

**Statement for the Commission on
Human Rights Inquiry Hearing
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It is an honor to give this statement for the Republic of the Philippines Commission on Human Rights for the National Inquiry on Climate Change. I am the Director of Climate Science at the Union of Concerned Scientists (UCS) and have discussed my plans for the presentation with legal representative for the petitioners, Hasminah Paudac along with Kristin Casper, litigation counsel, Greenpeace.

I submit the following statement, my *Curriculum Vitae*, and the PowerPoint to be presented during the fourth round of public hearings in New York, USA on September 27, 2018:

The climate assessments of the Intergovernmental Panel on Climate Change (IPCC) demonstrate the advances in science attributing human contribution to climate change. The second assessment report in 1995 briefly defined the difference between detection and attribution:

“Detection and attribution studies attempt to distinguish between anthropogenic and natural influences. “Detection of change” is the process of demonstrating that an observed change in climate is highly unusual in a statistical sense, but does not provide a reason for the change. “Attribution” is the process of establishing cause and effect relations, including the testing of competing hypotheses.”

It then declared, “the balance of evidence suggests that there is a **discernible human influence** on global climate” (IPCC 1995). By the fifth assessment report (IPCC 2013), the advances in both detection and attribution for temperature trends were clear:

*“Warming of the climate system is **unequivocal**, and since the 1950s, many of the observed changes are unprecedented over decades to millennia.”*

*“It is **extremely likely**¹ that **human influence** has been the **dominant cause** of the observed warming since the mid-20th century.”*

The largest contribution to this change arose from human activities, in particular the release of greenhouse gases into the atmosphere from fossil fuels (Myhre et al., 2013). Heede (2014), found that nearly two-thirds of all industrial carbon dioxide (CO₂) and methane (CH₄) emissions can be traced to the products of a small number of major industrial carbon producers; 83 producers of coal, oil, natural gas, and 7 cement manufacturers.

¹ IPCC 2013 defines extremely likely as a 95-100% probability of an outcome or result.

I had the opportunity to conduct research with co-authors from the University of Oxford, Climate Accountability Institute, and UCS to use a simple climate model to quantify the contribution of historical (1880–2010) and recent (1980–2010) emissions traced to these carbon producers to the historical rise in global atmospheric CO₂, surface temperature, and sea level (Ekwurzel et al., 2017). We found that emissions traced to these 90 carbon producers contributed ~57% of the observed rise in atmospheric CO₂, ~42–50% of the rise in global mean surface temperature (GMST), and ~26–32% of global sea level (GSL) rise over the historical period and ~43% (atmospheric CO₂), ~29–35% (GMST), and ~11–14% (GSL) since 1980 (based on best-estimate parameters and accounting for uncertainty arising from the lack of data on aerosol forcings traced to producers). Our study demonstrates that the proportional increase in atmospheric carbon dioxide, GMST, and GSL—key indicators of human impact on the global environment—from emissions traced to major carbon producers is quantifiable and substantial. The analyses presented here could be extended to examine the contribution of emissions traced to major carbon producers to other impacts.

Attribution science has advanced to now assess the contribution of human-induced climate change to many types of extreme events (see figure and table, UCS 2018).



Figure source: UCS (2018)

Table: Excerpts from table A1 (UCS 2018)

Event	Period	Region	Attribution Statement	Source
Thailand heat and dryness	April 2016	Thailand	"The record temperature of April 2016 in Thailand would not have occurred without the influence of both anthropogenic forcings and El Niño, which also increased the likelihood of low rainfall."	Christidis et al. (2018)
Asian extreme heat	2016	Asia	"The 2016 extreme warmth across Asia would not have been possible without climate change. The 2015/16 El Niño also contributed to regional warm extremes over Southeast AsiaThe 2015/16 El Niño also contributed to regional warm extremes over Southeast AsiaThe 2015/16 El Niño also contributed to regional warm extremes over Southeast Asia and the Maritime Continent."	Imada et al. (2018)
European heat wave	Summer 2003	Paris; London	"In summer 2003, anthropogenic climate change increased the risk of heat-related mortality in Central Paris by ~70% and by ~20% in London."	Mitchell et al. (2016)
European heat wave	Summer 2003	Continental Europe	"It is very likely (confidence level >90%) that human influence has at least doubled the risk of a heatwave exceeding this threshold magnitude."	Stott, Stone, and Allen (2004)
Extreme rainfall	June - July 2016	Yangtze-Huai region of China	"Both the 2015/16 strong El Niño and anthropogenic factors contributed to the June-July 2016 extreme precipitation (R20mm, RX5day) in Yangtze-Huai, China. Combined, they increased the risk of the event tenfold."	Sun and Miao (2018)
Hurricane Harvey	August 25-30, 2017	Texas	"...global warming made the precipitation about 15% (8%-19%) more intense, or equivalently made such an event three (1.5-5) times more likely."	van Oldenborgh et al. (2017b)
Hurricane Harvey	August 2017	Houston, Texas	"Human-induced climate change likely increased the chances of the observed precipitation accumulations during Hurricane Harvey in the most affected areas of Houston by a factor of at least 3.5. Further, precipitation accumulations in these areas were likely increased by at least 18.8% (best estimate of 37.7%)."	Risser and Wehner (2017)
Hurricane Harvey	August 2017	Texas	"Record high ocean heat values not only increased the fuel available to sustain and intensify Harvey but also increased its flooding rains on land. Harvey could not have produced so much rain without human-induced climate change."	Trenberth et al. (2018)
Hurricane Sandy	October 2012	New York	"A largely anthropogenically driven global sea-level (GSL) rise of 20 cm during the 20th century [Church and White, 2011] caused Sandy to flood an area ~70 km2 greater than it would have in 1880."	Miller et al. (2013)

Attribution science now can assess the increased likelihood of a specific extreme weather event occurring and evaluate the percent of an event’s heat-related mortality to human-induced climate change. Attribution studies for hurricanes (also called typhoons or cyclones) link additional flooding from rising sea levels to human-induced climate change, as well as how warmer ocean temperatures sustain and intensify a hurricane and assess increases in the precipitation (see table).

More than six thousand people lost their lives and over a million dwellings were destroyed from Super Typhoon Haiyan (Soria et al., 2015). Scientists have and will continue to study Super Typhoon Haiyan to better understand this devastating event. For example, Zhao et al., (2017) explored sea state conditions to improve intensity forecasts. Soria et al., (2015) compared Super Typhoon Haiyan with an 1897 Typhoon that followed a similar track through the Philippines. Super Typhoon Haiyan was “more intense, had larger maximum wind coverage, and moved faster” and the associated “storm surge was about twice the height of the 1897 event in San Pedro Bay” (Soria et al., 2015).

Super Typhoon Mangkhut made landfall in northern Philippines as a category 5 this September. Tragically the cascading consequences are still unfolding.

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