

## **Broadcast News Scripts**

### **The Connections between Extreme Weather and Climate Change**

The following scripts enable the broadcast news media to add clear, fact-based context to their segments on extreme weather disasters.

They have been vetted by Dr. Michael Mann, Distinguished Professor of Atmospheric Science at Penn State U, and Dr. Peter Kalmus, NASA Jet Propulsion Laboratory, and are followed by a list of references.

#### **Headline Statements**

- \*Climate change is making extreme weather more common and more dangerous.<sup>1</sup>
- \*Climate change is increasing the risk multiple disasters will happen at the same time.<sup>2</sup>
- \*Extreme weather disasters will continue to get worse until after we stop using fossil fuels.<sup>3</sup>

#### **Heat Waves**

- \*Heat waves are becoming hotter, longer lasting, and more common due to climate change.<sup>4</sup>
- \*Climate change has already caused record-breaking heat waves in 2018 and 2019.<sup>5</sup>
- \*Heat waves kill more Americans than any other extreme weather.<sup>6</sup>

#### **Wildfires/Bushfires**

- \*By making fire-prone areas hotter and drier, climate change is increasing the size and danger of catastrophic wildfires.<sup>7</sup>

#### **Tropical Storms**

- \*Climate change is making hurricanes bigger and more powerful. As our planet has gotten hotter, category 4 and 5 hurricanes have increased 30%.<sup>8</sup>

\*Flooding from hurricane downpours is increasing due to climate change. A hotter atmosphere holds more moisture, which falls as extreme rain.<sup>9</sup>

\*Scientists say climate change increases the potential for hurricanes to stall over land, compounding flooding and other storm damage.<sup>10</sup>

\*Most deaths from hurricanes are caused by drowning.<sup>11</sup>

\*Scientists are 99-100% sure that climate change is causing the number of strong hurricanes in the North Atlantic to increase.<sup>12</sup>

## **Droughts**

\*Climate change is increasing the risks of drought in the following regions:

Africa (Africa's climate is increasingly alternating between extreme droughts and floods)<sup>13</sup>

Australia<sup>14</sup>

central America<sup>15</sup>

north America, especially the southwestern US<sup>16</sup>

southern Europe and the Mediterranean<sup>17</sup>

## **Extreme Rainfall and Floods**

\*Climate change is making rainfall more extreme. Our planet has already warmed an average of 1°C, and the atmosphere holds more moisture as it warms.<sup>18</sup>

\*Climate change is increasing the risks of flooding in the following regions:

Africa (Africa is increasingly alternating between extremes of drought and flood.)<sup>19</sup>

the central and eastern US<sup>20</sup>

the Indian subcontinent<sup>21</sup>

northern Europe<sup>22</sup>

Russia<sup>23</sup>

western China<sup>24</sup>

## **Tornadoes**

\*Warmer waters in the Gulf of Mexico are making Spring thunderstorms and tornadoes in the Deep South more intense.<sup>25</sup>

\*As air in the southeastern US becomes drier due to climate change, "Tornado Alley" is moving east, with twisters now threatening people who live in Mississippi, Alabama, Arkansas, Missouri, and Illinois.<sup>26</sup>

For more see: <https://www.worldweatherattribution.org/>

## References

- <sup>1</sup> IPCC, *Special Report: Global Warming of 1.5°C* (2018). IPCC, *AR5 Synthesis Report: Climate Change 2014* (2014).
- <sup>2</sup> IPCC, *Special Report: Global Warming of 1.5°C* (2018), p. 69.
- <sup>3</sup> Mauritsen, *et al.* "Committed Warming Inferred from Observations." *Nature Climate Change* 7 (2017), p. 652-655. Hansen, *et al.* "Earth's Energy Imbalance: Confirmation and Implications." *Science* 308.5727 (3 June 2005), p. 1431-35.
- <sup>4</sup> 90-100% probability. IPCC, *AR5 Synthesis Report: Climate Change 2014*, p. 7-8, p. 10.
- <sup>5</sup> Vogel, *et al.* "Global record-breaking 2018 heatwave due to human-induced climate change." *Geophysical Research Abstracts* Vol. 21, EGU2019-8267 (2019). Rahmstorf, *et al.* "Increase of extreme events in a warming world." *PNAS* 108.44 (November 1, 2011), p. 17905-17909.
- <sup>6</sup> [www.weather.gov/hazstat](http://www.weather.gov/hazstat)
- <sup>7</sup> "High Confidence." IPCC, *AR5 Synthesis Report: Climate Change 2014*, p. 69.
- <sup>8</sup> Holland, *et al.* "Recent Intense Hurricane Response to Global Climate Change." *Climate Dynamics* 42.3-4 (Feb 2014), p. 617-27.
- <sup>9</sup> Trenberth, *et al.* (2018). "Hurricane Harvey links to ocean heat content and climate change adaptation." *Earth's Future* 6 (2018), p. 730-44. van Oldenborgh, *et al.* "Attribution of extreme rainfall from Hurricane Harvey," *Environmental Research Letters* 12.12 (August 2017).
- <sup>10</sup> <https://earthobservatory.nasa.gov/images/145139/tropical-cyclones-are-stalling-more>
- <sup>11</sup> Rappaport, E. "Fatalities in the United States from Atlantic Tropical Cyclones: New Data and Interpretation." *Bulletin of the American Meteorological Society* 100.12 (December 2019).
- <sup>12</sup> *AR5 Synthesis Report: Climate Change 2014* (2014), p. 53.
- <sup>13</sup> Kendon *et al.* "Enhanced future changes in wet and dry extremes over Africa at convection-permitting scale." *Nature Communications* 10 (2019), 1794. Lehmann, *et al.* "Increased occurrence of record-wet and record-dry months reflect changes in mean rainfall." *Geophysical Research Letters* 45 (2018). <https://doi.org/10.1029/2018GL079439>.
- <sup>14</sup> Marvel, *et al.* "Twentieth-century hydroclimate changes consistent with human influence." *Nature* 569 (2019), p. 59-65.
- <sup>15</sup> Marvel, *et al.* "Twentieth-century hydroclimate changes consistent with human influence." *Nature* 569 (2019), p. 59-65.
- <sup>16</sup> Marvel, *et al.* "Twentieth-century hydroclimate changes consistent with human influence." *Nature* 569 (2019), p. 59-65. *Fourth National Climate Assessment, Vol 2: Impacts, Risks, and Adaptation in the US* (2018), p. 1104, 1009, 1112, 1133.
- <sup>17</sup> Marvel, *et al.* "Twentieth-century hydroclimate changes consistent with human influence." *Nature* 569 (2019), p. 59-65. Hoerling, *et al.* "On the increased frequency of Mediterranean drought." *Climate* 25 (2012), p. 2146–2161. Romanou, *et al.* "Evaporation–precipitation variability over the Mediterranean and the Black Seas from satellite and reanalysis estimates." *Climate* 23 (2010), p. 5268–5287.
- <sup>18</sup> 90-100% probability. *AR5 Synthesis Report: Climate Change 2014* (2014), p 10.
- <sup>19</sup> Kendon *et al.* "Enhanced future changes in wet and dry extremes over Africa at convection-permitting scale." *Nature Communications* 10 (2019), 1794.
- <sup>20</sup> Lehmann, *et al.* "Increased occurrence of record-wet and record-dry months reflect changes in mean rainfall." *Geophysical Research Letters* 45 (2018). <https://doi.org/10.1029/2018GL079439>. *Fourth National Climate Assessment, Vol 2: Impacts, Risks, and Adaptation in the US* (2018), p.675-76, 677, 689, 694, 695, 696, 697, 701, 702, 713, 875, 876, 877, 878, 899, 900, 901, 903, 916, 917.
- <sup>21</sup> Marvel, *et al.* "Twentieth-century hydroclimate changes consistent with human influence." *Nature* 569 (2019), p. 59-65. Lehmann, *et al.* "Increased occurrence of record-wet and record-dry months reflect changes in mean rainfall." *Geophysical Research Letters* 45 (2018). <https://doi.org/10.1029/2018GL079439>.
- <sup>22</sup> Lehmann, *et al.* "Increased occurrence of record-wet and record-dry months reflect changes in mean rainfall." *Geophysical Research Letters* 45 (2018). <https://doi.org/10.1029/2018GL079439>.
- <sup>23</sup> Lehmann, *et al.* "Increased occurrence of record-wet and record-dry months reflect changes in mean rainfall." *Geophysical Research Letters* 45 (2018). <https://doi.org/10.1029/2018GL079439>.

---

<sup>24</sup> Marvel, *et al.* "Twentieth-century hydroclimate changes consistent with human influence." *Nature* 569 (2019), p. 59-65.

<sup>25</sup> Molina, *et al.* "Importance of the Gulf of Mexico as a Climate Driver for U.S. Severe Thunderstorm Activity." *Geophysical Research Letters* 43 (2016). <https://doi.org/10.1002/2016GL071603>.

<sup>26</sup> Gensini, *et al.* "Spatial Trends in United States Tornado Frequency." *Climate and Atmospheric Science* 38 (2018). <https://doi.org/10.1038/s41612-018-0048-2>