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Commentary on the Syria case: Climate as a contributing factor

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The article "Climate change and the Syrian civil war revisited" by Selby et al., 2017 (henceforth S2017) challenges research exploring the links between anthropogenic climate change, water scarcity and drought, impacts on agricultural production and economic stability, and the initial 2011 unrest in Syria. More broadly, the authors contest any causal link between climate and conflict. This is an important, evolving area of study and we encourage improved, expanded, and updated analysis of these connections. In their criticism, the authors of S2017 single out three papers (Werrell, Femia, & Sternberg, 2015; Gleick, 2014; and Kelley, Mohtadi, Cane, Seager, & Kushnir, 2015; here after K2015). Here we comment directly on our own work in K2015, though the others are equally unscathed by S2017's criticisms. We do so by refuting S2017's claims regarding the role of climate change, summarizing the sizeable evidence of the long-term drying trend in the region, and bolstering the link between the drought, migration and subsequent unrest by providing further supporting evidence.

Our response contends overall that S2017 fail to make their case. K2015 (as well as Gleick, 2014; Werrell et al., 2015) claim climate as one of many contributing factors to the unrest. Nothing in S2017 refutes this, and none of their supportable arguments even offer reason for doubting this view. While K2015 can and did make a quantitative estimate of the impact of anthropogenic effects on the drought, we cannot quantify the impact of climate or any other factor, separately, on the conflict.

1. The role of climate change in Syria's drought

The reality of the drought preceding the uprising is not in question. S2017 re-examined available station data and confirmed the results of K2015 that the three consecutive dry winters (2006–7, 2007–8, 2008–9) combined to produce the driest three-year period in the instrumental record. An average-to-wet 2009–10 winter across the Fertile Crescent was then followed by yet another very dry winter 2010–11, the winter directly preceding the uprising.

Therefore, the question turns to whether the drought was related to a long-term drying trend. S2017 agrees that the recent extended dry period (10–25 years) is "anomalous" relative to the rest of the previous 60–70 years. S2017's authors speculate that this was due to natural decadal to multidecadal variability, but offer no such evidence. Internal climate variability has the potential to episodically exacerbate or alleviate the long-term impact of anthropogenic drying. However, in addition to the clear evidence in K2015, other substantial evidence of a coherent and significant long-term climate change impact in the Mediterranean in general and the Middle East in particular has been presented by ourselves and other researchers. Prior published work by the lead author of K2015 using different methods (Kelley, Ting, Seager, Kushnir. Climate Dynamics, 2012; Kelley, Ting, Seager, Kushnir. Geophysical Research Letters, 2012) found that a long-term drying trend in the region could not be accounted for by natural modes of variability. Instead, it is consistent with human-induced climate change, in agreement with model simulations and the well-established theory of subtropical winter circulation and climate change. Independent investigators used different methods and arrived at the same conclusion: that there is an ongoing human-driven winter drying impacting the Fertile Crescent (Hoerling et al. Journal of Climate, 2012; Zappa, Hoskins and Shepherd. Climate Dynamics, 2015). Further, Zappa, Hoskins, Shepherd. (Environmental Research Letters, 2015) argued that the newest global climate models actually underestimate the drying of the Mediterranean.

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And, if instrumental data, model results and theory are not enough, an analysis of a new gridded tree ring dataset of winter/spring surface moisture availability for all of Europe, North Africa and the Middle East (Cook et al. Science Advances, 2015) concluded that 1998–2012 was the driest 15-year period in the Levant in the last 900 years (Cook, Anchukaitis, Touchan, Meko. Journal of Geophysical Research, 2016). This new evidence confirms that recent drying is outside the range of what would be expected due to natural variability. This strongly implicates an anthropogenic influence on the recent drying trend in the Fertile Crescent. To state that "there is no evidence of a long term drying trend …" ignores a sizable body of scientific literature.

2. A technical issue on trends

S2017 questions why only a fraction of the stations in the domain demonstrate a significant (outside of a 90% confidence interval) linear trend. (We invite the reader to look at the figures in K2015; the downward trend is obvious). As the authors of S2017 clearly appreciate, the spatially and temporally variable nature of precipitation and the shortness of many records make it difficult to find significant trends at any single station. Of the twelve stations that extend past 2010, eight indicate some degree of drying. (The only one with a significant wetting trend, Sivas, in central Turkey, is the one most removed from the domain). If the trends were all random, the likelihood of 8 out of 12 stations to be drying is less than one in eight. Furthermore, what matters for crops is soil moisture, which is influenced by temperature as well as rainfall. K2015 show a significant warming trend in the region, which drove a significant reduction in soil moisture (as measured by the self-calibrating Palmer Drought Severity Index, or scPDSI).

3. Drought, migration and unrest

S2017 argues as though the drought's effects and the unrest were coincidental but unrelated. K2015 emphasizes that Syria's vulnerability was acute prior to the drying of the 21st century, culminating in the severe drought period beginning in the winter of 2006–7. Population growth, poor agricultural policies, aggressive economic liberalization policies and the influx of Iraqi refugees had all placed an unsustainable burden on water resources, including rainfall and groundwater resources. The severe drought triggered an agricultural collapse and an internal displacement of entire rural farm families – utterly unlike the usual seasonal labor migrations or the rural-to-urban migration from prior years.

S2017 acknowledges the "significant demographic and migration changes in Syria prior to the civil war" and then dismisses out of hand their relevance to the conflict by citing the lack of evidence of "drought" as a grievance during the initial 2011 protests. It need not be the case that the drought's role in the displacement, and drought as a grievance itself, be as important to the ultimate social unrest as the other underlying, intertwined grievances (*e.g.* unemployment, food and housing prices) in order for it to have been a contributing factor.

Regarding internal migration statistics, S2017 acknowledges that such estimates cannot have high certainty, but insists that the number of migrants was on the lower end of a range of estimates. K2015 summarized sources indicating an upper bound on the estimated displacement of "as high as 1.5 million," and it is more likely that the actual number displaced is closer to this number. S2017 cite Myriam Ababsa's chapter in the book entitled "Syria from Reform to Revolt, Volume 1," (Ababsa, 2015), but cite it selectively. In this same chapter, Ababsa states that according to a report by the International Institute for Sustainable Development, between 160 and 220 villages were abandoned due to drought because wells went dry, and harsh windblown sand invaded Syrian houses (Ababsa, 2015; Brown & Crawford, 2009). In addition, in 2010 the UN Office for the Coordination of Humanitarian Affairs found that about 300,000 families were driven to Damascus, Aleppo, and other cities in one of the "largest internal displacements in the Middle East in recent years" due to drought (Ababsa, 2015). During a mission to Syria that ended in September 2010, Olivier de Schutter, UN special reporter, stated that 1.3 million people had been affected by the four-year drought, 800,000 of whom had their livelihoods devastated. Not included in these estimates is the considerable displacement that occurred in the 6–18 months directly preceding the uprising, the time when we would expect that most of the displacement occurred given the accrued stress associated with the drought's persistence. The authors of S2017 provide little evidence that "excess migration" due to the drought was only a small proportion of the total displaced. Also cited by Ababsa was a 2010 report (IRIN, 2010) by IRIN, an independent, non-profit media service specializing in ground reporting on humanitarian crises. This report, titled "Syria drought pushing millions into poverty," stated: "A top UN official warns that Syria's drought is affecting food security and has pushed 2 to 3 million people into 'extreme poverty'."

Further anecdotal evidence was presented in a 2015 article in Scientific American. John Wendle visited refugee camps in Greece and interviewed a dozen Syrian farmers and business owners hailing from the drought-plagued regions in Syria and all agreed that the exceptionally severe drought instigated a mass migration and contributed to the initial social turmoil.

4. In conclusion

Continued critical examinations of the links between climate change, drought, displacement and unrest are warranted not least because climate models robustly project that the current aridification of the wider Mediterranean and Middle East will continue and intensify in the coming decades. Nothing in S2017's critique creates any doubt that this process is already underway, is having a social impact, and that there is a dangerous potential for increased environmental stress to contribute to future unrest in the region.

Conflict of interest

None.

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