The Syrian Climate-Migration-Conflict Nexus: An Annotated Bibliography

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This bibliography will get updated as long as the Climate Stress Syria project is ongoing. Use this QR code to read the latest version of the bibliography, and find out more about the Climate Stress Syria project, on https://popenvmiddleeast.wordpress.com/

Introduction

The scientific debate about the Syrian civil war being linked to climate change that manifested through a prolonged drought took off in 2014, with two key publications: De Châtel's article in the *Middle Eastern Studies* in January, and Gleick's article in *Weather, Climate, and Society* in July. In 2015, Kelley published an article in *Proceedings of the National Academy of Sciences*, which yielded massive media attention and has been cited more than 1300 times, according to Google Scholar. The debate reached a peak in 2017 (fig. 1 below), when Selby et al. (2017b) published an article criticising Gleick (2014) and Kelley et al. (2015). This led to three consecutive responses (Gleick, 2017; Hendrix, 2017; Kelley et al., 2017) and a rejoinder (Selby et al., 2017a). Since 2017, there has been on average one article per year, suggesting that the debate is still ongoing.

This annotated bibliography is an article-by-article summary of the peer reviewed literature published on the climate-conflict nexus in Syria. It currently includes 19 articles where drought after 2005 is discussed together with the Syrian uprising turning into a civil war in 2011. It may be relevant to note that different articles place the drought between different years, from 2007-2009 to 2006-2011. This reveals a disparity in how drought is defined in the different studies, and also in the framing of its severity. A 3-year drought is different from a 6-year drought.

The existing literature on the topic reflects both quantitative (e.g. Ash and Obradovich, 2020; Kelley et al., 2015), qualitative (e.g. De Châtel, 2014; Feitelson and Tubi, 2017; Fröhlich, 2016; Gleick, 2014; Gürcan, 2019; Selby, 2018) and more mixed approaches (e.g. Eklund and Thompson, 2017; Selby et al., 2017b).

Herein we list the purpose, methods and data used, and the findings/conclusions of each article. The articles are listed in chronological order.

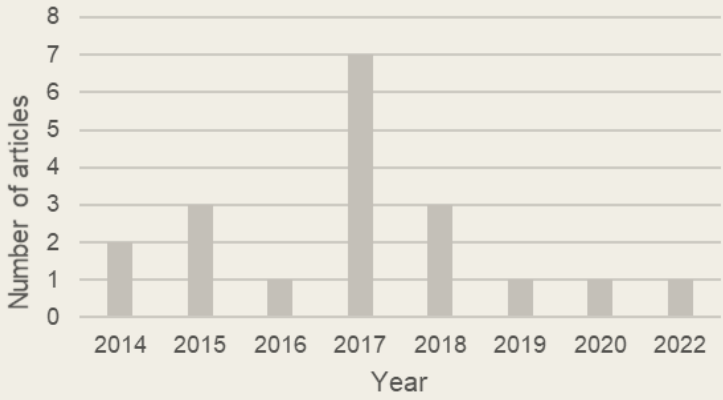

Fig. 1: Number of articles published per year.

1. DE CHÂTEL, F., 2014. THE ROLE OF DROUGHT AND CLIMATE CHANGE IN THE SYRIAN UPRISING: UNTANGLING THE TRIGGERS OF THE REVOLUTION. ***MIDDLE EASTERN STUDIES*** **50, 521–535.** https://doi.org/10.1080/00263206.2013.850076

This article discusses climate change and more specifically drought as a contributing factor in the Syrian uprising. As a response to several media reports and analyses suggesting that climate change played an indirect role in the Syrian uprising, the article sets out to contextualize the 2006-2010 drought. De Châtel argues that the Syrian government's response to the drought was a more important factor than the drought per se. Focusing on climate change removes responsibility from the government and draws attention away from the core problem, which she argues is the long-term mismanagement of natural resources.

Findings of this article are based on field work from 2008 and 2009 and interviews with Syrian officials and migrants who left drought-affected areas.

However, no information exists on how, where and when these interviews were carried out (apart from the 3 interviews cited in the text and listed in the notes section).

2. GLEICK, P.H., 2014. WATER, DROUGHT, CLIMATE CHANGE, AND CONFLICT IN SYRIA. *WEATHER, CLIMATE, SOCIETY*. 6, 331–340.

https://doi.org/10.1175/WCAS-D-13-00059.1

This article looks at the complex relationship between water and conflict in Syria, offers future outlooks for climate-related risks, and suggests ways to reduce such risks. Gleick first provides a historical background of the links between water and conflict in the MENA/Levant region, and then moves on to describe the most recent drought, lasting between 2006 and 2011.

The data presented includes annual river discharge and river flow anomalies, national population, irrigated area, and rainfall. In addition to this, news reports and UN reports about migrant numbers and food insecurity are cited. These factors are discussed together with information about water resource management in Syria prior to the drought to make the claim that "water and climatic conditions have played a direct role in the deterioration of Syria's economic conditions" (Gleick 2014, p.331).

The article concludes that the drought, which may be attributed to climate change, was combined with bad management of resources that led to the displacement of people from rural to urban areas. Furthermore, Gleick predicts even greater risks of political instability if demographic developments and water insecurity are left unaddressed. Lastly, he suggests improvements in water-use efficiency and agricultural productivity as well as transboundary water resource cooperation as ways to reduce the risks of political instability.

3. KELLEY, C.P., MOHTADI, S., CANE, M.A., SEAGER, R., KUSHNIR, Y., 2015. CLIMATE CHANGE IN THE FERTILE CRESCENT AND IMPLICATIONS OF THE RECENT SYRIAN DROUGHT. *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES* 112, 3241–3246.

https://doi.org/10.1073/pnas.1421533112

This article is separated into two parts: the first part investigates the social and economic mechanisms through which the severe drought of 2007-2010 has impacted political instability, by comparing the vulnerable Syrian political context to the ones of Iraq and Turkey through secondary literature. The second part investigates the extent to which the severe drought was made worse by anthropogenic climate change.

The analysis is mainly focused on the attribution of drought severity to climate change. To investigate this, the authors estimate the increase in likelihood of an extreme 3-year drought through regression analysis of winter precipitation (1901-2008) and annual global atmospheric CO_2 ratios.

The authors find that when climate change and CO_2 forcing are combined, they are "2-3 times more likely to produce the most severe 3-year droughts" (p. 4). They conclude that based on the significant results of the analysis, the century-long negative trend in precipitation (climate change) can be attributed to the rise in anthropogenic greenhouse gases which in turn severely impacted the Syrian drought of 2007-2010.

Although the authors agree that there is "evidence that the 2007-2009 drought contributed to the conflict in Syria" (p. 1), they point out that the statistical findings do not provide a causal link between climate change and conflict. They argue that the estimation does not include other variables playing a role in determining this relationship, such as poor governance, poverty, or other sociopolitical factors.

4. WERRELL, C.E., FEMIA, F., STERNBERG, T., 2015. DID WE SEE IT COMING?: STATE FRAGILITY, CLIMATE VULNERABILITY, AND THE UPRISINGS IN SYRIA AND EGYPT. *SAIS REVIEW OF INTERNATIONAL AFFAIRS* 35, 29–46.

https://doi.org/10.1353/sais.2015.0002

This article examines how state fragility in Syria and Egypt may have been impacted by climate change, drought, and insufficient natural resource management before 2011.

By looking at two indices, the Failed States Index (FSI) and the Notre Dame Global Adaptation Index (ND-GAIN – a climate vulnerability index), the authors seek to understand the situation preceding the 2011 uprisings in Syria and Egypt. Based on meteorological data of an undeclared source, they use the Standard Precipitation Index to examine drought patterns in Syria between 1975 and 2012. They also include a figure from the United States Department of Agriculture's "Foreign Agricultural Service Commodity Intelligence Report" showing rainfall declines in Syria and data

from the Centre for Research on the Epidemiology of Disasters (CRED) International Disaster Database on major drought events in West Asia. In addition to that, they cite UN and International Red Cross reports on estimations on lost livelihoods, food insecurity, poverty, and displacement. Finally, they summarize a number of studies on winter precipitation, governance and resource mismanagement in Syria.

Werrell et al. find that both above mentioned indices show an improving trend in the years before the popular uprisings in Syria and Egypt, and suggest that climate vulnerability, and its interactions with state fragility, should receive more scholarly attention. They find the ND-GAIN scores for Syria between 2006 and 2010 notable since they show a reduction in climate vulnerability, despite an ongoing drought. Based on their analysis of meteorological data, the authors conclude that the period between 2006 and 2011 represents the "most extreme drought in its history of records" (p. 44), which led to mass migration and total crop failures in large parts of the country.

5. WEINTHAL, E., ZAWAHRI, N., SOWERS, J., 2015. SECURITIZING WATER, CLIMATE, AND MIGRATION IN ISRAEL, JORDAN, AND SYRIA. *INTERNATIONAL ENVIRONMENTAL AGREEMENTS: POLITICS, LAW AND ECONOMICS* 15, 293–307.

https://doi.org/10.1007/s10784-015-9279-4

This article may not be central in the Syrian climate-conflict nexus debate, but it discusses the link between drought and migration in pre-uprising Syria. The authors highlight that the Syrian government downplayed the drought and its impacts, and when it was brought to attention, it portrayed it as a consequence of climate change, i.e., a global rather than a national issue.

The article investigates the process of the securitization of water to explore the water-climate change-migration nexus. It also gives a more robust understanding of the linear relationship assumption between climate change and migration, by analyzing the processes of securitization of water for three similarly situated countries: Jordan, Israel, and Syria. By doing so, the authors question how different securitization framings can lead to unintended consequences.

The analysis is based on governmental and publicly available documents, as well as fifteen field interviews with Israeli and Jordanian policymakers, non-governmental organizations (NGOs), and experts.

The findings show that the extent to which water is securitized by governments is related to their experiences with external or internal migrants. Evidence shows that in Israel and Jordan, two countries that hosted external migrants, water became a national security priority with the purpose of attracting foreign financial aid and justifying xenophobic policies. In Syria, where migration flows mostly took place within territorial boundaries, the government did not securitize water, did not acknowledge, or address the problem of water scarcity, and even worsened it through the implementation of agricultural water-intensive policies.

The article concludes by arguing that regardless of how the securitization discourse is framed, governments often downplay the role of policies by structuring the linkages between water resources, climate and migration the way it best serves political intersts.

6. FRÖHLICH, C.J., 2016. CLIMATE MIGRANTS AS PROTESTORS? DISPELLING MISCONCEPTIONS ABOUT GLOBAL ENVIRONMENTAL CHANGE IN PRE-REVOLUTIONARY SYRIA. *CONTEMPORARY LEVANT* 1, 38–50.

https://doi.org/10.1080/20581831.2016.1149355

The purpose of this article is to go beyond the simple causal relationship between climate change and migration by proposing a more complex approach that includes other factors determining migration, such as economic, political, demographic and social factors, in addition to environmental ones. Fröhlich acknowledges that environmental drivers of migration often operate through non-environmental factors, thus making it difficult to distinguish them from each other. Moreover, she suggests that Syrian "climate migrants" were not engaged in sufficiently reliable social networks to organize an uprising of the magnitude of the 2011 protests.

The analysis is based on 30 semi-structured interviews conducted in September and October 2014 in the Jordanian refugee camps Azraq and Zaatari, and in the cities of Irbid and Ramtha in northern Jordan. The interviewees included women and men, migrants and non-migrants, wage workers, large-scale landowners,

activists, and people who did not participate in the protests.

Based on the interviews, Fröhlich investigates the different factors influencing migration decisions in Syria and finds that while climate change played a role in Syria's uprising in 2011, it was not the main decisive factor. She further argues that migrants coming from rural areas could not have been the driving force of the 2011 uprising in Daraa because they did not identify with people from the city, impeding a unified movement. Fröhlich finds that the challenges in Daraa were rather unemployment, higher food prices, patronage and corruption, rural marginalization, or population growth, which qualify as co-determinants of political protests.

7. EKLUND, L., THOMPSON, D., 2017. DIFFERENCES IN RESOURCE MANAGEMENT AFFECTS DROUGHT VULNERABILITY ACROSS THE BORDERS BETWEEN IRAQ, SYRIA, AND TURKEY. *ECOLOGY AND SOCIETY* 22.

https://doi.org/10.5751/ES-09179-220409

This article compares land degradation trends, vegetation stress during drought, and the socio-economic and political settings across the borders between Iraq, Syria, and Turkey. It uses remote sensing (mapping precipitation levels, land productivity trends, and vegetation anomalies) together with document analysis/literature synthesis. Eklund and Thompson find that the drought affected all three sides of the border, and while the Syrian and Iraqi sides have seen a negative trend in vegetation health since the 2000s, there was a positive trend on the Turkish side. This highlighted the important role hydropolitics and the large-scale dam projects played in Turkey.

The findings of the article are largely in line with arguments about resource mismanagement, put forward by de Châtel (2014). The authors find sharp differences between Turkey and Syria, where the Turkish side shows an overall positive trend in vegetation health, while the Syrian side shows a negative trend.

The authors conclude that the severity of the effects of the drought are determined by different aspects, including biophysical as well as political and socioeconomic factors. They also highlight the importance of exploring how drought is manifested through impacts on vegetation, as opposed to largely relying on meteorological measures.

Disclaimer: This article was co-authored by one of the authors of this bibliography.

8. FEITELSON, E., TUBI, A., 2017. A MAIN DRIVER OR AN INTERMEDIATE VARIABLE? CLIMATE CHANGE, WATER AND SECURITY IN THE MIDDLE EAST. *GLOBAL ENVIRONMENTAL CHANGE* 44, 39–48.

https://doi.org/10.1016/j.gloenvcha.2017.03.001

Feitelson and Tubi argue that the relationship between climate change and conflict is subject to a complex set of interactions that need to be studied within a specific geopolitical and internal setting. For this reason, they describe the article's purpose as to analyze two specific cases – namely the lower Jordan River and the Euphrates River basins – within their internal settings, as well as in relation to neighboring countries. These two basins were selected because they have been among the most heavily affected areas by the 2007-2010 drought and, since the two rivers flow through different countries, they may highlight different pathways linking climate change and societal responses.

The article develops a conceptual framework linking climate change induced droughts and conflicts. They discuss different dependent and independent variables between geopolitical settings, physical settings and internal settings, and describe how they affect each other to explain the extent to which these relationships may lead either to conflict or cooperation. The data includes news reports, statistical reports, and peer-reviewed literature, but also so-called "grey literature" such as governmental or UN reports, to produce a comprehensive and contextualized analysis.

Feitelson and Tubi suggest that the link between security and climate change is an inter-relationship, whereby conflict increases vulnerability and thus raises the likelihood that climate change worsens a conflict through geopolitical relations and internal power relations.

In the case of the Euphrates basin, they find that among Iraq, Turkey, and Syria, the latter has been the most heavily affected by the 2007-2010 drought, especially considering the malnutrition and related diseases that manifested in the population, the rural outward-migration to the cities, and the resulting stress in these urban settlements that became the centers for the 2011 unrest. In the case of the lower Jordan basin, they find that Palestine, Israel, and Jordan suffered only limited impacts during the

2007-2010 drought, where no significant migration occurred and no conflict erupted between or within the states.

The authors conclude that intensified droughts do not represent a main driver of armed conflicts in the Middle East, but rather that droughts can lead to conflicts, as in Syria, if adaptive capacities to environmental stress have been compromised.

9. SELBY, J., DAHI, O.S., FRÖHLICH, C., HULME, M., 2017A. CLIMATE CHANGE AND THE SYRIAN CIVIL WAR REVISITED. *POLITICAL GEOGRAPHY* 60, 232–244.

https://doi.org/10.1016/j.polgeo.2017.05.007

This article systemically interrogates claims that have been made around the Syrian civil war and its relation to climate change: (1) The drought experienced in Syria was directly attributed to climate change, (2) the drought led to large-scale migration, and (3) the migration exacerbated the socio-economic situation in Syria, making way for the uprising, turned civil war.

For the first claim, Selby et al. review Kelley et al.'s (2015) statistical model and raw station rainfall for Syria and its environs. They point out that the rainfall datasets used for Kelley et al.'s analysis either present missing values for several months of the estimated period 2004-2012, or is not specific to Syria (as it covers the Fertile Crescent), and that the different authors do not agree on when to place the Syrian drought in time. The authors find that Syria experienced a severe drought between the three years 2006/2007, 2007/2008, 2008/2009, but that – in the absence of findings of progressive long-term drying trend in the region – it cannot be considered a five-plus year drought that affected the whole of Syria. Moreover, due to uncertainties related to climate model simulations, Selby et al. consider that there is no clear evidence about the implication of human influences on the climate system in the Syrian drought. They also argue that southeast Turkey and northern Iraq were also affected by the drought. Therefore, Selby et al. argue that Kelley et al. were wrong in modelling the rainfall time series as a linear trend, and that their results were misleading.

To analyze the relationship between the drought and migration, as well as the large-scale migration and the Syrian war, the authors revisit the works of Werrell et al. (2015), Gleick (2014), Kelley et al. (2015), as well as Frölich's (2016) interviews with Syrian refugees. Selby et al. consider that while the drought years saw increased migration, the scale of migration and the extent to which migration was driven by drought is overstated by Femia and Werrell, Gleick, and Kelley et al., as the evidence indicates that not 1.5-2 million people were displaced, but rather 40,000-60,000 families, and that economic liberalization policies of Bashar al-Assad – namely removal of subsidies, trade liberalization, privatization of state farms – had more influence on migration patterns than drought.

Regarding the relationship between migration and civil war, the authors point out that there is no clear evidence for drought-related migration as a key element in population pressures in pre-civil war Syria. Indeed, the authors find that Syria already experienced large population movements and demographic changes before the uprising, such as "natural population growth, […] the arrival of Iraqi refugees, […] general rural-to-urban migration, […] out-migration from Syria, […] circular migration to Lebanon, […] and "excess" migration from Syria's northeast" (p. 242). Selby et al. conclude that Kelley et al. "significantly overstate the contribution of drought-related migration to Syria's pre-civil war urban growth." (p. 239). Moreover, they conclude that the timeline and geography of the early unrest had little to do with "the drought-migration-civil war thesis" (p. 240) and that the drought, and resulting unemployment, were not driving factors pushing people to revolution.

The article sparked a discussion involving several different scholars in the field. Below are the responses to the article and their main arguments in articles 10-13.

10. KELLEY, C., MOHTADI, S., CANE, M., SEAGER, R., KUSHNIR, Y., 2017. COMMENTARY ON THE SYRIA CASE: CLIMATE AS A CONTRIBUTING FACTOR. *POLITICAL GEOGRAPHY* 60, 245–247.

https://doi.org/10.1016/j.polgeo.2017.06.013

In this article, Kelley et al. respond to Selby et al.'s arguments. Concerning the role of climate change and the Syrian drought, Kelley et al. present evidence confirming that the recent drying out trend is outside the range of what can be expected from natural climate variability, implying that there is anthropogenic influence on the drying trend that resulted in severe drought years. Concerning the linkages between drought, migration and unrest, Kelley et al. consider that while other factors (e.g., population growth, poor agricultural policies, economic liberalization) stressed water resources, it was the 2006-2009 drought that

triggered an agricultural collapse and internal displacement of rural families. Finally, the authors reflect on the discussions around the number of Syrians who were affected by the drought in Syria, and conclude that there is much evidence suggesting that drought was an important factor that led to food security issues, poverty, as well as excess migration.

11. GLEICK, P.H., 2017. CLIMATE, WATER, AND CONFLICT: COMMENTARY ON SELBY ET AL. 2017. *POLITICAL GEOGRAPHY* 60, 248–250.

https://doi.org/10.1016/j.polgeo.2017.06.009

Gleick also responds to Selby et al.'s article by pointing to flaws, inconsistencies, and failures in supporting their main hypothesis that there is no sufficient evidence to support the link between climate change and the Syrian civil war. For example, he criticizes the interview data presented in the article (and by Fröhlich 2016) for being a small size (30 interviews) and questions the sampling of respondents. Gleick suggests that Selby et al. (2017a) fail to distinguish between "causality" and "influence" or "contribution" of climate change to the severe drought and the following unrest. Gleick explains that there is evidence confirming human-induced effects on climate change, specifically leading to drought in the Tigris and Euphrates regions. Moreover, he argues that although the scale and importance might be debatable, the evidence for a connection between drought and migration remains strong.

Gleick also comments on the narrow definition of drought adopted by Selby et al., which focuses only on changes in rainfall, leaving out other important aspects of drought, such as groundwater levels, temperature, runoff and soil moisture.

12. HENDRIX, C.S., 2017. A COMMENT ON "CLIMATE CHANGE AND THE SYRIAN CIVIL WAR REVISITED." *POLITICAL GEOGRAPHY* 60, 251–252.

https://doi.org/10.1016/j.polgeo.2017.06.010

At first, Hendrix's article comes in support of Selby et al., suggesting that their paper was necessary to correct the emerging narrative that climate change is the primary factor that led to the Syrian Civil War. Hendrix explains that while a relationship between the two seems very reasonable – even if it is context- and scale-dependent – causality cannot be inferred. Hendrix makes a general comment about research in the fields of climate change and conflicts, and suggests that scholars should continue to investigate these relationships further and be more careful when using causal language. He points out the necessity of focusing on broader cases and not only on some of particular interest to avoid framing findings in a way that confirms the chosen narrative, leading to bias. He also highlights the risk of Selby et al.'s (2017a) paper being read as refuting the climate-conflict link, which may end up nourishing climate skeptic narratives that undermine the importance of discussing environmental aspects of conflict in policy spheres.

13. SELBY, J., DAHI, O., FRÖHLICH, C., HULME, M., 2017B. CLIMATE CHANGE AND THE SYRIAN CIVIL WAR REVISITED: A REJOINDER. *POLITICAL GEOGRAPHY* 60, 253–255.

https://doi.org/10.1016/j.polgeo.2017.08.001

Selby et al. responded to the three waves of comments on their article by discussing various points. The authors point out that they do not contest the idea that anthropogenic climate change was a contributing factor for the Syrian uprising, but do not agree with Gleick's and Kelley et al.'s findings of "a non-zero link" and "a primary or substantial factor" respectively, as they consider that the narrative "that climate change was a contributory factor in Syria's unrest is, by itself, without clear meaning, impossible to falsify, and hence close to meaningless." (p. 253). Moreover, Selby et al. repeat that their aim was not to determine a causal relationship, but to examine the validity and robustness of the evidence presented by Gleick and Kelley et al. Again, they emphasize the weak argumentation presented in the comments regarding the number of drought-related migrants. They insist on their findings questioning the drought's attribution to anthropogenic climate change. Finally, the authors respond to Hendrix's comments by highlighting that their paper does not intend to disagree on anthropogenic climate change or on the link between climate change and conflicts.

14. SELBY, J., 2018. CLIMATE CHANGE AND THE SYRIAN CIVIL WAR, PART II: THE JAZIRA'S AGRARIAN CRISIS. *GEOFORUM*.

https://doi.org/10.1016/j.geoforum.2018.06.010

In this article, Selby focuses on the agrarian crisis in pre-civil war Syria, specifically its northeast part. Selby

aims to bring a historical context to the Syrian drought and the subsequent civil war, and the narratives surrounding their linkages. Selby here reviews and analyzes literature and reports on Syria's agrarian crisis, for example the Annual Agricultural Statistical Abstract of 1991-2014 of the Syrian Ministry of Agriculture and Agrarian Reform and other secondary sources coming from international organizations, and state agencies.

Selby argues that instead of a severe multi-year drought, which led to crop failures and resulting large-scale migration, three other long-term and structural factors led to the agrarian crisis in the governorate and the following migration: (1) Extreme water resource degradation; (2) deepening rural poverty; and (3) specific features of national and local politics and political economy.

Selby claims that rather than a case of climate induced conflict, Syria is a case of politically-induced environmental scarcity and insecurity, in the sense that resource availability, control, exploitation and insecurity are shaped through political and economic relations. Highlighting that the drought of 2006/2007-2008/2009 had negative consequences for agricultural production, livelihoods and migration in northeast Syria, Selby concludes that the main problem was the agrarian crisis that started before the drought and that its roots were in ever-deepening structural problems related to "the over-extension of agriculture into marginal lands, staggering rates of groundwater depletion, particularly high poverty, extreme fossil fuel dependence, and simmering ethnic conflict" (p. 12).

15. HOFFMANN, C., 2018. ENVIRONMENTAL DETERMINISM AS ORIENTALISM: THE GEO-POLITICAL ECOLOGY OF CRISIS IN THE MIDDLE EAST. *JOURNAL OF HISTORICAL SOCIOLOGY* 31, 94–104.

https://doi.org/10.1111/johs.12194

This article rather focuses on the topic from a philosophical and theoretical perspective, and offers to bring historical sociology and political ecology together for thoroughly understanding the conflict-environment nexus in the Middle East. Hoffman takes a critical stance to thus-far existing analyses of the conflict and climate nexus in Syria by suggesting that "environmental oriental determinism in Middle East can be overcome by entering political ecology into the register of historical sociological analysis" (p. 94). He argues that linking the Syrian conflict to climate change is problematic because it obscures political responsibility for the oppression in Syria, suggesting that it is difficult to understand whether environmental degradation causes neoliberal agricultural policies, or neoliberal agricultural policies such as pricing cause environmental degradation that results in migration.

Hoffman's main argument is that conflict is caused by the presence, not absence, of exploitable resources, which addresses the role of not only local governments but also the international/imperial/colonial powers that should be taken into account in environmental exploitation and degradation in the region. Hoffman points out Bookchin's (1982, see also 1996) "dialectical naturalism" (a way to overcome the society-ecology dichotomy by focusing on the interrelationship between humans and their ecosystems) as a useful framework in understanding the role of geopolitical and local issues such as internal colonialism, Baathist state strategy, water conflicts, embargoes and war economy in Syria, and the Middle East at large.

16. IDE, T., 2018. CLIMATE WAR IN THE MIDDLE EAST? DROUGHT, THE SYRIAN CIVIL WAR AND THE STATE OF CLIMATE-CONFLICT RESEARCH *CURRENT CLIMATE CHANGE REPORTS* 4, 347–354.

https://doi.org/10.1007/s40641-018-0115-0

This article reviews the existing literature about the climate-conflict nexus around the Syrian civil war, and examines the extent to which the debates around the topic reproduce shortcomings from the climate-conflict research in general. To do so, Ide starts with a review of the literature about the potential links between climate change and the Syrian civil war. The literature review includes most articles listed in this bibliography up until 2017, listing Gleick (2014); Kelley et al. (2015); Frölich (2016); Selby et al. (2017a) and Feitelson & Tubi (2017) as being of particular interest.

Ide divides his findings into four main points. First, he finds that the relationship between climate change and the 2006-2009 drought is plausible but also that the causal link is not proven. Second, he finds that the majority of scholars agree that the livelihood loss can be attributed to the multi-year drought but that it is contested. Third, he finds that most scholars agree that the livelihood loss triggered the migration

to urban centers but that it is contested. Fourth and finally, he finds that a relationship between migration and existing grievances, as well as the kick-start of the protests could be possible, but that little is known about the contribution of migration to the intensification of grievances and the facilitation of the kickstart of the protests.

Ide concludes that the research about the Syrian climate-conflict reproduces three main shortcomings of the literature related to climate change and conflicts in general. First, he argues that there is limited dialogue between different methods, as most researchers either use qualitative or quantitative methods, without combining them, resulting in a lack of policy-relevant insights and findings. Second, he claims that there is an overstatement of differences instead of triangulating existing information or looking for an acceptable middle-way, to foster complementarity, mutual inspiration and scholarly compromises. Third, he finds a lack of (existing and new) theoretical engagement when it comes to the explanation of the observations.

17. GÜRCAN, E.C., 2019. EXTRACTIVISM, NEOLIBERALISM, AND THE ENVIRONMENT: REVISITING THE SYRIAN CONFLICT FROM AN ECOLOGICAL JUSTICE PERSPECTIVE. *CAPITALISM NATURE SOCIALISM* 30, 91–109. https://doi.org/10.1080/10455752.2018.1516794

The article investigates the dynamics between political and ecological factors in the Syrian conflict by going beyond security concerns, and offers to understand to what extent these factors triggered or contributed to the Syrian unrest. Gürcan's analysis is guided by the methodological framework of "ecological justice", a concept coming from "social justice" and an extension of "environmental justice". The main focus of the framework is on the responsibility of humans towards the environment, which the author questions through the Syrian case. The methodological guideline of this article is process tracing – or the puzzling of historical events and actors' opportunities, motives, and interests to interpret the observed outcome – as it permits to adopt a more flexible narrative to explain the findings, without compromising their robustness.

The main finding of the paper is that the most important causes of the Syrian conflict can be found within the oil-centered extractivist model of development, the lack of provision of adequate livelihoods, the widening of inequalities, as well as the bankruptcy of the agricultural sector resulting from the restructuring policies, and the neglect of the environment and natural resources in the process. In other words, Gürcan argues that the development model chosen by the Baath Administration of the 1970s, which was based on oil revenues, prevented the development of a competitive industrial sector (resource curse) and the liberalization policies adopted in the mid-1980s deteriorated the conditions of farmers and the agricultural sector. Furthermore, Gürcan discusses the relationship between (1) climate change, (2) the consequences of the oil-centered development model, as well as (3) neo-liberal policies to explain the extent to which the drought impacted the crisis experienced by Syria. Overall, Gürcan contests the understanding that the political-ecological crisis in Syria was due to the country's limited resources and growing population, and attributes much of the problem to the government's promotion of the irrigated agricultural sector.

18. ASH, K., OBRADOVICH, N., 2020. CLIMATIC STRESS, INTERNAL MIGRATION, AND SYRIAN CIVIL WAR ONSET. *JOURNAL OF CONFLICT RESOLUTION* 64, 3–31. https://doi.org/10.1177/0022002719864140

The authors of this article examine the associations between climate change and Syria's political unrest. The idea behind the study is "to use the Syrian case as a model for future quantitative research on climatic stress and conflict". They also present an "internal migration hypothesis" which states that drought can indirectly impact political instability, through internal migration. The study uses temperature and precipitation data (CRU TS 3.24) in cropland areas together with protest data from ICEWS, night-time light data from DMSP-OLS and data on demography and religion at sub-district level.

The authors evaluate the following hypotheses (pp. 7-9): (1) "Regions experiencing climatic stress are more likely to experience anti-government protest," (2) "regions experiencing climatic stress are more likely to experience a decrease in population," (3) "regions with greater net in-migration are more likely to experience anti-government protest," and (4) "regions with greater net in-migration and settlements of members

of the in-migrants' relevant identity group are more likely to experience anti-government protest." The findings support the "internal migration hypothesis" as the authors' arguments can be summarised in four points. First, protests were more frequent in less-severely drought-stricken regions, and regions experiencing climatic stress did not experience an increased risk of protest. Second, climatic stress decreased night-time light intensity during the drought, indicating out-migration from those sub-districts. Third, Sunni Arab areas experiencing an increase in night-time light intensity between 2005 and 2010 also experienced increased risk of protest, suggesting that the arrival of migrants reinforced already present grievances. Finally, without controls, there is a direct and positive association between night-time lights and protest, but that association disappears when controls are added and is thus not robust/inconclusive.

19. EKLUND, L., THEISEN, O.M., BAUMANN, M., FORØ TOLLEFSEN, A., KUEMMERLE, T., ØSTERGAARD NIELSEN, J., (2022). SOCIETAL DROUGHT VULNERABILITY AND THE SYRIAN CLIMATE-CONFLICT NEXUS IS BETTER EXPLAINED BY AGRICULTURE THAN METEOROLOGY. *NATURE COMMUNICATIONS EARTH AND ENVIRONMENT*.

This forthcoming article argues for a stronger focus on agricultural effects in research on the climate-conflict nexus, as they show how weather data by itself is not sufficient to explain the links between drought and conflict in Syria. The paper looks into the arguments of an agricultural collapse, which has been put forward in the Syrian climate-conflict narrative, and defines four criteria for such a collapse based on the social-ecological system, that a collapse involves 1) rapid changes that are 2) more severe than previous changes, 3) the changes should have lasting effects and 4) change the structure of the system.

Focusing on satellite-based cropland data in Syria between 2000 and 2016, the authors find that nearly all of the croplands that were left fallow during the 2007-2009 drought had been recultivated again by 2010. Eklund et al. also find that drier periods coincided with more land being inactive, showing a link between meteorological and agricultural drought. The authors do not find support for the claim that there was an agricultural collapse, as only criteria 1 and potentially criteria 4 were met. Instead, they argue that due to the drought and subsequent conflict, the Syrian agricultural system may be closer to collapse due to increased vulnerability to dryness.

Although Eklund et. al. observe an increase in drought vulnerability in Syria, they also show indications of resilience, the ability to bounce back after shocks, suggesting that the migration was temporary, not as widespread as reported, or that others were using the land. Eklund et al. conclude by highlighting the usefulness of remote sensing data, which can provide new insights into the climate-conflict nexus in data-scarce regions.

Disclaimer: This article was co-authored by one of the authors of this bibliography.

Conclusion

This annotated bibliography shows that the debate about the role of climate change – or climate stress – in the Syrian uprising turned civil war is still ongoing. Below we discuss some research gaps, future research suggestions, as well as implications for policy.

A major research gap, due to a lack of reliable data, concerns the links between drought and migration. The concept of migration has, in the above presented literature, generally been used in a static way, which has failed to represent the dynamic nature of migration. For example, the migration described in relation to the 2007-2009 drought may have been short term (temporary/seasonal) as suggested by Fröhlich (2016), or long term, which seems to be suggested between the lines in several of the articles in this bibliography. Furthermore, most of the literature about climate induced migration in Syria does not engage with the overall climate migration literature. In the field of climate-migration, the link between the two is complex and multi-directional (see for example Black et al., 2011; Cattaneo et al., 2019; Obokata et al., 2014). For example, climate stress may increase short distance migration, but reduce long-distance migration (e.g. Chen and Mueller, 2018; Gray and Wise, 2016; Ocello et al., 2015). Furthermore, a recent topic in the field is trapped populations, who are unable to migrate, despite suffering the consequences of climate stress (Black and Collyer, 2014; Zickgraf, 2018). The debate about the drought-linked migration patterns in Syria would benefit from including those perspectives as well.

We also do not know enough about the post-migration livelihoods and experiences of Syrians (and Syrian farmers) who have left their lands. More research on this would inform policy-makers and civil-society organizations that work towards the well-being of Syrian refugees in their new host countries.

Whether the Syrian 2007-2009 drought increased the risk of conflict by 5, 20 or 50% may not even be relevant. We know that climate change has negative impacts on societies and people, and scholars agree that even if we have not worked out the mechanisms linking climate change to conflict yet, we can expect that climate change will increase the risk of conflict in the future (Mach et al., 2019). Understanding how drought and other climate stressors interact with society may provide us with important information that can help us understand how to (re-)build climate resilient and peaceful societies in the future.

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