



FACTS MISSISSIPPI

A M E R I C A N S E C U R I T Y P R O J E C T

Pay Now, Pay Later: Mississippi

Climate change greatly threatens Mississippi's fields, forests, aquaculture, and marine fisheries, putting priceless natural resources and billions of dollars in annual revenue at risk.¹

Nearly one in four employed Mississippians work in an industry sensitive to climate change.²

Mississippi holds the capacity to transform its abundant natural resources into clean, renewable energy,³ potentially generating thousands of jobs in the process.⁴

According to a new study, a failure to mitigate the effects of climate change could begin to cause serious gross domestic product and job losses within the next several decades. Between 2010 and 2050, it could cost Mississippians \$7.3 billion in GDP and 63,000 jobs.*

**GDP numbers are based on a 0% discount rate. Job losses are measured in labor years, or entire years of fulltime employment. Backus, George et al., "Assessing the Near-Term Risk of Climate Uncertainty: Interdependencies among the U.S. States," Sandia Report (Sandia National Laboratories, May 2010), 141. https://cfwebprod.sandia.gov/cfdocs/CCIM/docs/Climate_Risk_Assessment.pdf (accessed March 23, 2011).*

Admittedly, the effects of climate change, a complex and intricate phenomenon, are difficult to predict with precision. Informed scientific and economic projections, as we have used in our research, however, allow us to see that Mississippi faces significant losses in industries crucial to its economy if no action is taken.

Moreover, data shows Mississippi is poised to benefit from the research, development, and distribution of renewable energy technologies. It has only begun to tap its renewable energy resources, which have the potential to generate over two-thirds of the state's electricity needs.⁵ In addition, many clean energy possibilities—such as deriving methane from manure or planting trees for biomass⁶—offer excellent side benefits, such as the elimination of unwanted livestock waste or the sequestration of carbon.⁷ Should we fail to take action against

climate change, Mississippians have much to lose.

Pay Later: The Cost of Inaction

Mississippi's famous climate and geography have long been mixed blessings for the state. The life-giving river that deposited the rich soils of the Mississippi Delta often floods, destroying crops, homes, and livelihoods. Cotton brought early prosperity, but then it brought the boll weevil and economic ruin.⁸ Similarly, although the oil rigs and platforms along the Gulf Coast provide 30% of the nation's oil—and the coastal plains of Mississippi and other Gulf Coast states boast one-third of the nation's oil-refining capacity⁹—Mississippi is judged to be the most vulnerable state to spikes in oil

prices.¹⁰ Its offshore oilrigs are among the region's assets most vulnerable to climate change. In total, the Gulf Coast states could lose a total of \$350 billion by 2030—88% experienced by coastal homes and businesses and the oil and gas industry.¹¹ Climate change will threaten Mississippi's core natural resources, its infrastructure, and its workforce.

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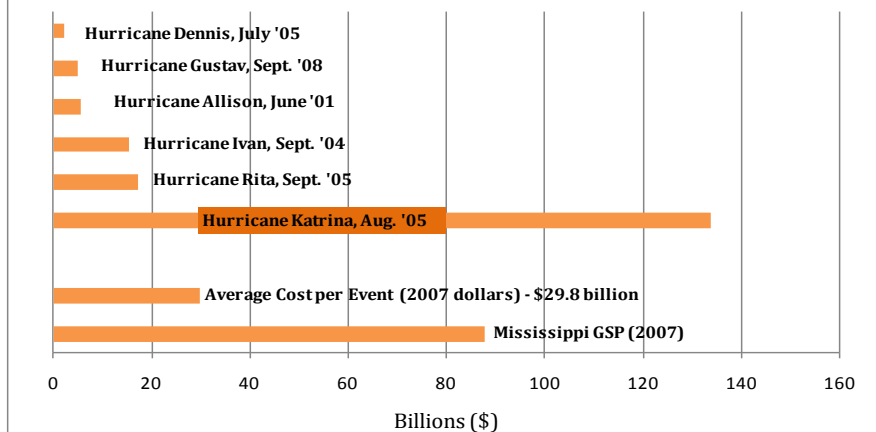
Delta Blues

Rising sea levels and average temperatures put Mississippi's natural riches at risk in every part of the state.¹²

Since its coast is subsiding while the sea level is rising, the relative change is potentially enormous—likely 15 inches by 2100 under a mid-range sea-level rise scenario.¹³

Coastal regions are projected to get warmer and drier, likely necessitating additional irrigation to maintain the \$4.3 billion agriculture industry.¹⁴ This would put additional pressure on freshwater resources already stressed

A Decade of Warning: Extreme Event Damage in Southeast v. Mississippi GSP



Sources: National Climatic Data Center; Coakley et al²⁹

by increased evaporation, residential demand, and industrial uses.¹⁵ Higher temperatures would also bring additional agricultural pests to the Southeast, a region that already loses 64% of its soybean crop to weeds. Worse still, higher concentrations of carbon dioxide make the herbicide of choice—glyphosate—less effective.¹⁶

Another industry likely to suffer is fish farming.¹⁷ Mississippi has the nation's most valuable aquaculture industry, but shrinking freshwater supplies, increasing salinization, warmer water temperatures, and contaminated runoff from high precipitation events all threaten fish farming.¹⁸ Fishing wild marine species in the Gulf is also threatened, with maximum catch potential anticipated to fall 20% below 2000s levels by 2055.¹⁹

The worst effects, however, are likely to be felt in Mississippi's forests, which generate \$14 billion annually for the state economy and employ over 52,000 people.²⁰ Climate models disagree as to whether upland forests will experience an increase or decrease in precipitation, but either scenario brings risks when combined with higher temperatures. Under the drier scenario, forest

fires would become more frequent, and many stretches of forest would eventually transform into grasslands and savannahs.²¹ Under the wetter scenarios, profitable softwood forests would likely give way to hardwoods²² or subtropical evergreens²³ and see an increasing risk of forest pests.²⁴

Gambling on Business as Usual

Mississippi currently lacks the infrastructure to weather the projected effects of climate change,²⁵ be they storms, drought, sea level rise, or flooding.²⁶ **The nearly \$2.5 billion gaming industry,²⁷ for example, is clustered on vulnerable dock-sides and other lowlands along the Mississippi River and Gulf Coast.** Hurricane Katrina wreaked havoc on Mississippi's Gulf Coast casinos in 2005, costing \$500,000 per day in tax revenue during the aftermath.²⁸

Mississippi is also located near the center of the Gulf Coast region's integrated network of roads, ports, and rail lines;³⁰ indeed, wholesale trade, transportation, and warehousing account for nearly 130,000 jobs statewide.³¹

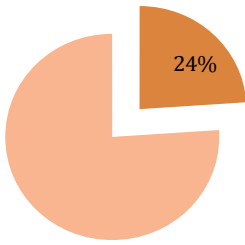
Yet the Union of Concerned Scientists notes that “27% of the major roads, 9% of the rail lines, and 72% of the ports” within the region are built at or below the level reached by a four-foot rise in sea level, and estimates that “60,000 miles of coastal highway are already exposed to periodic flooding from coastal storms and high waves.”³² Some of the roadways projected to be permanently flooded within 50 years are the very ones designated as evacuation routes.³³ And given the damage caused by past natural disasters in Mississippi, evacuation routes are much needed.

Of the 70 natural events causing \$1 billion or more in damage in the United States between 1980 and October 2007, at least 16 of them affected Mississippi.³⁴ While Hurricane Katrina may still be fresh in the minds of Mississippians, less well remembered, perhaps, are the 900+ flood events that struck the state between 1990 and October 2009, causing nearly \$420 million in total damages.³⁵ Rising sea levels will likely increase storm surges, hastening erosion and increasing the damage from storms.³⁶ If concentrated in Mississippi, an extreme event, like those hitting the Southeast over the past decade, could easily cause damages exceeding one quarter of gross state product.³⁷

More Mississippians, Fewer Jobs

The state is projected to gain an additional 300,000 residents by 2025,³⁸ but **with so many industries vulnerable to climate change and unemployment reaching 10% (as of August 2010),³⁹ prospects for gainful employment seem slim under a “business as usual” approach.** Agriculture,⁴⁰ the gaming industry,⁴¹

Mississippian Labor Force Projected to be Directly Affected



Sources: Mississippi Department of Employment Services, AMD-3 Report; The American Gaming Association; National Wildlife Foundation

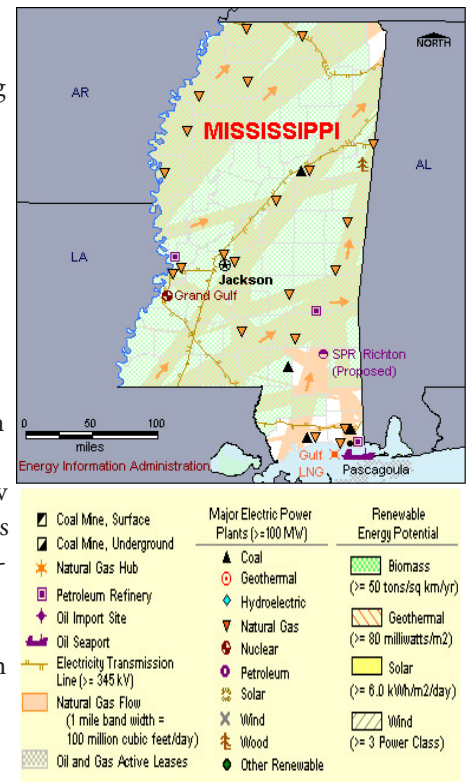
wood and paper manufacturing,⁴² and wildlife-related employment⁴³ account for over 150,000 jobs. Combined with wholesale trade, warehousing, transportation, and related jobs, these vulnerable industries account for nearly 280,000 jobs, or about one-fourth of Mississippi’s workforce.⁴⁴

In fact, these new residents may well want to leave as climate change accelerates. By 2080, southern Mississippi could see as many as 150 days reaching 90°F or higher each year,⁴⁵ exacerbating asthma and other health conditions.⁴⁶ Warmer, wetter weather could also help spread malaria and other mosquito-borne diseases, while increased drought-heavy rain cycles favor an explosion of rodents and the diseases they carry.⁴⁷ Heavy rains and increased demand could make fresh water less pure⁴⁸ and possibly more expensive.

Pay Now: The Benefits of Taking Action

Mississippians have the opportunity to take important and beneficial action to combat climate change. In the past Mississippi has turned a blind eye toward climate change and neglected preparations to tackle it.⁴⁹ This de facto stance, along with a growing reliance on fossil fuels,⁵⁰ has likely contributed to the fact that Mississippians use 39% more electricity per capita than the average American.⁵¹ Trimming consumption would be great, but the state’s natural resources also offer tremendous potential for producing clean energy.

Wood and wood waste contribute about 3% to Mississippi’s net electricity generation—by far the largest renewable source⁵²—but the state’s vast forests and agricultural fields hold much greater promise through soybean-based biodiesel and cellulosic ethanol.⁵³ Manure from Mississippi’s swine, poultry, and dairy industries offers another source of renewable energy; the state debuted the nation’s first system producing methane gas from poultry waste.⁵⁴ In fact, Mississippi’s clean energy employment level grew at seven times the state average from 1998 to 2007, and now provides approximately 3,200 jobs.⁵⁵ This suggests that increasing renewable sources to 20% of the state’s energy portfolio by 2020 (which the National Wildlife Federation calls “readily achievable”)⁵⁶ could potentially support over 20,000 jobs within the state.⁵⁷ Mississippi has the capacity to generate at least 71% of its electricity from renewable sources, and is increasingly tapping its potential to sequester carbon through tree-planting initiatives.⁵⁸



Conclusion

Mississippi must consider action on climate change not just in terms of cost, but also in terms of opportunities. If we give Mississippi’s population, businesses, and investors clear and consistent signals by properly offering initiatives and cultivating demand, investment and innovation in renewable technologies will follow.

Mississippians will have to pay for the effects of climate change. The only remaining question is whether they will pay now, or pay later and run the risk of paying significantly more.

(Endnotes)

- 1 Detailed below in “Delta Blues.”
- 2 Detailed below in “More Mississippians, Fewer Jobs.”
- 3 National Wildlife Foundation, *Charting a New Path for Mississippi’s Electricity Generation and Use*, 2008, 2. http://www.nwf.org/Global-Warming/-/media/PDFs/Global%20Warming/Clean%20Energy%20State%20Fact%20Sheets/MISSISSIPPI_10-22-5.ashx (accessed July 28, 2010); Hembree Brandon, “Fuels from biomass may feed energy cravings,” *Delta Farm Press*, July 19, 2006. <http://deltafarmpress.com/fuels-biomass-may-feed-energy-cravings> (accessed October 12, 2010).
- 4 Pew Environment Group, *The Clean Energy Economy: Mississippi*, Pew Charitable Trusts, 2009. http://www.pewglobalwarming.org/cleanenergyeconomy/factsheets/Clean_Economy_Factsheet_Mississippi.pdf (accessed July 28, 2010); Pew Charitable Trusts, *Mississippi Clean Energy Economy Jobs Grew Nearly Seven Times Faster than State’s Overall Jobs*, June 10, 2009. http://www.pewglobalwarming.org/cleanenergyeconomy/pdf/MS_Release_09-0610.pdf (accessed July 28, 2010).
- 5 National Wildlife Federation, *Global Warming and Mississippi*, January 30, 2009, 2. <http://www.nwf.org/Global-Warming/-/media/PDFs/Global%20Warming/Global%20Warming%20State%20Fact%20Sheets/Mississippi.ashx> (accessed July 28, 2010).
- 6 While burning biomass does release greenhouse gases, this source of energy is a better alternative compared to fossil fuels. Moreover, growing trees and plants for biofuel offsets carbon emissions, and dead wood and other waste release toxins when left in a landfill. Fewer pollutants are released when combusting biomass since they are often burned at temperatures so high the chemicals break-down into a less toxic form naturally. The government also requires the implementation of scrubbers, filters, and the like in biofuel plants. Energy Information Administration, *Biomass*. http://www.eia.doe.gov/kids/energy.cfm?page=biomass_home-basics (accessed October 28, 2010).
- 7 Brandon.
- 8 Eugene R. Dattel, *Cotton in a Global Economy: Mississippi (1800-1860)*, October 2006. <http://mshistory.k12.ms.us/articles/161/cotton-in-a-global-economy-mississippi-1800-1860> (accessed October 28, 2010); Blake Layton, *The Boll Weevil In Mississippi: Gone But Not Forgotten*, Mississippi State University Extension Service, 2002, 1, 3. <http://msucares.com/pubs/publications/p2294.pdf> (accessed July 28, 2010).
- 9 Union of Concerned Scientists, *Backgrounder: Southeast*, 2009, 3. http://www.ucsusa.org/assets/documents/global_warming/us-global-climate-change-reportsoutheast.pdf (accessed July 28, 2010).
- 10 David Gardiner and Associates, *Ranking States’ Oil Vulnerability: Assessing the Continued Threat of Gas Price Spikes*, Natural Resources Defense Council, March 2010, 2-3. http://docs.nrdc.org/energy/files/ene_10031601a.pdf (accessed July 28, 2010).
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- 12 Environmental Protection Agency, *Climate Change: Mississippi*, September 1998. <http://www.epa.gov/nscep/> (accessed October 13, 2010); Center for Integrative Environmental Research, University of Maryland, *Regional Highlight: Southeast*, October 2007. <http://www.cier.umd.edu/documents/Southeast-Economic%20Impacts%20of%20Climate%20Change.pdf> (accessed July 28, 2010); Union of Concerned Scientists; National Wildlife Federation, *Global Warming and Mississippi*; Robert Twilley and Richard Miller, *Mississippi: State Findings from Confronting Climate Change in the Gulf Coast Region*, 2001. http://www.ucsusa.org/assets/documents/global_warming/acfxt3p3v.pdf (accessed July 28, 2010).
- 13 Twilley and Miller, 2.
- 14 Environmental Protection Agency, 3; U.S. Department of Agriculture, *State Fact Sheets: Mississippi*, September 10, 2010. <http://www.ers.usda.gov/StateFacts/MS.htm> (accessed October 13, 2010).
- 15 Environmental Protection Agency, 3; Union of Concerned Scientists, 1.
- 16 Ibid, 5.
- 17 Center for Integrative Environmental Research, University of Maryland, 1-2; Twilley and Miller, 3-4.
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- 19 William W.L. Cheung et al., *Impact of climate change on US marine fisheries with a special emphasis on the Gulf and Southeast Atlantic States*, Sea Around Us Project, 2009, 6. <http://www.seaaroundus.org/researcher/dpauly/PDF/2009/OtherItems/ImpactOfClimateChangeOnUSMarineFisheries.pdf> (accessed July 28, 2010).
- 20 Mississippi Forestry Commission, *Mississippi's Forest Legacy Program*, March 2007, 12. <http://www.mfc.ms.gov/pdf/Mgt/FL/Forest%20Legacy%20AON-1.pdf> (accessed October 28, 2010).
- 21 Twilley and Miller, 3.
- 22 Ibid.
- 23 Environmental Protection Agency, 4.
- 24 Ibid.; Twilley and Miller, 3.
- 25 Twilley and Miller, 4; Union of Concerned Scientists, 2.
- 26 These are the top four regional threats from climate change. Oxfam America, *Social vulnerability and climate change in the US Southeast*, October 21, 2009, 5. <http://www.oxfamamerica.org/files/Exposed-Social-Vulnerability-and-Climate-Change-in-the-US-Southeast.pdf> (accessed July 28, 2010).
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- 30 Union of Concerned Scientists, 4.
- 31 Mississippi Department of Employment Services, *AMD-3 Report* (2009), April 2010, 1. <http://www.mdes.ms.gov/Home/docs/LMI/Publications/AMRS/stateamr3-2009.pdf> (accessed July 28, 2010). Figure includes wholesale trade; transportation, warehousing and utilities; transportation and warehouse; and warehousing and storage categories.
- 32 Union of Concerned Scientists, 4.
- 33 Ibid., 4.
- 34 Center for Integrative Environmental Research, University of Maryland, 1.
- 35 Oxfam America, 10.
- 36 Twilley and Miller, 4.
- 37 National Climatic Data Center, Coakley et al., 75.
- 38 Twilley and Miller, 3.
- 39 Mississippi Department of Employment Services, *Labor Market Data for August 2010*, August 2010, 5. <http://www.mdes.ms.gov/Home/docs/LMI/Publications/Labor%20Market%20Data/labormarketdata.pdf> (accessed October 13, 2010).
- 40 Mississippi Department of Employment Services, *AMD-3 Report*. Subtracting the total non-farm labor force from the total employed civilian labor force yields an agricultural labor force of 71,900.
- 41 The American Gaming Association reports a gaming workforce of 25,739. American Gaming Association, *State Information: Statistics - Mississippi*. Mississippi has determined, however, that gaming supports 1.45 total jobs for every job in gaming. Denise von Herrman, Robert Ingram, and William C. Smith, *Gaming in the Mississippi Economy: A Marketing, Tourism, and Economic Perspective*, University of Southern Mississippi, June 30, 2000, 14. <http://www.usm.edu/dewd/pdf/Gamingstudy.pdf> (accessed July 28, 2010). Applied to the gaming workforce, this multiplier suggests that gaming supports a total of 37,322 jobs.

- 42 Includes wood product manufacturing, sawmill-wood preserve, and paper manufacturing categories. Mississippi Department of Employment Services, *AMD-3 Report*.
- 43 An estimated 23,438 jobs, averaging 2001 and 2006 data. National Wildlife Federation, *Global Warming and Mississippi*, 2.
- 44 Based on total employed workforce of 1,168,600. Mississippi Department of Employment Services, *AMD-3 Report*.
- 45 Union of Concerned Scientists, 1.
- 46 Center for Integrative Environmental Research, University of Maryland, 1; Twilley and Miller, 4.
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- 48 Ibid; Twilley and Miller, 3-4.
- 49 In the Pew Center on Global Climate Changes state directory of climate change programs and actions, for example, Mississippi has nothing listed under either category. Pew Center on Global Climate Changes, *US States and Regions: Mississippi*. <http://www.pewclimate.org/states-regions/states/Mississippi> (accessed July 28, 2010). Forbes ranked Mississippi 46th in “America’s Greenest States,” noting: “All [five worst-ranked states] suffer from a mix of toxic waste, lots of pollution and consumption and no clear plans to do anything about it. Expect them to remain that way.” Brian Wingfield and Miriam Marcus, “America’s Greenest States,” *Forbes.com*, October 17, 2007. http://www.forbes.com/2007/10/16/environment-energy-vermont-biz-beltway-cx_bw_mm_1017greenstates_print.html (accessed July 28, 2010). Mississippi also controversially abandoned a measure that would require insurers to disclose their climate change risks. Austin Considine, “State sidesteps climate change survey: Indiana leads coalition of defiant deniers,” *NUVO*, March 3, 2010. <http://www.nuvo.net/indianapolis/state-sidesteps-climate-change-survey/Content?oid=1329553> (accessed July 28, 2010).
- 50 National Wildlife Federation, *Charting a New Path for Mississippi’s Electricity Generation and Use*, 2008, 1-2. http://www.nwf.org/Global-Warming/-/media/PDFs/Global%20Warming/Clean%20Energy%20State%20Fact%20Sheets/MISSISSIPPI_10-22-5.ashx (accessed July 28, 2010).
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- 52 U.S. Energy Information Administration, *Mississippi Renewable Energy Profile* (2007 data), June 2010. http://www.eia.doe.gov/cneaf/solar.renewables/page/state_profiles/mississippi.html (accessed July 28, 2010).
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- 54 Ibid.
- 55 Pew Charitable Trusts, *Mississippi Clean Energy Economy Jobs Grew Nearly Seven Times Faster than State’s Overall Jobs*, 1.
- 56 National Wildlife Federation, *Charting a New Path for Mississippi’s Electricity Generation and Use*, 1.
- 57 Based on the current proportion of renewable energy capacity to jobs. Mississippi currently supports 3,200 clean energy jobs, while generating 3% of its electricity from renewable sources—about 1,065 jobs per renewable percentage of total generation capacity. If this proportion holds, 20% renewable generation would support about 21,300 jobs.
- 58 National Wildlife Federation, *Global Warming and Mississippi*, 2.