of sea level rise will be reflected in the fair market value of coastal properties. The fair market value of threatened properties should drop significantly as the forecasts and projections for what lands will be inundated by sea level rise become more accurate and localized, and as the waters continue to slowly rise year after year. There will likely be a significant drop in demand for land that will soon be under the ocean. The fair market value of this land will likely drop in value even further when it actually becomes inundated by the ocean.<sup>122</sup> It is at this point, when the private land becomes submerged by the ocean and the value of the land is likely to be at its lowest, that the state government will assert the public trust over the land. As a result, if it is considered a taking, then the just compensation owed to the private property owner will likely be substantially lower than the value of the property today.

If state actions are considered takings, the compensation owed to each landholder will usually not amount to much, but the slow and continuous nature of sea level rise creates problems for structuring a system of compensation. First, the private land will become submerged and subject to the public trust at a continuous, but extremely slow rate and this creates problems for determining the proper frequency of compensation. The rise in sea level will be imperceptible on a daily basis, and will likely be relatively insubstantial even on an annual basis.<sup>123</sup> How often then should the government have to provide payment to the private property owners for the land it has taken? An annual payment might seem logical.

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119. See *supra* note 36 and accompanying text.

120. *United States v. New River Collieries Co.*, 262 U.S. 341, 344 (1923) ("Where private property is taken for public use, and there is a market price prevailing at the time and place of the taking, that price is just compensation.").

121. See *supra* notes 110-18 and accompanying text.

122. As Ted Turner once succinctly stated on climate change: "People like to live close to the ocean, but they don't want to live under it." Betsy Marston, *Heard Around the West*, *HIGH COUNTRY NEWS*, May 26, 2008, at 32.

123. Since 1993 the seas have risen by 3 mm per year. See *supra* note 23 and accompanying text. To provide a rough idea and crude approximation of future sea level rise we could assume a linear rate of rise. Under that assumption, the IPCC's projection of a 0.6 meter rise in sea level by 2100 would cause a 6.5 mm annual rise in sea level. If sea level rose by one meter by 2100, the linear annual rise in sea level would be 1.1 cm per year.

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However, given the relatively small quantities of land taken on an annual basis from individual private property owners and the low fair market value of these properties, such an annual payment would likely be negligible and the process would have to be repeated continuously year after year until the entire property was taken. Perhaps it would be more efficient to wait until a substantial portion of the private property has been taken until compensation must be paid? However, such a system raises fairness concerns because of the inherent arbitrariness of identifying a critical threshold when compensation would be payable. In addition, private landowners would be forced to suffer an uncompensated taking for a period of time, and additional compensation would still have to be paid in the future for the remainder of the property that is later taken. Perhaps then no compensation should be required until a given property is entirely submerged? This would lead to greater efficiency, but would require a private property owner to suffer an uncompensated taking for a substantial period of time. Courts might construe any taking that went uncompensated for a significant duration of time to be a taking without just compensation, rendering such a system unconstitutional.

Another difficulty in structuring a compensation system would be deciding whether the government would be responsible for initiating payment, or whether private parties would be left to seek compensation from the government in the courts. Either way there will be substantial costs incurred to provide compensation to private landowners. If the government provides a compensation program then it would likely require a survey and appraisal of the submerged private lands along a state's entire coastline. Depending upon the frequency with which compensation must be paid, the costs of such a program could conceivably dwarf the amount of compensation paid to private property owners. If private individuals are left to bring suit against the government for compensation then there would also be high litigation and transaction costs that could exceed the compensation received. For private landowners with small holdings these costs could be prohibitive.

Thus, if it is considered a taking when the government takes title or asserts the public trust over lands submerged by climate change and large-scale sea level rise it will likely be difficult to provide compensation in an efficient manner. This is due to several factors which include the likely low fair market value of private lands that have been inundated by the ocean, the large number of private

property owners that will lose land to the government, and the slow and continual nature of sea level rise. These difficulties in providing efficient compensation are an additional factor which distinguishes the potential government taking here from the usual possessory taking.

## VI. CONCLUSION

Climate change and large-scale sea level rise will present unique challenges to American property law. The public trust doctrine will compel the states to assert the public trust over submerged private lands that have become tidal lands and waters. The loss of this private land is beyond the scope of the common law doctrine of erosion and accretion, so the takings clause would seemingly require the states to compensate the private property owners for a possessory taking. Yet finding a taking here is problematic because of the magnitude of the potential sea level rise—thousands of square miles of land and several major cities are at risk of being submerged.

This unprecedented threat posed by climate change calls for a narrow exception to the current *per se* possessory takings rule that it always constitutes a taking when the government physically occupies or appropriates private property. The taking that results from climate change and large-scale sea level rise is distinguished from the typical possessory taking because it is a passive government reaction to an uncontrollable force of nature that is novel and unprecedented. In addition, the government will not single out individual private property owners for the taking, and the government action will not upset the reasonable expectations of private landowners because of the slow rate of sea level rise. Finally, providing a system of compensation would likely be inefficient and impracticable. Thus, it should not be considered a taking when a state asserts the public trust over private lands submerged because of climate change and large-scale sea level rise.