ROUTLEDGE STUDIES IN HAZARDS, DISASTER RISK AND CLIMATE CHANGE

# Climate Hazard Crises in Asian Societies and Environments

Edited by
Troy Sternberg

ROUTLEDGE

# Climate Hazard Crises in Asian Societies and Environments

Climate hazards are the world's most widespread, deadliest and costliest natural disasters. Knowledge of climate hazard dynamics is critical since the impacts of climate change, population growth, development projects and migration affect both the impact and severity of disasters. Current global events highlight how hazards can lead to significant financial losses, increased mortality rates and political instability.

This book examines climate hazard crises in contemporary Asia, identifying how hazards from the Middle East through South and Central Asia and China have the power to reshape our globalised world. In an era of changing climates, knowledge of hazard dynamics is essential to mitigating disasters and strengthening livelihoods and societies across Asia. By integrating human exposure to climate factors and disaster episodes, the book explores the environmental forces that drive disasters and their social implications. Focusing on a range of Asian countries, landscapes and themes, the chapters address several scales (province, national, regional), different hazards (drought, flood, temperature, storms, dust), environments (desert, temperate, mountain, coastal) and issues (vulnerability, development, management, politics) to present a diverse, comprehensive evaluation of climate hazards in Asia. This book offers an understanding of the challenges climate hazards present, their critical nature and the effort needed to mitigate climate hazards in 21st-century Asia.

*Climate Hazard Crises in Asian Societies and Environments* is vital reading for those interested and engaged in Asia's development and well-being today and will be of interest to those working in Geography, Development Studies, Environmental Sciences, Sociology and Political Science.

**Troy Sternberg** is a researcher at the School of Geography, Oxford University. His research focuses on climate hazard impact on environments and societies across Asian drylands.

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**Climate Hazard Crises in Asian Societies and Environments**
*Edited by Troy Sternberg*

# Climate Hazard Crises in Asian Societies and Environments

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Troy Sternberg

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# Foreword

Climate hazards are the world's most universal and damaging natural disasters. Floods, droughts and storms affect tens of millions of people, disrupt livelihoods, negatively impact communities and impoverish residents. At the same time these events are harmful to societies, economics, infrastructure and environments. Our book, *Climate Hazard Crises in Asian Societies and Environments*, examines the multiple dimensions of climate hazards across Asia. Exploring the social implications and environmental dynamics of risk, mitigation and vulnerability are a major global challenge. The book's contemporary focus highlights the challenges hazards present in Asia as climate change, expanding populations, rapid development and conflict affect the continent's 4.4 billion people. The chapters cover a diverse range of climate hazard contexts that are essential reading for understanding the ongoing threat climate hazards present for Asia in the 21st century.

Natural hazards become disasters when they affect people and society. In Asia climate disasters now account for 87 per cent of hazard events and >90 per cent of fatalities. Their frequency, magnitude and intensity affects the basics of life – water, food, health and livelihoods. The book's key theme is how recurrent disasters are shaped by people and landscapes as well as climate. Trigger events reflect a combination of weather forces, social exposure and the ability to mitigate disaster impact and physical damage. The book crosses the continent to identify the many forms hazard risks take in Asia. Beginning in the Middle East and Arabia, the chapters address key issues of drought and environments, then moves on to South Asia to highlight complex flood dynamics in Pakistan and the impact of global warming in Himalayas. Dust in Central Asia reflects the trans-border nature of hazard events as well as how policy decisions can dramatically increase hazard exposure. In East Asia Taiwan offers a well organised storm response strategy whilst China exemplifies the natural vs constructed risk conundrum hazards may present. Large-scale assessments integrate the weather and disaster management over Eurasia, dryland exposure across the continent, the hazard implications on health and the effects of human and political action on societal resilience. The range and breadth covered convey the complexity of climate hazards whilst providing critical insight into hazard immediacy at local and regional levels.

Commencing with Femia and Werrell's interpretation of climate and the Arab Spring provides a cautionary tale of how drought, poor governance and migration affected social dynamics in Syria; research identifies the role of climate hazards in instigating civil war. When writing on Yemen, Lackner had to twice update her chapter on climate, development and security in Yemen due first to political conflict, then civil war fueled by international forces. In both countries, floods, drought or environmental stress contributed to conflict yet are forgotten amidst state collapse. Rahim and Rueff capture the multiple factors that make Indus floods so deadly in Pakistan. Inequality, land tenure rights, weak governance and economic exploitation ignore endemic flooding at great human and social cost. Panday examines how changing global weather patterns in the Hindu Kush-Himalayan region affect water resources, ecosystems and livelihoods for >600 million downstream agriculturalists.

More positively, Chen traces Typhoon Morakot 88 and the resulting flood disaster's impact in Taiwan. Whilst to many the government response was exemplary, particularly compared to global norms (e.g. Hurricane Katrina in the US), satisfying local concerns proved elusive. Sternberg's evaluation (Chapter 8, this volume) of underlying forces framing China's hazard regime makes clear that humans and governments can contribute to, as well as mitigate, climate disasters. Manipulating nature and the environment raises the question across China whether disaster results from natural forces, policy and human action or a deadly combination of both.

Turning the focus to weather Orlovsky et al.'s long-term investigation of dust storms in the Aral Sea and former Soviet Middle Asia highlights how the severity of extreme dust storms was linked to the human-driven desiccation of the Aral Sea. Investigation finds that since 1990 dust events and hazard damage has decreased. High-impact weather is stressed by Shinoda in the mid-latitude drylands that cover much of the Asian steppe. Efforts to integrate major hazards show the links between drought, *dzud* (extreme cold), dust and desertification which can reshape livelihoods and environments. Research represents a new methodology to identify extreme weather and develop an effective early warning system. Sternberg then expands this theme to present climate hazards in Asian drylands, identifying that arid and semi-arid areas, comprising 39 per cent of Asia, share several similarities when facing climate hazards. Vast spatio-temporal scales, drought, marginality and policy neglect combine to increase exposure. Improved awareness and international cooperation can strengthen knowledge and reduce vulnerability across desert societies.

More broadly, Kelman and Colbourn bring the issue of hazard and health in Asia to the forefront. This is a cross-cutting issue from tropics to mountains that reflects poverty and location-borne exposure that varies in disease and incidences as well as corollary impacts on food and water safety. Interactions include human physical, environmental and sociological health. Dominelli draws several themes together in her chapter on society and disaster. She stresses the human role in disaster engagement, gaining political support for action, then integrating the local and the global when working across boundaries and borders. The great social impact of hazards shows the need for new theory and practice that emphasises resilience throughout the disaster process.

The chapters show the many ways that climate hazards impact and interact with societies. Each environment has recognised exposure to climate events whilst human and social pressures add a level of risk and vulnerability for residents in Asian landscapes. We are often aware of physical dimensions but pay less attention to socio-economic dynamics like marginality, education and politics. In addition, capacity and funding for effective mitigation of hazards varies across countries. Integrating the natural, social and governance roles can identify how disasters may be directly linked to specific risk factors and how system failure can turn climate events into crises. Disasters are multi-faceted events best mitigated through a holistic approach that encompasses the range of contributory factors in each country and landscape.

Chapters reflect the great diversity of Asian environments and the relevant hazard dynamics. Deserts are represented in work on Syria, Yemen and Central Asia whilst the two dryland chapters stress common hazard patterns and exposure that are specific to arid zones. As an example, Pakistan shows how agricultural heartlands can also be part of extensive drylands nourished by water from mountain sources. The same water that brings fecundity can also wreak great damage through flooding. The source for the Indus in Pakistan and Ganges in India are in the Himalayas, making changes to mountain climates a key hazard risk. Of particular concern in a warming world are rates of glacial melt which directly affect water resources for hundreds of millions of farmers in South Asia. The greater Himalayan alpine region also provides the source water for the Yangtse, Yellow, Mekong and Brahmaputra rivers. Typhoon Morakot in Taiwan and Typhoon Haiyan in the Philippines identify how coastal regions are particularly vulnerable to storm activity and resulting community exposure.

The multiple perspectives covered in the book explore the socio-economic centrality of hazard mitigation. Perhaps it should be no surprise that Taiwan, with the highest GDP of countries represented herein, has provided the most effective example of hazard mitigation in the case studies. The corollary finds impoverished states, such as Yemen and Pakistan, vulnerable to climate forces that exacerbate endemic social challenges. China provides another approach to hazard management that responds to natural events whilst also exacerbating local exposure. This suggests that over-management can be detrimental as poor management is damaging. Appraisal chapters show how, on diverse issues from health to exposure to drylands, mitigation capacity depends on several inter-linked factors. For instance, drawing together landscapes and human action, we see that dust in Central Asia was directly linked to centralised economic planning that encouraged agriculture despite great downstream ecological damage that turned a flood region into a major dust source.

The nuanced role of climate hazards is often missed amongst dramatic event headlines, great human misery (migration, conflict, mortality), timespans and spatial scales as well as limited coverage or interest amongst international audiences to localised events. At the same time the immediacy of hazards focuses engagement on initiation and damage but seldom takes a longer-term perspective to understand the forces that contribute to disaster, or an assessment-over-time of how hazards impact society. A clear example is how the Hindu Kush-Himalayan chapter directly links changes in global warming with the mountain climate and downstream agricultural systems. Thus as a warming temperature affects glacial melt, water supply and flood risk that threatens the future viability of farming in the Gangetic and Indus plains. Chapters on Syria and Yemen work backwards to show how past climate events reduced capacity to cope with crises. The resulting conflicts show how poor disaster management contributes to great destruction. Similarly, the conceivable risk of the Three Gorges Dam being breached in a flood would result in a catastrophic event.

The many threads of hazard implications place responsibility for mitigation strategy on national and local governments. Political leadership, effective policy and local action are key across Asia yet chapters reflect a reluctance of the state to engage and address root-and-stem causes and issues. The cost, time and attention may be one reason; another is the difficulty in bringing together multiple interests and perspectives to resolve challenges. In countries with low capacity, the international community often plays an additional role. Effective preparation is repeatedly stressed in global forums, such as the UN International Strategy for Disaster Reduction and the Hyogo Framework for Action 2005–2015. These well-intentioned approaches and documents offer guidelines to improve disaster engagement. However, the fact remains that countries, especially in the developing world, face several immediate challenges, such as food, health, education and security that take precedence over unpredictable disasters that may later become exponentially more damaging. We see this book as call to action for Asian leaders, researchers and civil society because neglecting climate disasters changes hazards into crises events. The first step is acknowledgement and awareness by all stakeholders. Then, effective methods to engage with disasters are needed. Finally, adequate mitigation mechanisms are essential to limiting damage. Avoiding hazards is unrealistic; however, basic response systems can keep disasters from spinning out control. Poor reaction to a disaster exacerbates a host of vulnerabilities and triggers a cascading set of further problems and misery. Throughout hazard evaluation we need to keep sight of their human costs in lives lost, livelihoods disrupted, homes and work destroyed and hope extinguished.

Often politicians and publics engage with research at a distance, yet in-depth investigation is key to identifying problems, breakpoints, systemic weaknesses and response failures. More positively, clear knowledge provides an excellent starting point for addressing hazards. Understanding climate variability and change; household, community and national exposure and potential mitigation strategies at several levels and learning from the experience of others offer ways to enhance and restructure climate hazard thinking, planning and response. The chapters in this book give insight into climate hazards across Asia. In such a vast continent, this work is an introduction and provides a way to grasp and understand the complexity, intensity and immediacy of hazards in our globalised world. In each chapter, we see the role of humans and their societies. Our challenge is to take this a step further – that once we better understand hazards to then engage and address hazard risk. Whilst the challenge is global, *Climate Hazard Crises in Asian Societies and Environments* provides an introduction to climate hazard crises in Asia.

# 1 An unstable, stable nation? Climate, water, migration and security in Syria from 2006–2011

*Francesco Femia and Caitlin Werrell*

## Introduction

From 2006–2012 Syria experienced one of the worst extended droughts in its history. This drought, coupled with natural resource mismanagement, demographic dynamics and overgrazing in certain areas, contributed to a massive displacement of agricultural and pastoral peoples. Despite these dynamics and other existing underlying socio-political and economic grievances, key actors in the international community largely considered Syria to be a stable country relative to other nations in the Middle East and North Africa that experienced significant social unrest in the so-called Arab Uprisings (Butters 2011; Mann 2012). This chapter explores the climate and natural resource elements of Syria's state fragility, the phenomenon of governments across the international community misdiagnosing the probability of Syrian instability in 2011 and the possible pathways forward for the country and the international community in addressing these risks.

## The climate-water-natural resource management nexus in Syria from 2006–2012

The factors that contributed to the popular uprisings in Syria in 2011 are very complex and remain little explored. As with all conflicts, a confluence of ultimate and proximate causal factors intersect, resulting in discontent turning to revolt, and governments either managing or suppressing that revolt, collapsing or something in between. In the case of Syria's popular revolt, which began most visibly in the southern rural town of Dara'a in March 2011 (PBS 2011), political, economic, ethnic, sectarian and religious grievances, as well as inspiration from uprisings in Tunisia and Egypt, have been offered as contributing factors to the collapse of security in the country.

Less attention has been paid, however, to significant agricultural, pastoral, environmental and climatic changes in Syria. Combined with the mismanagement of water and food resources by the al-Assad regime, which between 2007 and 2011, these changes converged to precipitate a severe humanitarian crisis. Despite UN reports highlighting the crisis, it was barely noticed by the international community, in part due to the Syrian government's attempts to prevent reporters from accessing internally displaced peoples (Worth 2010). This study represents an update of a previous study on the subject (Femia and Werrell 2012).

## A climate-exacerbated drought on top of a drought

From 2006 to 2012, Syria experienced one of the worst long-term droughts and most severe set of crop failures and livestock devastation in its history of records, with the period from 2009–2012 registering as the most extreme drought conditions across a number of regions (Werrell et al. 2015, p. 31). From 2007 to 2008, the severe drought affected 97.1 per cent of Syria's vegetation (Figure 1.1) (Wadid et al. 2011, p. 11). This drought also followed on the heels of another of Syria's most severe droughts in modern history, which took place from 1999–2000, and affected 329,000 people (Werrell et al. 2015, p. 31).

Recent evidence suggests that the probability of such a severe-to-extreme drought period from 2006–2012 increased as a result of anthropogenic climate change. A study by Hoerling et al. (2012) found strong evidence that winter precipitation decline in the Mediterranean littoral and the Middle East from 1971 to 2010 was likely due to climate change, with the region experiencing nearly all of its driest winters since 1902 in the past 20 years (Figure 1.2) – a problematic phenomenon given that the region receives most of its annual rainfall in the

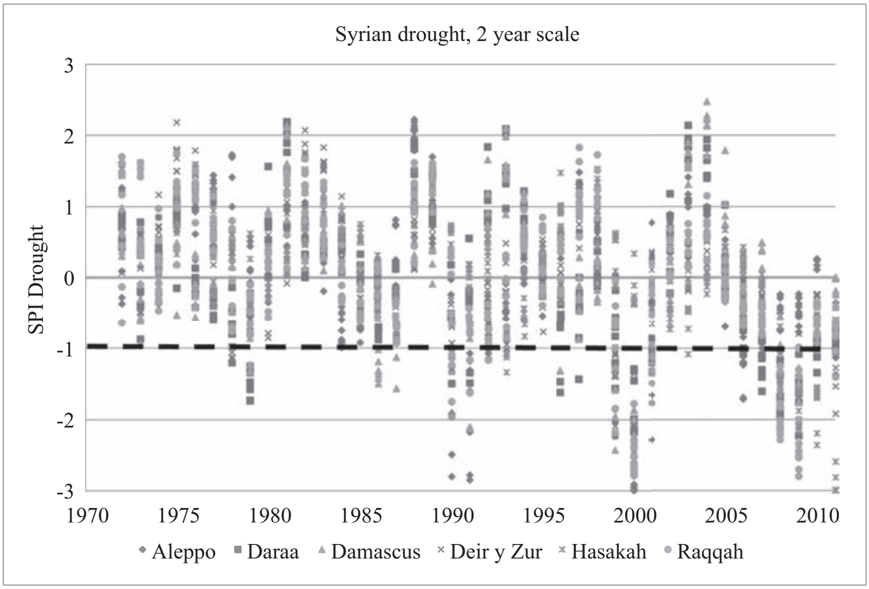


*Figure 1.1* Drought, two-year scale, Syria from 1970 to 2011. Calculated by Standard Precipitation Index (SPI), -1 or below signifies drought (-1 = moderate drought; -2 = extreme drought)

Source: Sternberg, unpublished data. For SPI calculation see Sternberg (2012)

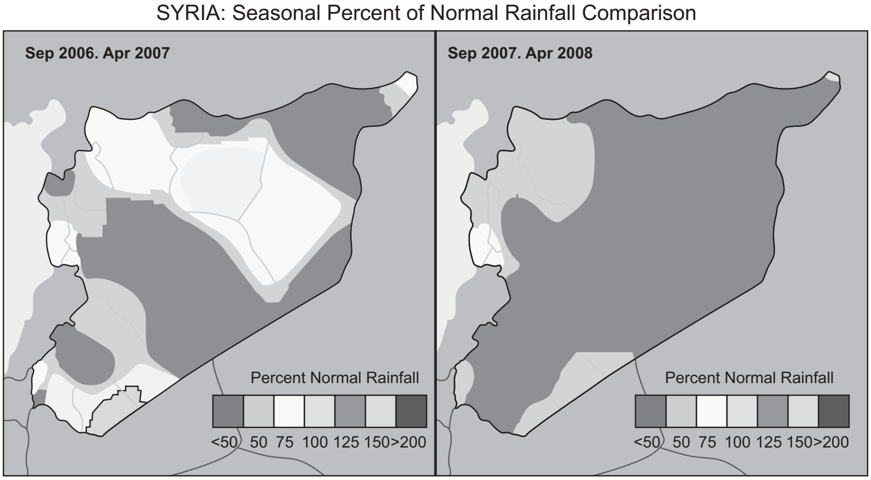


*Figure 1.2* Syria: Seasonal per cent of normal rainfall, comparison 2006–2008 (USDA 2008)

Source: USDA Foreign Agricultural Service (FAS. 2008. SYRIA: Wheat production in 2008/09 declines owing to season-long drought http://www.fas.usda.gov/highlights/2008/05/syria_may2008.htm)

winter. This trend of precipitation decline can also be seen quite clearly in the Standard Precipitation Index (Werrell et al. 2015, p. 31). The authors determined that half of this drying magnitude can be explained by anthropogenic greenhouse gas and aerosol forcing, as well as increases in sea surface temperature (Hoerling et al. 2012).

More recently, a study by Kelley et al. (2015) found that the extreme drought in Syria from (2007–2010) was two to three times more likely to be a result of anthropogenic rather than natural climatic changes (Kelley et al. 2015).

## Natural resource mismanagement and desertification

The reasons behind the collapse of Syria's farmland and rangeland extend beyond the drought, and the climate change drivers that increased its likelihood. A complex interplay of variables, including natural resource mismanagement, demographic dynamics and overgrazing interacted with changing climatic conditions to enable that outcome (Femia and Werrell 2012).

First, poor governance by the al-Assad regime compounded the effects of the drought, which contributed to water shortages and land desertification. The al-Assad government, like many of its predecessors, heavily subsidised water-intensive wheat and cotton farming (more than 50 per cent of which was grown in the al-Hassakeh governorate (Matlock 2008), which was incidentally hardest hit by the drought). A focus on water-intensive crops, coupled with the widespread use of inefficient irrigation techniques, such as 'flood irrigation,' wherein nearly 60 per cent of water used is wasted, placed significant strains on Syria's water resources (IRIN 2010a). This dynamic stood in contrast to a number of other nations in the Middle East and North Africa, who, for example, imported most of their wheat. In fact, 9 out of the top 10 wheat importers in the world can be found in the Middle East and North Africa (Sternberg 2013, p. 13).

In the face of water shortages that flowed from water-intensive agricultural practices, the previous drought from 1999–2000 and population pressures, farmers sought to increase supply by turning to the country's groundwater resources. Syria's National Agricultural Policy Center reported a 63 per cent increase in wells tapping aquifers from 1999 to 2007 (Sticklor 2010). This pumping 'caused groundwater levels to plummet in many parts of the country, and raised significant concerns about the water quality in remaining groundwater stocks'(Sticklor 2010). This wheat and cotton production, coupled with the severe–extreme drought, significantly diminished the water table in the country.

On top of water resource mismanagement, the Food and Agriculture Organization (FAO) reported that the overgrazing of land, and a rapidly growing population, compounded the land desertification process in Syria (IRIN 2010b). In a study from 2014, De Châtel (2014) also determined that overgrazing in areas of Syria affected by drought may have been a key driver of desertification (De Châtel 2014).

Water resource management in neighbouring countries, particularly Turkey, may also have played a role in Syria's water insecurity during the decade prior to the uprising, though likely not as significant a role as the al-Assad government's own policies. In particular, from 1990–2010, average annual flows of the Euphrates River, as measured close to the Turkish border in Jarabulus, were significantly lower than the average annual flows from 1937–1990. This decline coincided with the 1992 completion of the Ataturk Dam on the Euphrates in southeastern Turkey (Gleick 2014, p. 5).

## Internal mass displacement

This climate-drought-natural resource management nexus in Syria ultimately precipitated a significant and under-reported humanitarian disaster in the country from 2006–2011, prior to the outbreak of widespread popular revolt against the al-Assad government.

Of the most vulnerable Syrians dependent on agriculture, particularly in the northeast governorate of Hasakah, 75 per cent experienced total crop failure (Gleick 2014, p. 15). On average, pastoral peoples in the northeast of the country lost around 85 per cent of their livestock (Worth 2010). As of 2010, the combined impact on agricultural and pastoral lands affected at least 1.3 million people (Werrell et al. 2015, p. 32).

According to a report from *the New York Times*, the al-Assad government attempted to prevent international observers and journalists from accessing people affected by the collapse of farmland and rangeland (EM-DAT 2016). Nonetheless, from 2009 through 2011, some institutions of international agencies and non-governmental organisations had begun to identify the humanitarian crisis unfolding in Syria. In 2009, both the United Nations and International Red Cross reported that over 800,000 Syrians had lost their livelihoods as a result of the agricultural and rangeland collapse (IRIN 2009). By 2011, it was estimated that one million Syrians had been left extremely 'food insecure' by the collapse (Wadid et al. 2011, p. 5). Another estimated that two to three million people had been driven into extreme poverty, approximately 9–13 per cent of the country's population (Worth 2010).

This loss of livelihoods led directly to a mass displacement of farmers, herders and agriculturally-dependent rural families, a majority of whom moved to urban areas in search of employment opportunities (Wadid et al. 2011, p. 8). One estimate suggested that between 1.5 and 2 million people had been displaced (Mohtadi 2012). In October 2010, the a UN estimate that 50,000 families migrated from rural areas just that year, following the hundreds of thousands of people that had migrated to urban areas during the previous years of the drought (Worth 2010). In January 2011, it was reported that crop failures just in the farming villages around the city of Aleppo drove roughly '200,000 people from rural communities into the cities' (Nabhan 2010). This occurred while Syrian cities were already coping with influxes of Iraqi refugees since 2003, as well as a steady stream of refugees from Palestinian territory (UNHCR 2010). Crumbling urban infrastructure, a phenomenon that preceded the drought, combined with these population pressures and contributed to a significant decline in per capita water availability in urban areas (IRIN 2010a).

## Interaction of natural resource stress and socio-political dynamics

The stresses that flowed from drought conditions, as well as water and land mismanagement by the al-Assad regime, existed in the context of a range of socio-political grievances among non-Alawite Arab and Kurdish populations in rural areas of Syria, particularly in the north and south. For example, anecdotal evidence suggests that well-drilling contracts were often awarded by the al-Assad government on sectarian grounds, favouring Alawite and other Shiite populations over others ("Anonymous" 2013).

The rural farming town of, the focal point for protests in the early stages of the opposition movement in 2011, was home to all of the stresses detailed above. Dara'a had been significantly affected by five years of drought and water scarcity (PBS 2011). The town also hosted a population that had been largely ignored by the al-Assad government, not least due to sectarian differences (Paralleli 2011).

Recent research has also made the case that discontent among a number of tribal populations displaced by the drought, a dramatically declining water table and underdevelopment played an important role in tribal uprisings, despite attention being paid primarily to sectarian drivers of unrest (Dukhan 2014). According to Syrian researcher Haian Dukhan:

> the collapse of the rural economy of tribal communities in the south and east of Syria during Bashar al-Assad's regime due to drought, lack of development

> projects and the mismanagement of al-Badia resources ignited the Syrian uprising to start in tribal regions.

Lastly, anonymous, unpublished interviews with tribal peoples who were displaced by the drought, and migrated to suburbs of Damascus and Homs, describe evidence of social tensions. This includes tensions between tribespersons from Hassakeh (particularly the Jabbour and Tay tribes) and residents of the Hajr Aswad suburb of Damascus, as well as sectarian tensions between displaced members of the Fwaira and Nu'im tribes and Alawite residents of the Baba Amr suburb in Homs (Dukhan 2015).

Though the lines of causality remain difficult to disentangle, it is reasonable to suggest that the combination of climate, drought, natural resource mismanagement, internal mass displacement of farmers and herders and sectarian grievances in Syria, coupled with knowledge of the recent revolutions in Tunisia and Egypt, played a role in fraying the social contract between a range of rural and urban populations in the country and the seemingly 'stable' al-Assad government (Shadid 2011).

## Misdiagnosed: Syria's unstable stability

Despite the climate, water and food insecurities in Syria detailed earlier, and despite the mass displacement of people that followed, key actors in the international community, including the US government, seemed largely surprised by the Syrian uprisings that began in 2011. For example, the US Deputy Secretary of State during the initial wave of the Arab Uprisings, James Steinberg, was very clear about the fact that no one in a position of authority within the US foreign policy infrastructure considered Syria to be a likely candidate for significant political unrest. In an interview, Steinberg highlights the fact that Syria sat at the bottom of an Administration list of Middle Eastern and North African nations that were 'at risk of large-scale political turmoil'(Mann 2012, p. 270). Given that such a list was likely compiled using analysis from key departments and agencies in the US government, including the intelligence community, it can be reasonably surmised that predictive tools being utilised at the time by US government analysts were missing some important elements:

> The Obama administration began trying to figure out which country would come next. Administration officials hurriedly made a list of which countries in the Middle East were most at risk of large-scale political turmoil, and which were least at risk. That list turned out to be wrong in many cases. At the top of the list were Yemen and Jordan, the countries where political unrest seemed likely. In the middle tier were Libya, Bahrain and Oman, all countries where it appeared possible. At the bottom were the nations where any widespread demonstrations for democracy were judged to be improbable: Saudi Arabia and Syria. 'No one was focused on Syria, because it seemed far less likely than other states in the region,' said James Steinberg a few months later.
>
> (Mann 2012, p. 270)

Analysts in the public sphere also seemed to have not seen the Syrian uprising coming. During the progress of the uprisings in Tunisia and Egypt, few (if any) reporters in English language media suggested a high probability of a Syrian uprising that could threaten the al-Assad regime. On Feb 4, 2011, the eve of political turmoil in the country, *TIME* magazine's Andrew Lee Butters, who had recently witnessed political protests in Damascus, determined that a government's alliance with the United States was a key indicator of a fragile government, and that Syria did not meet that criteria. As he stated, less than a month before the Syrian government affected a violent clampdown of political unrest in Dara'a:

> demonstrations in Syria are unlikely to pick up anywhere near enough momentum to seriously threaten the regime of President Bashar al-Assad. The reason is simple: Syria, unlike Egypt, Yemen and Jordan, isn't allied with the United States.
>
> (Butters 2011)

Publicly-available measurements of state fragility and climate vulnerability also seemed to have missed deteriorating social, environmental and natural resource conditions in Syria during the five years prior to the uprisings. A study published Werrell et al. (2015) demonstrated that two popular indices used to measure state fragility and climate vulnerability (the Fragile States Index and the Notre Dame Global Adaptation Index, respectively), both seemed to miss a deteriorating trend in the nation's fragility and climate vulnerability (Werrell et al. 2015). In fact, the indices detected an improving trend in both measurements from 2006–2010 (Werrell et al. 2015, pp. 38–39). It is not until 2011, after Syria had already plunged into large-scale political unrest, that the indices detected a deteriorating trend (Werrell et al. 2015, pp. 38–39).

Furthermore, intelligence analyst Margolis (2012) found that from 2007–2010, four respected indices measuring state instability (the Failed States Index, the State Fragility Index, the Economist Intelligence Unit and the Index of State Weakness) presented a picture of improving stability in the country, with Syria ranking as more stable than 48, 75, 94 and 59 other countries in the world, respectively (Margolis 2012).

Additionally, a number of confidential sources within the US government noted that after the uprisings in Tunisia and Egypt, a majority of analysts from across the US intelligence, foreign policy and defense communities had determined that the al-Assad regime was very stable relative to most other nations in the region, and that water insecurity, food insecurity and population displacement dynamics on the sub-national level were not deemed significant enough to increase the likelihood of large-scale political revolt. This latter assessment of the relatively low weight given to natural resource security variables within these predictive assessments was often cited as a 'norm' among regional analysts within the US government. Normally 'accurate' predictive tools not being particularly sensitive to natural resource dynamics were also cited on a number of occasions as one possible, though partial, explanation for this misdiagnosis ('Anonymous' 2013).