



TEXAS STATISTICS S	SUMMARY (201
17	CLIMATE DISAS
2ND HIGHEST	FEDERAL FUND
5TH HIGHEST	PER CAPITA SPE
7TH HIGHEST	NUMBER OF DI
WALKER	COUNTIES WIT
49	COUNTIES WIT
26	SUPERFUND SIT
С	ASCE INFRASTR
HARRIS	HIGHEST COMP
\$14.8 BILLION	FEMA + HUD PC
28.6 MILLION	POPULATION TO
\$517	PER CAPITA SPE
\$26.6 BILLION	OF CLIMATE INF A SMALL INSUR

|1 - 2021)

STER DECLARATIONS

DING IN THE COUNTRY

PENDING ON CLIMATE DISASTERS

ISASTERS IN THE COUNTRY

H THE HIGHEST DISASTER OCCURENCES

TH FIVE OR MORE DISASTERS

ITES

RUCTURE REPORT CARD GRADE

POUNDING RISKS

OST-DISASTER FUNDING

OTAL

PENDING ON CLIMATE DISASTERS

IFRASTRUCTURE COULD BE SUPPORTED THROUGH RANCE SURCHARGE

DISASTER OCCURRENCES 2011-2021

FEDERALLY DECLARED CLIMATE DISASTERS BY COUNTY

FEDERAL ASSISTANCE 2011-2021 POST-DISASTER PUBLIC ASSISTANCE AND HAZARD MITIGATION FUNDS **OBLIGATED BY COUNTY FOR CLIMATE DISASTERS**







MAPPING THE IMPACT

\$3.8B FEMA obligations

\$14.8B FEMA + HUD assistance

SOCIAL VULNERABILITY INDEX 2011-2021

AREAS OF GREATEST SOCIAL VULNERABILITY

ENERGY RELIABILITY 2011-2021

COUNTIES AT GREATEST RISK OF POWER OUTAGES



Social Vulnerability Index

CDC (2018)							
No Value							
0.0 - 0.2							
0.2 - 0.4							
0.4 - 0.6							
0.6 - 0.8	Source: CDC/ATSDR 2018 Social						
0.8 - 1.0	Vulnerability Index Maps courtesy of iParametrics						



Eighty-eight counties in Texas have high social vulnerability and low energy reliability.

Aggregated Annual Electric Outage Duration Including major events - SAIDI_W_MED



COMPOUNDING RISKS: A FRAMEWORK FOR FUTURE INVESTMENT



Areas with the greatest return on investment due to physical and social risk



U.S. counties were analyzed for social benefits using the following parameters: NOAA Sea Level Rise (Source: Sea Level Rise and Coastal Flooding Impacts (noaa.gov)); Population Density (Source: 2020 Census Demographic Data Map Viewer); Population Change (Source: 2020 Census Demographic Data Map Viewer); Poverty (Source: 2020 Census Demographic Data Map Viewer); Cardiovascular Diseases (Source: US Data | GHDx (healthdata.org)); Neoplasms (Source: US Data | GHDx (healthdata.org)); Diabetes, urogenital, blood, and endocrine diseases (Source: US Data | GHDx (healthdata.org)); FEMA Natural Hazard risk (Source: Map | National Risk Index (fema.gov))t | Map courtesy of APTIM.

County Name	High Population Density	High Percent of Population Change	High Poverty Rate	High Health Risk	Types of High Climate Risk	Sea Level	Total Risk Count
Anderson							0
Andrews							0
Angelina					3		3
Aransas					2		4
Archer							0
Armstrong					1		1
Atascosa					1		2
Austin							0
Bailey					3		2
Bandera							0
Bastrop							0
Baylor					1		3
Bee							0
Bell					2		2
Beyar					6		4
Blanco					0		
Borden							0
Booguo							0
Bosque					2		0
Bowie					3		3
Brazoria					2		4
Brazos					1		3
Brewster					1		1
Briscoe					1		2
Brooks					2		3
Brown					1		2
Burleson							0
Burnet					1		2
Caldwell					1		2
Calhoun					1		2
Callahan							0
Cameron					8		3
Camp							0
Carson							0
Cass					2		3
Castro					1		2
Chambers							1
Cherokee							0
Childress							0
Clay					1		2
Cochran					1		3
Coke							0
Coleman					1		3
Collin					2		3
Collingsworth					1		3
Colorado							0
Comal					1		2
Comanche							0
Concho							0
Cooke					1		2
Cooke					1		2

County Name	High Population Density	High Percent of Population Change	High Poverty Rate	High Health Risk	Types of High Climate Risk	Sea Level	Total Risk Count
Coryell							0
Cottle					3		3
Crane							0
Crockett							0
Crosby					3		3
Culberson							0
Dallam					2		2
Dallas					8		3
Dawson							0
Deaf Smith					4		3
Delta							0
Denton					2		3
DeWitt					1		3
Dickens							0
Dimmit					2		3
Donley					1		3
Duval							0
Fastland							0
Ector					2		3
Edwards					1		2
El Paso					8		3
Ellis					0		0
Enath							0
Falls							0
Fannin							0
Favette							0
Fisher							0
Floyd							0
Foard					1		3
Fort Pond					1		3
Fort Benu					I		4
Franklin							0
Frie							0
Cainas							0
Gaines					2		0
Gaiveston					3		4
Garza					2		0
Gliespie					3		
Glasscock							0
Gonzelas	<u> </u>				1	<u> </u>	0
Gonzales					1		3
Gray					2		2
Grayson					4		3
Gregg					4		3
Grimes							0
Guadalupe					1		2
Hale					4		2
Hall					1		3
Hamilton							0
Hansford					2		2
Hardeman							0
Hardin							1

County Name	High Population Density	High Percent of Population Change	High Poverty Rate	High Health Risk	Types of High Climate Risk	Sea Level	Total Risk Count
Harris					8		5
Harrison					1		3
Hartley							0
Haskell							0
Hays					1		2
Hemphill					1		2
Henderson					1		3
Hidalgo					1		4
Hill					1		2
Hockley							0
Hood					1		2
Hopkins					1		2
Houston							0
Howard							0
Hudspeth							0
Hunt					2		3
Hutobingon					2		2
					2		2
Irion							0
Јаск							0
Jackson							1
Jasper					2		3
Jeff Davis					1		1
Jefferson					5		4
Jim Hogg							0
Jim Wells					2		3
Johnson					1		3
Jones							0
Karnes							0
Kaufman							0
Kendall							0
Kenedy							1
Kent							0
Kerr					4		1
Kimble					1		3
King							0
Kinney							0
Kleberg					1		4
Knov					1		3
					1		0
					2		0
Lamar					2		3
Lamp					3		3
Lampasas							0
Lavaca					1		2
Lee							0
Leon							0
Liberty					1		4
Limestone							0
Lipscomb							0
Live Oak							0
Llano					4		2
Loving							0

County Name	High Population Density	High Percent of Population Change	High Poverty Rate	High Health Risk	Types of High Climate Risk	Sea Level	Total Risk Count
Lubbock					7		4
Lynn							0
Madison							0
Marion							0
Martin							0
Mason							0
Matagorda					2		4
Maverick					3		3
McCulloch							0
McLennan					2		4
McMullen							0
Medina							0
Menard							0
Midland					2		2
Milam							0
Mills							0
Mitchell							0
Montague							0
Montgomery					3		3
Moore					5		1
Morris					1		3
Motlov					I		0
Nacadooboo					2		2
Nacoguoches					2		3
Navarro					2		3
Newton					0		0
Noian					2		3
Nueces					4		4
Ochiltree					2		2
Oldnam							0
Orange					2		3
Palo Pinto					1		3
Panola							0
Parker							0
Parmer					1		2
Pecos							0
Polk					2		4
Potter					7		3
Presidio					4		2
Rains							0
Randall					3		2
Reagan							0
Real					2		3
Red River					1		3
Reeves							0
Refugio					1		4
Roberts							0
Robertson							0
Rockwall							0
Runnels							0
Rusk							0
Sabine					1		3

San AgentionImageImageImageImageImageImageSan JachinoImage	County Name	High Population Density	High Percent of Population Change	High Poverty Rate	High Health Risk	Types of High Climate Risk	Sea Level	Total Risk Count
San PairoiImage <thimage< th="">Image<thimage< th="">ImageImageImageImage</thimage<></thimage<>	San Augustine							0
San PartialImage <thimage< th="">Image<td>San Jacinto</td><td></td><td></td><td></td><td></td><td>2</td><td></td><td>3</td></thimage<>	San Jacinto					2		3
San SahaImageImageImageImageImageImageImageSchiebderImageImageImageImageImageImageImageImageShachadImage	San Patricio					2		3
ScheiderImageImageImageImageImageImageStackefordImage	San Saba							0
Sury ShakeliordImage Image ShelyImage Image Image Image ShelyImage Image Image Image Image Image Image Image Image Image Image Image Image Image Image Image Image Image 	Schleicher							0
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ShelyII	Shackelford							0
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SonewailImage<	Sterling							0
SuttornImageImageImageImageImageImageImageImageSwisherImageI	Stonewall					1		3
SwisherImageImageImageImageImageImageImageImageTaryanImageIm	Sutton							0
TarantImageImageImageImageTaylorImageIma	Swisher							0
TaylorImage Taylo	Tarrant					6		3
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WebbImage: sector s	Washington							0
WhartonImage: selection of the s	Webb					4		2
WheelerImage: sector secto	Wharton					2		3
WichitaImage of the second	Wheeler					1		2
WilbargerImage: selection of the	Wichita					1		2
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WilliamsonImage: selection of the selection of th	Willacy					3		4
WilsonImage: selection of the se	Williamson							0
WinklerImage: Sector of the secto	Wilson					1		2
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Wood Image: Marcine Strategy of Strate	Wise							0
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Young Image: Constraint of the second s	Yoakum							0
Zapata 2 3 Zavala 2 3	Young							0
Zavala 2 3	Zapata					2		3
	Zavala					2		3

TEXAS

FEMA PA + HM HUD CDBG-DF FEMA + HUD A	ASTERS 1: \$3.8 B R: \$10.9 B ASSISTANCE: \$14.8 B		2011 2013 4159: SEVERE STORMS AND	4223: SEVERE STORMS, TORNADOES, STRAIGHT-LINE	U15 2016 2017 2018 2019 2020 4245: SEVERE STORMS, tornadoes, straight-line 4266: SEVERE STORMS, 4269: SEVERE STORMS and 4272: SEVERE STORMS and 4377: SEVERE STORMS and 4416: SEVERE STORMS and 4454: SEVERE STORMS and	2021	
County Name	# of Climate Disasters 2011-2021 Obligation 17 \$1.056.3	1999: WILDF S PA Obligations H 67.219 \$48,502,179	IRES 4029: WILDFIRES 4136: EXPLOSION FLOODING M Obligations PA Obligations PA Obligations PA Obligations PA Obligations \$734,285 \$29,908,775 \$593,814 \$3,553,575 \$140,106 \$716,629	WINDS AND FLOODING PA Obligations HM Obligations \$0 \$31,869,172 \$2,267,280	WINDS, AND FLOODING WINDS, AND FLOODING WINDS, AND FLOODING TORNADOES, AND FLOODING FLOODING FLOODING FLOODING FLOODING 432: HURRICANE HARVEY FLOODING FLOODING 4466: TROPICAL STORM IMELDA 4572: HURRICANE LAURA 4586: SEV Ins PA Obligations HM Obligations PA Obligations	igations HM Obligations	
Anderson County Andrews County Angelina County	4 \$1,: 2 \$ 3 \$1,:	00,662 \$34,689 34,032 \$134,032 06,308 \$134,032	\$0 \$129,702 \$0 \$129,702 \$0	\$1,164,568 \$63,375	Control Control <t< td=""><td>\$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0</td></t<>	\$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	
Aransas County Archer County Armstrong County Atascosa County	2 \$77, 4 \$1, 2 \$2 2 \$3	16,597 22,655 \$80,895 19,578 \$19,578 04,204 \$19,578	\$0	\$664,716 \$0 \$0 \$267,905	Image:	\$59,609 \$0 \$3,375 \$0 \$0 \$0 \$36,299 \$0	
Austin County Bailey County Bandera County	5 \$3, 3 \$ 2 \$	02,621 69,504 \$3,901 30,034	\$0 \$0	\$871,725 \$0	x0 x0 <td< td=""><td>\$20,901 \$0 \$0 \$0 \$0 \$0</td></td<>	\$20,901 \$0 \$0 \$0 \$0 \$0	
Bastrop County Baylor County Bee County Bell County	8 \$33, 4 \$9 2 \$1, 1 9	93,211 \$0 84,413 \$10,865 55,521 53,770 53,770 53,770	\$3,101,895 \$15,184,726 \$188,389 \$0	\$1,568,800 \$1,827,009 \$100,601 \$0	9 \$461,555 \$2,439,934 \$2,439,934 \$2,478,977 \$3,597,538 \$0 Image: Comparison of the compariso	\$23,451 \$0 \$0 \$0 \$12,649 \$0 \$53,770 \$0	
Bexar County Blanco County Borden County	2 \$	75,605 68,235 \$0 \$0	\$0 Image: second se	\$668,235 \$0	\$39,178 \$0	\$736,427 \$0 \$0 \$0 \$0 \$0	
Bosque County Bowie County Brazoria County Brazos County	6 \$1, 3 \$4 5 \$50, 2 \$3	97,467 56,637 01,689 88,521	\$107,064 \$0 \$75,441 \$0	\$237,915 \$0 \$781,196 \$0 \$343,918 \$0	\$309,763 \$0 \$0 \$0 \$100 <	\$0 \$0 \$0 \$0 \$124,190 \$0 \$77,952 \$0	
Brewster County Briscoe County Brooks County	2 3 3 3 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	16,187 \$16,187 51,475 \$26,755 79,594 \$79,594	\$0 \$0<		Image: state in the state	\$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	
Brown County Burleson County Burnet County	5 \$6, 4 \$1, 3 \$1, 7 \$2	68,179 \$62,158 20,482 20,718 \$0	\$0	\$839,625 \$0 \$432,300 \$0	\$1 \$1 <td< td=""><td>\$0 \$0 \$0 \$0 \$16,245 \$0 \$4,505 \$0</td></td<>	\$0 \$0 \$0 \$0 \$16,245 \$0 \$4,505 \$0	
Calhoun County Callahan County Callahan County	2 \$19, 6 \$5, 4 \$	40,932 76,286 \$77,274 27,075	\$00,323 \$0 \$300,049 \$0 \$0 \$0 \$0 \$1 \$1 \$0 \$1 \$1	\$669,627 \$1,344,207	x 2 5 5 x 3 x 3 0 <th 0="" 3="" <="" td="" x=""><td>\$4,503 \$0 \$22,729 \$0 \$7,425 \$0 \$24,884 \$0</td></th>	<td>\$4,503 \$0 \$22,729 \$0 \$7,425 \$0 \$24,884 \$0</td>	\$4,503 \$0 \$22,729 \$0 \$7,425 \$0 \$24,884 \$0
Camp County Carson County Cass County	2 9 2 9 7 \$	12,308 34,948 \$34,948 19,117 \$64,090	\$12,308 \$0 \$0 \$0 \$45,815 \$0	\$192,213 \$67,200	Image: Second	\$0 \$0 \$0 \$0 \$0 \$0	
Chambers County Cherokee County Childress County	3 \$4,1 4 \$1,2 3 \$2,2	24,667 \$6,104 21,538 64,734 33,502 \$14,044	\$0 \$134,700 \$0 \$134,700 \$0 \$134,700 \$0 \$134,70	\$902,268 \$0	x = 0 x = 0 <th< td=""><td>\$0 \$0 \$26,641 \$0 \$4,960 \$0 \$0 \$0</td></th<>	\$0 \$0 \$26,641 \$0 \$4,960 \$0 \$0 \$0	
Clay County Cochran County Coke County	4 \$: 3 3 5 2	15,345 \$82,651 68,040 \$13,808 \$0 \$0	\$0 \$40,177 \$0 \$0 \$0 \$0 \$0 \$0 \$0	\$192,517 \$0	No Image: second se	\$0 \$0 \$0 \$0 \$0 \$0	
Collin County Collingsworth County Colorado County	3 \$1, 1 \$: 3 \$ 5 \$4,	36,137 \$34,992 76,753 35,968 74,812 1	\$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$	\$34,806 \$0 \$135,968 \$0 \$505,829 \$0	3 3	\$41,878 \$0 \$341,947 \$0 \$0 \$0 \$0 \$0	
Comal County Comanche County Concho County	4 \$1, 4 \$10, 2	86,228 93,513 \$6,141 \$6,141	Image: second	\$253,415 \$0 \$4,448,156 \$0	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	\$10,816 \$0 \$0 \$0 \$0 \$0	
Cooke County Coryell County Cottle County Crane County	2 \$4, 6 \$2, 3 2	57,807 48,579 \$101,819 88,959 \$88,959 18,682 \$18,682	\$0 \$168,859 \$0 \$0 \$168,859 \$0 \$0 \$0 \$0	\$4,917,949 \$0 \$273,390 \$0	\$0 \$0 <td< td=""><td>\$39,858 \$0 \$0 \$0 \$0 \$0 \$0</td></td<>	\$39,858 \$0 \$0 \$0 \$0 \$0 \$0	
Crockett County Crosby County Culberson County	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	62,634 \$62,634 15,783 \$7,621 51,654 \$51,654	\$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0		Image: state stat	\$0 \$0 \$8,162 \$0 \$0 \$0	
Dallam County Dallas County Dawson County Deaf Smith County	1 4 \$13, 2 \$	\$0 01,346 12,892 \$12,892 62,415 \$52,436	\$0 \$0	\$6,766,625 \$154,738	i i	\$0 \$0 \$441,483 \$0 \$0 \$0 \$0 \$0	
Delta County Denton County DeWitt County	3 \$ 2 \$5,0 3 \$1,0	89,551 15,481 58,135		\$259,014 \$0 \$4,886,788 \$64,766 \$58,312 \$0	\$1 \$227,015 \$0 \$227,015 \$0 \$1 <td>\$3,522 \$0 \$563,927 \$0 \$0 \$0</td>	\$3,522 \$0 \$563,927 \$0 \$0 \$0	
Dickens County Dimmit County Donley County	4 \$ 2 3 \$ 3 \$	93,325 \$102,961 \$0 53,930 \$53,930 66,235 \$21,848	\$0	\$72,414 \$0	\$1 1 \$1 \$1	\$17,949 \$0 \$0 \$0 \$0 \$0 \$0 \$0	
Eastland County Ector County Edwards County	4 \$9,1 1 4 \$1,2	\$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0 \$0 \$0	\$2,475,007 \$2,813,942 \$90,302 \$0	42 A	\$0 \$16,901 \$0 \$0 \$0 \$0 \$0	
Ellis County El Paso County Erath County Falls County	3 \$1, 1 5 \$3,	73,571 \$0 07,737 \$91,950 80,237	So Image: Solution in the state of the stat	\$732,605 \$0 \$546,505 \$0	\$1 \$380,64 \$1	\$260,302 \$0 \$0 \$0 \$25,489 \$0 \$0	
Fannin County Fayette County Fisher County	- \$1 3 \$2, 6 \$3, 4 \$1	16,703 83,195 90,499 \$58,006	Image: select	\$653,997 \$1,008,265 \$262,651 \$236,119	65 66 66 66 67 66 66 66 67 67 68 68 68 68 61 <	\$7,500 \$0 \$17,125 \$0 \$0 \$0	
Floyd County Foard County Fort Bend County Franklin County	2 \$: 4 9 5 \$59,	35,529 30,548 \$17,358 08,333 47,398	\$0 \$13,190 \$0 \$0 \$9,557 \$0	\$0 \$533,288	1 1	\$0 \$0 \$0 \$0 \$273,783 \$0 \$0	
Freestone County Frio County Gaines County	2 \$\$ 3 3	47,253 12,766 \$0 09,286	\$0 \$426,654	\$0 \$12,766 \$109,286 \$0	a b b b b b b b b b b b b b b b b b b b	\$0 \$20,599 \$0 \$0 \$0 \$0	
Galveston County Garza County Gillespie County	4 \$74, 3 \$ 2 \$	60,765 10,765 \$63,383 70,425	\$0 Image: S0 <	\$147,382 \$0 \$64,544 \$0	1 1	\$381,731 \$0 \$0 \$0 \$105,881 \$0	
Goliad County Goliad County Gonzales County Gray County	2 \$ 2 \$ 4 \$2,0 1	92,921 67,173 \$14,580 \$0	\$0	\$131,499 \$25,358	a b b b b b c	\$0 \$0 \$13,316 \$0 \$149,734 \$0 \$0 \$0	
Grayson County Gregg County Grimes County	3 \$2, 3 \$1, 7 \$1,	94,247 91,740 85,303	\$57,777 \$1,028,603 \$227,108 \$0 \$0 \$0	\$1,775,232 \$538,579 \$0	75 A	\$23,960 \$0 \$63,359 \$0 \$16,760 \$0	
Guadalupe County Hale County Hall County Hamilton County	4 \$9 1 6 \$9 1	\$0 \$0 \$8,176 \$23,653 \$0	\$0 \$19,986 \$0	\$0 \$0 \$218,479 \$0	\$113,200 \$0	\$157,263 \$0 \$0 \$0 \$0 \$0 \$0 \$0	
Hansford County Hardeman County Hardin County	2 3 7 \$58,0	\$0 \$0 33,697 \$0 04,726 \$75,003	\$0 \$0<	\$218,206 \$0	Image: Serie Seri	\$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	
Harris County Harrison County Hartley County Haskell County	7 \$1,404, 7 \$1, 3 \$1, 4 \$1,	70,585 49,926 \$62,256 72,807 \$53,481 78,764 \$0	\$0 \$130,951 \$0 \$0 \$0	\$12,032,865 \$1,884,330 \$299,401 \$0 \$19,326 \$0	30 50 <td< td=""><td>6,311,493 \$0 \$6,382 \$0 \$0 \$0</td></td<>	6,311,493 \$0 \$6,382 \$0 \$0 \$0	
Hays County Hays County Hemphill County Henderson County	4 \$1, 4 \$10, 2 \$ 5 \$\$2,	70,784 \$0 56,848 36,565 29,951 36,565	\$0 \$0 \$1,007,153 \$0 \$89,469 \$0	\$0 \$3,667,782 \$60,000 \$2,004,589 \$0	a b b a b <th< td=""><td>\$0 \$0 \$77,688 \$0 \$0 \$0 \$72,513 \$0</td></th<>	\$0 \$0 \$77,688 \$0 \$0 \$0 \$72,513 \$0	
Hidalgo County Hill County Hockley County	6 \$16, 5 \$12, 3 \$\$	96,548 56,427 83,615 \$17,452	\$131,071 \$0 \$0	\$5,606,382 \$5,899,898 \$1,227,137 \$19,793	9 \$3,799,68 \$633,04	\$74,858 \$0 \$0 \$7,103 \$0	
Hood County Hopkins County Houston County Howard County	4 \$4,4 4 \$4,4 6 \$6,4 3 \$	98,696 73,822 \$62,068 79,657 \$145,406	\$0 \$123,128 \$0 \$0 \$34,251 \$0	\$419,121 \$0 \$1,860,280 \$0 \$1,113,927 \$0	\$1 \$1 <td< td=""><td>\$15,129 \$0 \$7,918 \$0 \$28,382 \$0 \$0 \$0</td></td<>	\$15,129 \$0 \$7,918 \$0 \$28,382 \$0 \$0 \$0	
Hudspeth County Hunt County Hutchinson County	1 2 2	\$0 52,559 \$3,019 \$3,019	\$52,559 \$0 \$0		Image: state stat	\$0 \$0 \$0 \$0 \$0 \$0	
Irion County Jack County Jackson County Jasper County	2 3 3 \$(2 \$2, 8 \$3	22,524 \$22,524 67,174 \$0 86,580 70,919 \$29,985	\$0	\$667,174 \$0	Image: Second secon	\$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	
Jeff Davis County Jefferson County Jim Hogg County	2 5 5 \$157,5 2	85,575 \$85,575 63,188 \$8,675 \$0	\$0 \$0<		Image: state stat	\$0 \$0 \$250,496 \$0 \$8,675 \$0	
Jim Wells County Johnson County Jones County Karnes County	4 \$1, 2 \$9 6 \$8, 2 \$1	29,999 41,089 52,450 \$0 28,924	Image: Solution of the second seco	\$1,155,426 \$0 \$541,089 \$0 \$1,359,843 \$0	\$0 \$0 \$0 \$135,235 \$0 \$139,338 \$10	\$0 \$0 \$0 \$0 \$15,736 \$0 \$0 \$0	
Kaufman County Kendall County Kenedy County	3 \$1,0 3 \$2 1	80,379 80,442 \$0	\$0 \$0	\$959,416 \$0 \$280,442 \$0	\$0 \$656,538 \$64,425 \$664,4	\$0 \$0 \$0 \$0 \$0 \$0	
Kent County Kerr County Kimble County King County	1 \$ 4 \$3, 3 \$	42,962 \$42,962 06,286 34,141 \$0 22,370 \$22,370	\$0 \$0 \$0 \$23,826 \$0 \$0		\$0 \$0	\$0 \$0 \$106,286 \$0 \$28,435 \$0 \$0 \$0	
Kinney County Kleberg County Knox County	2 \$\$ 3 \$\$ 4 \$2	05,610 87,620 36,825 \$0	\$0		Image: Sector	\$0 \$0 \$4,560 \$0 \$0 \$0	
Lamar County Lamb County Lampasas County La Salle County	4 \$2; 3 \$ 2 2	40,850 \$42,359 64,469 \$38,700 \$0 \$0 \$0	\$0	\$2,197,545 \$0	\$0 \$486,484 \$0 \$1	\$14,462 \$0 \$0 \$0 \$0 \$0 \$0 \$0	
Lavaca County Lee County Leon County	2 \$	58,837 52,733 \$0 89,646 \$81,918	\$0 \$15,535 \$0 \$0 \$269,707 \$0	\$166,096 \$0 \$328,778 \$0	Image: Serie Seri	\$4,241 \$0 \$4,772 \$0 \$36,338 \$0	
Liberty County Limestone County Lipscomb County Live Oak County	7 \$18, 3 1 2	16,736 \$9,383 \$0 28,195 \$21,744	\$0 \$0 \$0 \$0	\$2,508,212 \$0	\$1 \$322,442 \$0 \$0 \$1 \$924,908 \$0 \$0 \$924,908 \$0 \$0 \$924,908 \$0 \$0 \$924,908 \$0 \$0 \$924,908 \$0 <td< td=""><td>\$0 \$0 \$9,383 \$0 \$0 \$0 \$6,451 \$0</td></td<>	\$0 \$0 \$9,383 \$0 \$0 \$0 \$6,451 \$0	
Liano County Loving County Lubbock County	2 \$2,5 1 3 \$2,6	\$0 49,695		\$1,196,634 \$465,000	Image: Property and p	\$114,214 \$0 \$0 \$0 \$0 \$0	
Lynn County McCulloch County McLennan County	3 \$ 3 \$2, 3 \$27,	52,783 \$10,366 15,975 92,058	\$0 \$0<	\$138,790 \$0 \$1,002,611 \$760,561	\$0 0	\$3,628 \$0 \$0 \$0 \$14,144 \$0 \$0 \$0	
Madison County Marion County Martin County	6 \$1, 4 \$;	\$4,782 50,351 \$24,548 \$4,574 \$4,574	\$0 \$77,062 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	\$414,908 \$0	\$0 \$60,029 \$0 \$120,020 \$193,628 \$0 \$606,830 \$75,000 \$	\$0 \$0 \$24,635 \$0 \$0 \$0 \$0 \$0	
Mason County Matagorda County Maverick County	3 \$	44,813 \$37,764 45,285 14,748 17,513	\$0 \$0<		Image: Comparison of the state of	\$0 \$0 \$51,677 \$0 \$14,748 \$0 \$17,513 \$0	
Menard County Midland County Milam County	4 \$: 2 \$ 4 \$3.	99,902 \$17,458 14,255 \$14,255 38,861	\$0 \$0 \$0 \$0 </td <td>\$366,369 \$173,034</td> <td>a a a b</td> <td>\$0 \$0 \$0 \$0 \$0 \$0 \$0</td>	\$366,369 \$173,034	a a a b	\$0 \$0 \$0 \$0 \$0 \$0 \$0	
Mills County Mitchell County Montague County	2 2 4 \$13,	\$0 \$0 13,174 \$13,174 97,067 \$69,299 85,213	\$0 \$0 \$0 \$60,335 \$0 \$0	\$13,134,600 \$0	Image: State in the	\$0 \$0 \$0 \$0 \$32,833 \$0 \$174,264	
Moore County Mooris County Motris County Motley County	2 \$28, 2 \$2 3 \$2 3 \$2 3 \$2 5	60,130 \$60,130 21,462 \$15,236 61,749 \$61,749	S0 S0<	ک وں \$0	Image: state with the state with th	\$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	
Nacogdoches County Navarro County Newton County	2 \$1, 6 \$5, 8 \$34,	56,024 46,093 60,297 \$36,701 80,505	\$117,729 \$0 \$25,630 \$11,828 \$0 \$0	\$1,156,024 \$0 \$1,840,448 \$325,170 \$292,548 \$1,748,154	Image: Serie Seri	\$0 \$0 \$14,962 \$0 \$0 \$0	
Nueces County Ochiltree County Oldham County	3 \$139, 2 2	\$0 \$0 \$0 \$0 \$0 \$0 \$0	\$0 \$0<	\$1,861,534 \$62,438	38 38 6	\$45,025 \$0 \$0 \$0 \$0 \$0	
Orange County Palo Pinto County Panola County Parker County	7 \$137, 4 \$0 3	36,537 80,440 \$0 \$0 \$0 49,693	\$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	\$347,932 \$0 \$171,084 \$0	\$0 \$1,088,231 \$0 \$1,088,231 \$0 \$119,062,812 \$6,339,387 \$10,487,583 \$10,485,599 \$0 \$10,485,599 \$0 \$10,485,599 \$0 \$10,485,599 \$0 \$10,485,599 \$0 \$10,485,599 \$0 \$10,485,599 \$0 \$10,485,599 \$0 \$10,485,599 \$0 \$10,485,599 \$0 \$10,485,599 \$0 \$10,485,599 \$0 \$10,485,599 \$0 \$10,485,599 \$0 \$10,485,599 \$0 \$10,485,599	\$24,994 \$0 \$62,885 \$0 \$0 \$0 \$26,272	
Parmer County Parmer County Pecos County Polk County	5 \$1, 2 \$9 3 \$9 6 \$14	67,402 59,683 \$59,683 01,216	\$0 \$0<	\$1,204,802 \$0 \$184,248 \$0	x = x = x = x = x = x = x = x = x = x =	\$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	
Potter County Presidio County Rains County	2 3 2 3 2 \$	37,939 \$37,939 43,752 \$43,752 21,105 61,425	\$0		Image: Serie Seri	\$0 \$0 \$0 \$0 \$0 \$0	
Randall County Reagan County Real County Red River County	2 2 2 3 \$ 6 c	\$0 \$0 \$0 \$0 79,493 48,948 \$19,751	\$0 \$0 \$0 \$32,157 \$0	\$207,350 \$0 \$512,205 \$0	a b	\$0 \$0 \$0 \$0 \$16,482 \$0 \$0 \$0	
Reeves County Refugio County Roberts County	2 3 \$28, 3	\$0 78,872 34,665 \$28,199	\$0 \$0 \$0 \$0 \$0 \$6,467	\$33,536 \$0	i i i i i i i i i i i i i i i i i i i	\$0 \$0 \$16,781 \$0 \$0 \$0	
Robertson County Rockwall County Runnels County Rusk County	2 \$ 2 2 3 1 4 6	10,897 \$0 13,098 \$50,678	\$0 \$223,321 \$0	\$290,602 \$0	a b a b a b <th< td=""><td>\$20,363 \$0 \$10,897 \$0 \$0 \$0 \$34,948 \$0</td></th<>	\$20,363 \$0 \$10,897 \$0 \$0 \$0 \$34,948 \$0	
Sabine County San Augustine County San Jacinto County	5 \$1, 6 \$3 6 \$4,	80,193 \$0 09,832 \$24,331 71,322	\$0 \$0 \$12,464 \$0	\$173,044 \$0 \$0 \$0 \$1,328,011 \$39,090	\$0 \$268,36 \$18,22 \$ <	\$36,745 \$0 \$0 \$0 \$0 \$0	
san Patricio County San Saba County Schleicher County Scurry County	2 \$39,0 3 \$1, 2 \$ 3	52,082 \$0 20,336 \$30,160	\$0 Image: Constraint of the second of the seco		Image: series and seri	\$36,897 \$0 \$0 \$0 \$0 \$0 \$0 \$0	
Shackelford County Shelby County Sherman County	3 4 \$2,7	\$0 \$0 75,130 \$0	\$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$	\$1,616,379 \$0	A SO	\$0 \$0 \$30,282 \$0 \$0 \$0	
Smith County Somervell County Starr County Stephens County	5 \$2, 4 \$: 2 \$	52,731 37,491 \$0 66,485 51,032 \$41,042	\$195,006 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	\$115,954 \$0 \$165,217 \$0 \$66,485 \$0	\$1,370,101 \$0 \$0 \$1,370,101 \$0 \$1,370,101 \$0 \$1,370,101 \$0 \$1 \$0 \$1 \$1	\$19,401 \$0 \$0 \$0 \$0 \$0 \$0 \$0	
Sterling County Stonewall County Sutton County	2 3 4	\$0 \$0 \$0 \$0 91,129 \$30,269	\$0 \$0 <td< td=""><td></td><td>Image: Serie (Serie) Image: Serie (Serie) <td< td=""><td>\$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0</td></td<></td></td<>		Image: Serie (Serie) Image: Serie (Serie) <td< td=""><td>\$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0</td></td<>	\$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	
Swisher County Tarrant County Taylor County Terrell County	2 3 \$4, 2	\$0 \$0 03,764 22,791 51,957 \$54,057	\$0 [1 = 0 = 0 = 0 = 0 = 0 = 0 = 0 = 0 = 0 =	\$2,702,468 \$1,430,179	79 1	\$0 \$0 \$171,117 \$0 \$122,791 \$0 \$0 \$0	
Terry County Throckmorton County Titus County	3 \$4 5 \$1, 3 \$2	33,435 \$16,167 11,280 \$50,954 64,323	\$0 \$0<	\$192,005 \$0	\$ \$	\$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	
Tom Green County Travis County Trinity County Tyler County	3 \$ 8 \$28,0 5 \$ 7	39,227 \$139,227 95,664 02,163 \$137,111 60,183 \$134,444	\$0 \$0 \$1,132, \$0 \$17,650 \$0	\$0 \$0 25 \$2,278,862 \$669,024 \$238,993 \$0 \$367,152	\$14,420,224 \$14,420,224 \$0 \$14,420,224 \$14,420,224 \$0 \$10	\$0 \$0 \$253,812 \$0 \$0 \$0 \$0	
Upshur County Upton County Uvalde County	\$1, 3 \$1, 2 2 3 \$1,	\$121,189 63,295 \$0 \$0 35,489	\$289,902 \$0 \$0 \$0	\$807,421 \$0	Image: Second and second	\$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	
Val Verde County Van Zandt County Victoria County Walker County	3 \$9 4 \$6, 3 \$26,	43,264 \$111,166 53,607 77,553 99,455	\$0 \$0 \$0 \$278 840 \$0	\$3,117,954 \$0 \$128,820 \$41,250 \$1,588,000	1 1	\$106,547 \$0 \$13,257 \$0 \$101,311 \$0 \$68,735	
Walker County Waller County Ward County Washington County	10 \$8, 6 \$3, 1 5 \$7	\$54,761 79,143 \$0 26,189	\$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$	\$1,588,096 \$0 \$308,457 \$0 \$327,750 \$0	30 3210,102 30 304,500 504,500 500,500 \$0 \$465,074 \$0 \$0 \$0 \$ <td>\$00,735 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$27,377 \$0</td>	\$00,735 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$27,377 \$0	
Webb County Wharton County Wheeler County	1 \$10,4 4 \$10,4 3	67,356 82,668 \$0 \$0	\$0 Image: Constraint of the second of the seco	\$1,812,510 \$0	1 1	\$67,356 \$0 \$12,345 \$0 \$0 \$0	
wicnita County Wilbarger County Willacy County Williamson County	3 \$1, 3 \$ 3 \$ 3 \$	55,214 \$0 24,807 \$24,807 56,045 49,543	\$0 <	\$1,307,934 \$1,307,934	a b </td <td>\$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$87,610 \$0</td>	\$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$87,610 \$0	
Wilson County Winkler County Wise County	3 \$1, 2 \$ 3 \$1,	19,782 24,719 \$24,719 65,360	\$0 \$67,366 \$0	\$888,357 \$0 \$1,397,994 \$0	\$228,49 \$0	\$2,935 \$0 \$0 \$0 \$0 \$0	
wood County Yoakum County Young County Zapata County	2 99 1 3 \$9	\$0 \$1,570 \$187,233 \$0	\$0 Image: second s	\$804,337 \$0	a b	\$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	
Zavala County	2	33,267		\$33,267 \$0		\$0 \$0	



DISASTER OCCURRENCES 2011-2021

	TOTAL DISASTERS
California	25
Mississippi	22
Oklahoma	22
lowa	21
Tennessee	20
Louisiana	18
Alabama	17
Texas	17
Vermont	17
West Virginia	17
Arkansas	16
Kentucky	16
New Hampshire	16
New York	16
Washington	16
Alaska	15
North Carolina	15
Nebraska	14
Missouri	13
Kansas	13
New Jersey	13
North Dakota	13
South Dakota	13
Montana	12
Oregon	12

	TOTAL DISASTERS
Virginia	11
Florida	11
Georgia	11
Minnesota	11
Connecticut	10
Hawaii	10
Maryland	10
New Mexico	10
Wisconsin	10
Idaho	9
Massachusetts	9
Pennsylvania	9
South Carolina	8
Colorado	7
Utah	7
Maine	6
Michigan	6
Ohio	6
Arizona	6
Delaware	5
Illinois	5
Indiana	4
Rhode Island	4
Wyoming	4
Nevada	3

FEMA AND HUD COST PER CAPITA 2011-2021

	PER CAPITA		PER CAPITA
Louisiana	\$1,736	New Mexico	\$97
New York	\$1,348	Arkansas	\$81
New Jersey	\$815	Massachusetts	\$73
North Dakota	\$738	Georgia	\$64
Vermont	\$593	Montana	\$63
Texas	\$518	Kansas	\$60
West Virginia	\$481	New Hampshire	\$55
Alaska	\$401	Rhode Island	\$53
Florida	\$390	Minnesota	\$49
Nebraska	\$390	Pennsylvania	\$49
South Carolina	\$289	Virginia	\$49
Alabama	\$275	Maryland	\$39
South Dakota	\$269	Washington	\$36
North Carolina	\$243	Wyoming	\$32
Hawaii	\$229	Idaho	\$32
lowa	\$228	Wisconsin	\$27
Oklahoma	\$215	Illinois	\$24
Oregon	\$210	Michigan	\$23
Missouri	\$162	Ohio	\$19
Mississippi	\$159	Maine	\$18
California	\$157	Delaware	\$14
Connecticut	\$149	Utah	\$11
Colorado	\$141	Nevada	\$11
Kentucky	\$105	Indiana	\$7
Tennessee	\$97	Arizona	\$2

DATA VISUALIZATION TOOLS

It is evident the U.S. is already paying a steep price for this challenge. Rebuild by Design partnered with APTIM and iParametrics to create the following visual tools to demonstrate how climate events have affected each state. The set of six maps depicts which areas have been hit the hardest by recent climate events, where recovery funds are focused, where those individuals with high social vulnerabilities live, and which areas have the least energy reliability.

The U.S. needs to change the way it is making funding decisions. Where we make priority investments is equally important to what we invest in. Returns on investments (ROI) in the form of social benefits to communities needs to be part of grant evaluations. The U.S. need to utilize new decision-making frameworks that are forward-looking. The final map in the set includes an example of a new decisionmaking framework that takes into account current vulnerabilities and future climate risks. This is one example of how physical and social vulnerability indicators could inform where investments in adaptation infrastructure can yield high returns in social benefits to the most impacted communities. Our team recognizes, however, that there are other decision-making frameworks to explore, and further research is needed to understand which indicators should be included in any state-specific model. Given the ever-present constraints on funding availability, the intent of presenting these maps together is to prompt investments that address multiple known vulnerabilities simultaneously within projects, furthering comprehensive climate adaptation planning.

The following data are designed as a tool to help communities understand their risks to make betterinformed choices with higher returns on investment, though each state should determine their own framework for investment.

There are always many ways to present these data. For the purposes of this report, we chose to analyze the years 2011-2021. The following six maps and two tables are presented in this format with the following considerations and limitations:

GEOGRAPHIC MAP

The map provides topographic and geographic context for each state and its surrounding areas, indicating whether the state encompasses coastal, riverine, lake, alpine, or desert land.



GEOGRAPHIC MAP. SOURCE: ESRI WORLD IMAGERY BASEMAP

DISASTER DECLARATIONS (RED)

This map shows federally declared climate disasters of sufficient severity and magnitude to warrant major by county from 2011-2021 – providing a snapshot of disaster assistance under this Act to supplement the magnitude of climate disasters across the country the efforts and available resources of States, local in recent history. This report only identifies federally governments, and disaster relief organizations in declared disasters, as there is no entity that collects alleviating the damage, loss, hardship, or suffering and publishes state disaster declarations. It should caused thereby."1 be noted that the declarations shown in this report do not reflect every climate event that has occurred Importantly, extreme heat waves do not fit the criteria between 2011-2021; the report instead only shows for federal disaster declarations despite being the those which have met the cost threshold for a federal leading cause of deaths among climate hazards. disaster declaration. Therefore, the findings overall Likewise, sea level rise is not included in this definition underestimate the number of occurrences and the despite the threat it poses to numerous communities, suffering that some communities have experienced. including damage to property, loss of land, and displacement.

According to the Stafford Act, as amended in May 2021, a "major disaster" includes "any natural catastrophe (including any hurricane, tornado, storm, high water, winddriven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, or drought), or, regardless of cause, any fire, flood,



DISASTER DECLARATIONS. SOURCE: FEMA 2021 | MAPS COURTESY OF IPARAMETRICS.

or explosion, in any part of the United States, which in the determination of the President causes damage

It should be noted that while most disaster declarations are due to climate events, there are a few instances of disasters due to other natural hazards, such as earthquakes and volcanic eruptions. Though these events are not increasing in magnitude or frequency due to climate change, the severity of their impact may be connected. As climate impacts degrade household and critical infrastructure, communities may become more vulnerable to other natural hazards. Retrofitting infrastructure after these events often requires the same measures as floods, tornadoes, fires, etc., so these events were included in the report to demonstrate the need to prioritize multi hazard adaptation approaches.

FEDERAL ASSISTANCE (ORANGE)

The map shows the amount of federal dollars allocated to counties through FEMA's Public Assistance and Hazard Mitigation Grant Programs between 2011-2021 which allocates funding to individual counties and statewide. The map does not show where "statewide" allocations were spent within the state, but rather only shows county allocations. However, these statewide allocation amounts are included in the Disaster Declaration table at the end of each chapter and included in the "FEMA Total" provided next to the map. The adjacent table adds HUD's Community Development Block Grant Disaster Recovery funds - which are only available to states after a disaster - to the FEMA Total for an estimate of federal post-disaster spending in each state.



FEDERAL ASSITANCE. SOURCE: FEMA 2021 | MAPS COURTESY OF IPARAMETRICS.

The Disaster Declaration tables provided at the end of each chapter show all federal Disaster Declarations declared between 2011-2021 and the corresponding FEMA obligations associated with those events. However, in some instances, FEMA continues to obligate funds for years following a declaration. Some states have received funds for events that took place between 2011-2021 after 2021, so the total sum of funds associated with that event are not captured. All FEMA funds allocated to counties between 2011-2021 are shown in the federal assistance map; however, they do not show up in the Disaster Declaration table if their corresponding event took place prior to 2011. For example, counties in the State of Illinois are still receiving funds from a 1960s storm. The funds obligated to those counties are included in the map, but that event is not included in the Disaster Declaration table at the end of the chapter.

There are additional sources of federal funding made available to governments or individuals in response to disasters, such as the U.S. Army Corp of Engineers (USACE) projects, Small Business Administration (SBA) loans, and private insurance payouts, which are not included in this report because they are harder to uniformly track and/or must be paid back. Therefore, our findings underestimate the total support available to states and individuals post-disaster. Since disaster aid is allocated to repair physical damage to property, events such as extreme heat, which largely creates physical damage to persons and not property, rarely qualify for federal disaster recovery aid. Additionally, there is only a shallow understanding of the economic impact of social and health-related costs and environmental degradation after a disaster.

SOCIAL VULNERABILITY INDEX (GREEN)

Social vulnerability refers to the potential negative effects on communities caused by external stresses on human well-being. Such stresses include natural or human-caused disasters or disease outbreaks. The factors that determine social vulnerability are directly tied to social determinants of health or the social, economic, and physical factors - such as race, socioeconomic status, and environmental conditions - that influence health. Socially vulnerable populations fare the worst during a disaster and often take longer to recover.² The Center for Disease Control/Agency for Toxic Substance and Disease Registry Social Vulnerability Index (CDC/ATSDR SVI) uses 15 U.S. census variables to help local officials identify communities that may need support before, during, or after disasters. The map presents the SVI on a census block level, indicating where the most socially vulnerable populations within each county live. The 15 indicators are grouped into four themes: Socioeconomic Status



SOURCE: CDC/ATSDR 2018 SOCIAL VULNERABILITY INDEX MAPS COURTESY OF IPARAMETRICS



SOURCE: US ENERGY INFORMATION ADMINISTRATION | MAPS COURTESY OF APTIM

(below poverty, unemployed, income, no high school diploma); Household Composition & Disability (aged 65 or older, aged 17 or younger, older than age 5 with a disability, single-parent households); Minority Status & Language (minority, speak English "less than well"); and Housing Type & Transportation (multi-unit structures, mobile homes, crowding, no vehicle, group quarters).
(below poverty, unemployed, income, no high school diplomal, inc

Social Vulnerability Index data are not being used to make post-disaster assistance funding decisions. HUD only requires Low and Moderate Income for a portion of their funding. FEMA does not consider it in their allocations. To learn more about how vulnerable populations fare during climate events, turn to p. 10.

ENERGY RELIABILITY (BROWN)

Climate events often lead to energy disruptions for hours, days, or weeks. This map shows the annual average interruption time (in minutes) across the different energy utility providers within a state. Regions (or utility territories) in the darkest shade, on average, experience longer energy outages. These data are aggregated by utility territory, not county, meaning more than one provider can serve a county or group of counties. Viewing the Energy Reliability Map next to the SVI Map, one can begin to infer which regions have the most socially vulnerable residents and are served by the least reliable energy providers. Energy reliability is increasingly becoming related to climate disasters and weather events. Inclusion of these maps is to support evaluation of need for concurrent flood and energy resilience projects. To read more about how energy reliability is calculated, see Appendix A.

COMPOUNDING RISKS (PURPLE)

This map overlays multiple physical and social vulnerability indicators to identify areas where new climate infrastructure would have the greatest return on investment.

This map overlays social inputs – population density, increase in population, and health risks – with physical risk inputs – high risk of climate hazards and sea level rise – to get a more detailed picture of the populations who are most vulnerable to climate events to inform future choices of where new climate infrastructure may have the greatest return on investment through the creation of social benefits.



SOURCES: NOAA, FEMA, 2020 US CENSUS, GHDX, US EPA I MAP COURTESY OF APTIM

some demographic information, these maps have added additional criteria, such as population density, population increase, poverty rates, and health risks, to focus on the compounding effects. For instance, if a climate event happens in an area where there is already high social vulnerability, that community is likely to suffer more.

This approach provides an example of how to begin creating new frameworks for allocating funding, moving away from funding based on damage estimates from the previous storm. These assumptions should be ground-checked by each state as data do not always give us the full picture. For instance, in some cases, the areas highlighted for "highest compounding risks" may already have numerous funding sources while others, such as rural communities, may not. In other areas, the location where investments need to be directed may be adjacent to the county with the highest need. For example, an adaptation intervention to protect a downstream riverine community may need to be built upstream in a less vulnerable area to stop flooding at its source.

Analyzed Risks Include:

- + Climate: sea level rise, multiple climate hazards
- + **Social:** population density, population increase, and poverty
- + Health: cardiovascular disease, neoplasms, and other health indicators

ENDNOTES

1 Federal Emergency Management Agency, "Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended," 42 U.S.C. 5121 et seq., and Related Authorities, 2021. [online], www.fema.gov/sites/default/files/documents/fema_stafford_act_2021_vol1.pdf

2 Flanagan, B., Gregory, E., Hallisey, E., Heitgerd, J. & Lewis, B. "A Social Vulnerability Index for Disaster

Management. Journal of Homeland Security and Emergency Management," 8(1), 2011. https://doi. org/10.2202/1547-7355.1792

COMPOUNDING RISK (TABLE)

Though 10 data sources went into the data for the purple map, the chart shows a simplified view into how the areas of most need were chosen. An array of physical and social challenges were analyzed and then each county was given a score of 0 to 6, with 6 showing areas with the highest potential for returns on investment in the form of social benefits to the county. In order to qualify for a high need of investment, counties needed to have high climate risk. Read more about this approach in Appendix B.

DISASTER OCCURRENCES AND FEMA INVESTMENTS BY COUNTY (TABLE)

The chart provides the raw county-level disaster data used to inform the first two maps. Our team found that sifting through disaster declaration data is often difficult or not available. By making these data public and easily accessible, it is our intent that other organizations, academics, governments, and other decision-makers will continue to make use of and build on this collection.

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