



Climate change, conflict and security scan

Analysis of current thinking

Katie Peters and Leigh Mayhew

April – July 2018





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1 Introduction

As the climate change–conflict–security nexus has gained attention in policy circles – particularly those associated with the international security apparatus, such as the UN Security Council – media coverage of this intersection of risk has ballooned, as have discussions on practical implications for policy-makers and operational agencies alike. The research community has to date both helped and hindered understanding of the links between the issues, with new insights confined to peer-reviewed journals – to which many policy-makers and practitioners do not have access – and arguably an overconcentration on conceptualising the links and on methodological questions around attribution.

Things are starting to change. UN agencies and non-governmental organisations that have been operationalising ‘resilience’ for some years are now increasingly getting to grips with what resilience-building to intersecting climate, conflict and disaster risks looks like. Policy dialogues at the regional and international level are becoming more action-oriented, exemplified by the hashtag #doable at the 2019 Planetary Security Conference in The Hague.¹ And robust research is increasingly being conducted, with a critical eye on the practical implications of the evidence being generated, using new methods to understand the climate change–conflict–security nexus.

The Scan aims to help policy-makers, practitioners and academics who are short on time get to grips with the range of literature, discourse and social media coverage of the intersection of resilience, climate change, conflict and security. It has assessed over 350 pieces of literature and summarises 146. It intentionally emphasises academic journals, because these remain inaccessible to many, including those who take critical policy and funding decisions on how

to prevent and respond to new manifestations of complex risk.

The Scan is not intended to be read from start to finish, but provides signposts to allow readers to head straight to the sections of relevance for them. We do not claim to be exhaustive, but the material we present covers as much as we feel is needed for anyone wanting to understand the new insights emerging from the academic literature, the grey literature, the blogosphere and social media coverage.

This Scan is the first of three, which will together provide a snapshot of everything written over the period of a year, between 2018 and 2019. Each instalment will cover a four-month period. This first Scan covers April 2018–July 2018. We described the methodology for each section below, but essentially follow an adapted version of the process that led to the highly successful Rockefeller-funded ODI Resilience Scans, which summarised emerging insights from the resilience field.

Over the coming year, this topic will remain firmly on the international agenda: the UN Security Council is set to hold further discussions on the security implications of climate change; the new Climate Security Mechanism within the UN system will come into effect; and many countries will continue to see discussions on the impacts of climate-related disaster risks, with consequences for conflict dynamics and security.

We are also likely to see a new shift. A nascent body of work focused on risk-informed development is emerging that takes a more holistic approach to the intersection of shocks, stressors, threats and hazards. A broadened approach, together with a greater diversity of voices on the nexus – which we aim to showcase here – seeks to bring new insight and

1 <https://www.planetarysecurityinitiative.org/>

fresh perspective into what has arguably become an echo chamber on 'climate security'. It is for this reason that we include topics that to many may seem new: psychosocial support, disaster risk governance, etc.

The impetus behind this work is to help guide policy-makers, practitioners and researchers to pursue pro-poor ways to address the intersection of climate change, conflict and security risks. Understanding what we already know is a first step towards this goal.

2 Climate change, conflict and security on Twitter

This section offers insights into how climate change, conflict and security were discussed on Twitter, as well as identifying the prominent Twitter users and the nature of their engagement, for the period 1 April to 31 July 2018.

2.1 Methodology

An initial search using the advanced search settings on Twitter identified tweets discussing

climate change, conflict and security, employing the following hashtags; #climatesecurity, #climateandsecurity. This generated search results of tweets in a range of languages. The search results were weighted by the number of retweets received, in the following groupings: 10 or more retweets; 8–9 retweets; and 5–7 retweets. Using retweets as the primary factor, the top 50 retweeted tweets were shortlisted for analysis.²

2 Given that tweets are live and receive continual engagement after the initial tweeting, engagement metrics are based on search results carried out in January 2019.

Climate change, conflict and security on Twitter

Top 5 individuals



1



@BaharehSeyedi
Policy Specialist, UNDP

2



@JanVivekananda
Senior Project Manager, Adelphi

Delighted to have co-authored new report on #ClimateSecurity and #LakeChadCrisis with @camillaborn for Expert Working Group on Climate-Related Security Risks. #ClimateRisk Includes brand new findings from excellent field research by @chitranagarajan *

3



@CamillaBorn
Senior Policy Advisor, E3G

4



@AmieraSawas
Senior Research and Policy Specialist, ActionAid UK

5



@AdilNajam
Professor of International Relations and Earth and Environment, Boston University

* <https://www.adelphi.de/en/publication/lake-chad-region>

** <http://strauss.tacc.utexas.edu/#/d>

Top 10 institutions



1



@UNEnvironment

2



@SwedenUN

3



@UCSUSA

4



@UKUN_NewYork

5



@SierraClub

6



@Planetary_Sec

7



@ClimateDiplo

8



@SIPRIorg

9



@NorwayUN

10



@StraussCenter

NOW LIVE: Our Complex Emergencies Dashboard, developed w/ @DGateway, showcases multilayered, interactive models of data on #climatesecurity vulnerabilities & responses in South & SE Asia **

Twitter engagement: examples of hot topics on Twitter



@henkovink
Special Envoy to the High
Panel on Water



@ClimateDiplo

Can #climatechange be the source of conflicts or is it merely one among several catalysers? And how can we avoid climate change mitigation & adaptation policies not to become a new source of tension? @PlanSecu @PlanSecu @Planetary_Sec #ClimateSecurity



@OnuTchad
United Nations Chad



@SwedenUN

The civil society briefer from the Sahel region in the #UNSC Debate on #ClimateAndSecurity July 11 is a woman from the Sahel region in #Chad. She can give testimonies of her own experiences of the vanishing #LakeChad & the subsequent consequences



@UlrikaModeer
Assistant Secretary General
and Director of Bureau
of External Relations and
Advocacy at UNDP



@FlorianKrampe

What is the role of the United Nations in managing the risks posed by climate change? New @SIPRIorg video featuring @Amierasawas. #ClimateSecurity #SustainingPeace #SthlmForum



@ADBClimate
Asian Development Bank



@ClimateDiplo

To help identify #climaterisks and hotspots in the South & Southeast Asia, the CESPA program at the @UTAustin recently launched the Complex Emergencies Dashboard, which integrates raw data & modelling with mapping technology #ClimateSecurity



@ChamberlainSDGs
Country Director UNDP
Ethiopia



@SIPRIorg

What is the role of the United Nations in managing the risk posed by #ClimateChange? Comments from a range of stakeholders in the new SIPRI Searchlight film. #ClimateSecurity #SustainingPeace @PlanSecu

Samples of twitter activity from selected key events



@SIPRIorg

Discussing the climate change – gender – security nexus at #SthlmForum. The session discusses the need from an intersectional analysis using #Sudan and #LakeChad as case studies. #gender #intersectionality ~climatesecurity @SIPRIorg @UNEnvironment @envpeacebuild



@ClimateDiplo

On 22 June 2018, the EU will host a high-level event 'Climate, Peace & Security: The Time for Action.' The event will assess #climatechnage threats, progress on #climatesecurity policy & options to further action on climate, security & peace



@EUEnergyNews

The EU can do much more to prepare for #climatesecurity risks – clear tasks for institutions @CntrClimSec @Clingendaelorg report ahead of 22June @FediricaMog Summit



@MinisterDPaul

Honoured to be at @FedericaMog's #ClimateSecurity HL Event. As she said, "The environment is our first line of defence" & as @margotwallstrom so eloquently put it, "Climate change is our common enemy". Kommol tata to these two great champions for action #United4Climate #ClimaDiplo

9th May 2018

Stockholm Forum on
Peace and Development

22nd June 2018

EU High Level Event Climate, Peace
and Security: The Time for Action



@detoxconflict

Round up of Yesterdays #climateandsecurity debate in the #UNSC where the majority of speakers supported the idea of integrating climate risk data into the UN's conflict prevention and response activities



@ClimateDiplo

Today, Sweden holds the first meeting in the UN Security Council since 2011 on #climatesecurityrisks, to better understand how #climatechange impacts security and enhance UN responses.
@margotwallstrom @AminaJMohammed @hindouomar



@camillaborn

Round up from yesterday's Security Council debate, the following countries called for strengthened climate risk assessment and reporting on #climateandsecurity AOSIS and the Arab Group

11th July 2018 UNSC debate

Top 3 retweets



As the top 3 retweets reveal, Twitter activity was most prolific around the 11th July 2018 UN Security Council debate on climate change.



@UNEnvironment

#Climatechange creates tensions over resources that are shared between states. These tensions can have security consequences. Watch the #UNSC debate on #ClimateAndSecurity starting in 15 minutes



@SwedenUN

Big week ahead!
@SwedishPM Stefan Lofven & Foreign Minister @margotwallstrom will be at the @UN to chair key meetings on our priorities:
July 9: Open Debate #CAAC
July 10: Debate #WPS
July 11: Briefing #ClimateandSecurity
Follow #SwedeninUNSC



@SwedenUN

The security impacts of #climate change are real. The @UN Security Council needs to catch up with these realities on the ground.
Don't miss the #UNSC Debate on #ClimateAndSecurity July 11. 10AM.
Webtv.un.org #SwedeninUNSC

3 Climate change, conflict and security in the blogosphere

Key points

- National security agendas should include climate change considerations; foreign aid has the potential to support adaptation and mitigation attempts in less developed regions.
- A disconnect exists between national governments and militaries in terms of their narratives on climate change; whereas we are increasingly seeing a militarised portrayal of climate change as a threat to national security, government institutions often give the issue insufficient prioritisation.
- The risks of climate change are expected to reinforce the need for wider regional responses and increased trans-boundary collaboration on issues such as early warning and response.
- The intersection of poverty, economic fragility, drought and environmental degradation in states that are unable to absorb the shocks of a changing climate produces fertile ground for non-state armed actors who are capable of undermining stability.
- International financial institutions are increasingly recognising the emerging threat of climate change to the global economy. Fragile and conflict-affected states are drawing increased attention as a result of their need for context-sensitive financing tools.
- The specific recovery needs of those affected by conflict and natural-hazard related disasters create a challenge beyond that of reconstruction. The vulnerability of displaced persons is a key concern and an in-depth focus is required to safeguard children and young girls.

This section offers insights into how the blogosphere addresses climate change, conflict and security. We systematically identify and analyse the top 21 blogs on the topic published between 1 April 2018 and 31 July 2018.

3.1 Methodology

For the purposes of this research, blog posts are defined as news or opinion articles and categorised as blog posts by search engines as discrete entries (articles) with a clear publication date. The basic approach here is based on the metrics of visibility and (online) impact and engagement.

Using blog search engines, we performed Boolean search queries to identify blog posts published on the topic of climate change, conflict and security, using a set of predetermined key words. This produced an initial 41 results, each of which we checked manually for relevance and context. Results that had low keyword/subject matter relevance were excluded. This process reduced the shortlist to 21 results, which we measured, ranked and scored for the following: number of social shares, journalist reach and readership of publishing website. The scores for each of the measures were then combined to produce a social visibility score and ranked to produce the final index for the blog search.

3.2 The top 21 blog posts

Ranking	Blog post title	URL	Publisher	Total score	Rank
Blog post 1	Climate change an 'existential security risk' to Australia, Senate inquiry says	https://www.theguardian.com/environment/2018/may/18/climate-change-an-existential-security-risk-to-australia-senate-inquiry-says	The Guardian	69.00	1
Blog post 2	Take it from the military: Climate security is national security	https://thehill.com/opinion/energy-environment/398310-take-it-from-the-military-climate-security-is-national-security	The Hill	65.00	2
Blog post 3	Senate report: Climate change is a clear and present danger to Australia's security	http://theconversation.com/senate-report-climate-change-is-a-clear-and-present-danger-to-australias-security-96797	The Conversation	61.00	3
Blog post 4	Fragile countries risk being 'stuck in a cycle of conflict and climate disaster,' Security Council told	https://news.un.org/en/story/2018/07/1014411	UN News	49.50	4
Blog post 5	Climate change is one of Australia's biggest national security risks	https://www.businessinsider.com/climate-change-national-security-risk-australia-2018-5?r=US&IR=T	Business Insider	49.00	5
Blog post 6	Q&A: The World Bank's pivot to fragile states	https://www.devex.com/news/q-a-the-world-bank-s-pivot-to-fragile-states-92572	Devex	45.00	6
Blog post 7	What to expect at the World Bank Spring Meetings	https://www.devex.com/news/what-to-expect-at-the-world-bank-spring-meetings-92547	Devex	42.00	7
Blog post 8	Quick facts: How climate change affects people living in poverty	https://reliefweb.int/report/world/quick-facts-how-climate-change-affects-people-living-poverty	Relief web	39.00	8
Blog post 9	Approving the climate security agenda	https://thebulletin.org/2018/07/approving-the-climate-security-agenda/	Bulletin of the Atomic Scientists	39.00	8
Blog post 10	UN security council considers 'cycle of conflict and climate disaster'	https://www.climatechangenews.com/2018/07/12/un-security-council-considers-cycle-conflict-climate-disaster/	Climate Home News	39.00	8
Blog post 11	ESCAP Multi-Donor Trust Fund for Tsunami, Disaster and Climate Preparedness: Strategic Note 2017–2020	https://reliefweb.int/report/world/escap-multi-donor-trust-fund-tsunami-disaster-and-climate-preparedness-strategic-note	Relief Web	35.00	11
Blog post 12	Proceedings and Knowledge Report: World Reconstruction Conference 3 – Promoting resilience through post-crisis recovery, Brussels, Belgium, June 6–8, 2017	https://reliefweb.int/report/world/proceedings-and-knowledge-report-world-reconstruction-conference-3-promoting-resilience	Relief Web	28.00	12
Blog post 13	Girls on the move: A publication about girls escaping natural disasters and violent conflict in Eastern Africa	https://reliefweb.int/report/world/girls-move-publication-about-girls-escaping-natural-disasters-and-violent-conflict	Relief Web	28.00	12

Ranking	Blog post title	URL	Publisher	Total score	Rank
Blog post 14	Nigeria on the receiving end of climate change	https://www.thisdaylive.com/index.php/2018/04/02/nigeria-on-the-receiving-end-of-climate-change/	This Day	26.50	14
Blog post 15	ADB's Strategy 2030 – a first look	https://www.devex.com/news/adb-s-strategy-2030-a-first-look-93163	Devex	22.00	15
Blog post 16	EU and China underscore 'highest political commitment' to effective implementation of Paris Agreement	http://sdg.iisd.org/news/eu-and-china-underscore-highest-political-commitment-to-effective-implementation-of-paris-agreement/	IISD	21.00	16
Blog post 17	Mapping climate security: New dashboard tool visualizes complex vulnerability in Asia	https://www.newsecuritybeat.org/2018/07/mapping-climate-security-dashboard-tool-visualizes-complex-vulnerability-asia/	New Security Beat	20.50	17
Blog post 18	First responders of last resort: South Asian militaries should strengthen climate security preparedness and cooperation	https://www.newsecuritybeat.org/2018/04/responders-resort-south-asian-militaries-strengthen-climate-security-preparedness-cooperation/	New Security Beat	19.00	18
Blog post 19	UN Security Council addresses climate change as a security risk	https://sdg.iisd.org/news/un-security-council-addresses-climate-change-as-a-security-risk/	IISD	17.00	19
Blog post 20	Climate Finance Institutional Update: IMF and World Bank Spring Meetings promote investment in sustainable growth	https://sdg.iisd.org/news/climate-finance-institutional-update-imf-and-world-bank-spring-meetings-promote-investment-in-sustainable-growth/	IISD	17.00	19
Blog post 21	ADB launches Strategy 2030 to respond to changing needs of Asia and Pacific	https://modern diplomacy.eu/2018/07/27/adb-launches-strategy-2030-to-respond-to-changing-needs-of-asia-and-pacific/	Modern Diplomacy	14.00	21

3.3 News-oriented blog posts: national security and the UNSC debate

The inclusion of climate change on security agendas – at both the national and the international level – was a dominant theme within news coverage.

Starting at the national level, the highest-ranked blog post, by Doherty (2018), and blog post 5, by Perper (2018), both focus on the Australian Senate Committee inquiry that took place in May 2018. Both blog posts describe how the Committee heard that climate change presented a threat not only to national security in Australia but also to wider stability within the Asian-Pacific region. Doherty states that recommendations from the inquiry included calls for increased foreign aid targeting adaptation and mitigation

within the region; a White Paper on climate security; emissions targets for the Department of Defence; and a post dedicated to climate security within the Department of Home Affairs. While the inquiry and the subsequent report were viewed as a positive step, Doherty notes that some raised concerns in relation to a 'disconnect between evidence presented to the inquiry and recommendations that emerged from it'.

Switching the focus to the international level, the UN Security Council (UNSC) debate, which took place in July 2018, was a prominent story. The contribution from UN News (2018) in blog post 4 provides an overview of key points raised by contributors to the debate, including those by UN Under-Secretary General Amina Mohammed, who had warned that '[f]ragile countries are in danger of becoming stuck in a cycle of conflict and climate disaster.' The Under-Secretary

General had also shared reflections on a recent visit to the Lake Chad region, highlighting that the reduction in the volume of the lake was leading to socioeconomic insecurity for the region's population. The post also brings attention to other regions, such as the Middle East: Iraq's minister of water had expressed concern related to the lack of agreements managing the region's shared water resources. The minister had stated that the 'absence' of 'bilateral or multilateral agreements or regional frameworks' was leading to unnecessary insecurity within the region.

Both the UN News (2018) post and blog post 10 by Darby (2018) highlight that links were made during the debate between climate change and armed recruitment. Darby (2018) states that Hindou Ibrahim from the International Indigenous Peoples Forum on Climate Change had raised awareness of the vulnerability of farmer and herder communities within the Sahel, describing the communities as facing economic uncertainty as a result of natural hazards such as droughts, which had left them 'vulnerable to recruitment by terrorist organisations'.

Blog posts also share recommendations and progress on climate security within the UN as expressed during the debate. On recommendations, blog post 19 by Mead (2018) notes that several entry points were listed, including means to carry out risk assessments, conflict analysis and early warning; climate- and conflict-sensitive prevention and development; and the inclusion of climate risks within UN secretary general reports. Calls were also made for the creation of a Special Representative on Climate and Security and an 'institutional home' for climate security within the UN. In terms of progress, both UN News (2018) and Mead (2018) state that the UN secretary general highlighted that the UN had increasingly utilised climate-related risk assessments and management strategies, with the 'recalibrated' UN Integrated Strategy for the Sahel listed as one example (UN News, 2018).

Not all member states shared the support during the debate for discussing climate change within the UNSC. Both Gaulkin 2018 in blog post 9 and Mead (2018) highlight the objections of member states. For example, Russia had

accused the debate of creating an 'illusion', by giving the perception the UNSC would address climate issues. Sharing personal reflections on the debate, Gaulkin (2018) questions whether the inclusion of climate change within the UNSC should be viewed as a 'hopeful sign' or make it evident that the international community was facing an 'unavoidable security threat'.

3.4 Opinion pieces: national security, state fragility and regional collaboration

Blog posts that are more opinion-oriented also focus on the inclusion of climate change within national security agendas. The second highest ranked post, by Cheney (2018), a retired brigadier general within the US Marine Corps, argues that, within the context of the USA, there is a disconnect between the current Trump administration's treatment of climate change and that of the US military, which has increasingly recognised climate change as a national security concern. The post highlights that we are increasingly seeing a narrative that draws attention to the vulnerability of US military infrastructure to natural hazards both at home and abroad. In addition, through its interaction with state fragility and increased resource scarcity, climate change presents a threat to global stability and US security interests abroad – putting the lives of both US military personnel and US civilians at risk. Cheney argues that the Trump administration's decision to 'roll back' policies aimed at tackling climate change is 'pushing an anti-security agenda' and calls for actions 'guided by science and that put American lives ahead of special interest.'

Blog post 3 (McDonald, 2018) also brings attention to a difference in stance between national governments and the military regarding the risks associated with climate change, this time in the context of Australia. The analysis is framed in relation to the recent Senate Committee inquiry on the impact of climate change on national security. While recognising that climate change holds a 'toxic' position within the domestic political arena in Australia, McDonald interestingly argues that the inquiry process has exposed a disconnect – similar to that in the

USA – between the government and the military in the level of priority given to climate change. Some within the government have met the set of recommendations that have emerged with the view that current ‘arrangements are sufficient’. In contrast, there is increasing acceptance that, as an institution, the military will need to include climate change within its planning. However, given the current political climate, the military are often reluctant to openly discuss this. McDonald argues that the inquiry and its recommendations may offer an opportunity for change, with regard to the inclusion of climate change both within ‘defence and security’ planning and also in wider ‘public debate and climate policy orientations’.

The risks associated with climate change require us to consider wider regional responses too, as blog post 18 reveals. Using the example of the Pacific Partnership – a joint military exercise in the Indo-Asia Pacific region aimed at building a coordinated response to manmade and ‘natural’ disasters – Ghazi (former Pakistan defence secretary and retired lieutenant general) and Fleishman (2018) call on South Asian countries to undertake a similar response to build collaborative norms within the region. The authors highlight that there is evidence that, at a national level, militaries within the region are already building climate change considerations into their planning. In Pakistan, for example, climate security is featuring within training, and the Sri Lankan military is increasingly dedicating resources to disaster response. However, more needs to be done to build greater collaboration between states. Entry points include joint threat analysis and scenarios; joint early warning and response; and building the capacity of local actors to enable them to respond and prepare.

Blog posts 8 and 14 focus on the intersection of climate change and socioeconomic and political factors, and how this exacerbates a context of insecurity. Beginning with blog post 14, Parks (2018) argues that climatic factors are at the heart of an increasing trend of violence associated with natural resources and livelihood security in North-Eastern Nigeria. Highlighting the vulnerabilities of populations living in the Lake Chad region, Parks states that a dynamic of ‘poverty, economic fragility, drought and

environmental degradation’ has provided ‘fertile ground’ for non-state armed actors. Those who face the double threat of increasing economic uncertainty in a changing climate are often the most ‘susceptible to the allure of violence’. While acknowledging that programmes by international institutions such as the World Bank are trying to improve the lives of those living in the region, Park calls on national policy-makers to give greater consideration to how climate change undermines stability within the country, and ‘to address this on a policy and operational manner’.

Blog post 8, by Mercy Corps (2018), also argues that natural hazard-related disasters can increase the risk of conflict. This is particularly acute in states that are unable to ‘absorb the shocks of a changing climate’. In Democratic Republic of Congo, for example, changing precipitation patterns are feeding into ethnic tensions by driving competition over resources. Similar conflict dynamics are being reported in the Kenya–Uganda border region of Karamoja, where again resource scarcity is said to be an influencing factor in outbreaks of violence between communities. However, through what Mercy Corps refers to as the ‘shared experience of climate change’, there are opportunities for conflict resolution – such as in Karamoja, where Mercy Corps (2018) has supported natural resource-sharing initiatives between communities. While addressing vulnerability requires an appreciation of the wider socioeconomic and political environment, other tools – such as changes in agricultural practices and accessing banking services – can also support communities in absorbing shocks.

3.5 Policy outlooks: IFI strategies and the EU and China’s commitment to sustainable development

Blog posts also considered the outlook in terms of the policies of the international financial institutions (IFIs). Beginning with the Asian Development Bank (ADB), blog post 15 by Ravelo 2018 and blog post 21 by Modern Diplomacy (2018) focus on ADB’s Strategy 2030, which is a bid to align with other 2030 development frameworks and to set out its operational priorities. According to

Modern Diplomacy, the strategy includes seven operational priorities, including ‘tackling climate change, building climate and disaster resilience and enhancing environmental sustainability’. Both blogs indicate that fragile and conflict-affected states are a priority. With this in mind, Ravelo states that ADB will design its interventions to be context-specific, including by ensuring ‘country strategies and operations are fragility and conflict sensitive’. A number of states the ADB considers fragile and conflict-affected are also Small Island and Developing States – contexts vulnerable to the impacts of climate change and disasters – thus we are likely to see ADB focusing on these considerations, alongside adaptation, disaster risk management and environmental sustainability.

Staying with the IFIs, the policy outlook for both the World Bank and the International Monetary Fund (IMF) during their annual Spring Meetings also comes in for consideration, in blog posts 6, 7 and 20. Blog 20 by Antonich (2018) states that the Meetings considered a range of emerging threats to the global economy, including climate change. In addition, in order to support the target of delivering the Sustainable Development Goals, support from the IMF will be offered to those countries affected by the ‘macroeconomic consequences’ of traditional threats such as conflict, and emerging threats such as climate change, cyber risks and migration.

Blog post 7 by Igoe and Edwards (2018) highlights that the World Bank raised awareness of its contributions to tackling ‘global challenges’ such as climate change and conflict and fragility. With regard to the latter, the Bank is ‘working to adapt its financing tools for use in countries still in the midst of conflict – or those threatened by it’s fallout’. Blog post 6, Igoe (2018), highlights this commitment: during an interview, the director of the World Bank Fragility, Conflict and Violence Group stated that the Bank planned to double ‘financing available for... fragile, conflict and violence – countries moving from \$7 billion to \$14 billion over the next three years’.

Blog post 16 (Nelson, 2018) focuses on the EU and China’s commitment to multilateralism in delivering sustainable development, including a renewed pledge to deliver the Paris Agreement. This commitment was underscored at the 20th

Summit between the EU and China, where a joint statement also recognised the security implications of climate change. The summit also outlined the ‘bilateral cooperation’ between the EU and China in areas such as investment in climate and clean energy projects; cooperation with developing states; and low-carbon development strategies.

3.6 Promoting research findings: the intersection of conflict, fragility and vulnerability

Several blog posts give attention to new research outputs. In blog post 12, which presents the key findings of the World Reconstruction Conference held in June 2017, the European Commission et al. (2018) identify the need to understand the specific recovery needs of those affected by conflict and fragility, in a bid to build resilience to natural hazard-related disasters. These contexts present a challenge that goes beyond simply physical reconstruction to cover also institutional failings; underlying drivers of conflict; and the application of conflict sensitivity in ‘recovery activities’. Also, areas such as cultural heritage – also identified in the Sendai Framework – play an important role in enabling communities to ‘absorb and recover from the effects of natural or human-made hazards’ but are often targeted during conflict. In addition, disasters or conflict often compound the vulnerability of women – in terms of marginalisation and poverty.

A new report by World Vision focuses on understanding the vulnerability of young girls displaced by conflict or natural hazard-related disasters. In blog post 13, World Vision (2018) reports on findings from 10 case study sites across East Africa, highlighting cases of young girls exposed to sexual violence, abuse and exploitation. In cases of displacement, children often lack ‘normal safeguards’; World Vision calls on the international community to do more to protect those affected.

The concept of vulnerability is also considered in relation to the effectiveness of early warning systems within the Asia Pacific region. As with other posts, blog post 11 by the UN Economic and Social Commission for Asia and the Pacific

(UNESCAP) (2018) identifies fragility and conflict as a significant obstacle, particularly when trying to develop early warning systems. The post argues that early warning systems often ‘fail to address fragility, conflict and complex crisis’. This is particularly apparent in cases of cross-border displacement, where individuals may ‘not be fully integrated in early warning systems of host communities and countries’. UNESCAP thus calls for greater cooperation in developing early warning systems that account for the trans-boundary nature of hazards and risk.

Focusing again on vulnerability within Asia, blog post 17, Smith (2018), assesses a new Complex Emergencies Dashboard developed by the Complex Emergencies and Political Stability

in Asia programme at the University of Texas at Austin. In mapping what is termed ‘climate security vulnerability’ in South and South-East Asia, the Dashboard combines the following datasets: climate exposure; population density; household resilience; and governance. The tool is also able to ‘overlay’ with other mapping datasets, such as the Terrorist Events dataset from the University of Maryland, making it possible to map the occurrence of terrorist events against those areas identified as a climate security hotspot. While Smith warns – as does the tools developer – that caution must be used in trying to determine direct causal links in what are ultimately complex situations, the tool offers an important means to visualise vulnerability within the two regions.

4 Climate change, conflict and security in the grey literature

This section examines the intersection of resilience, climate change, conflict and security within the grey literature. The review includes publications from research and private sector institutions, humanitarian, development and UN agencies and national governments. As this section is subdivided, the key points are included under each subsection, to enable a clearer reading.

4.1 Methodology

In searching the grey literature, we followed several steps. The first involved two separate Google searches for the terms “climate change” AND conflict, and “climate security”. From the results generated, we identified and collated the first usable 25 results published within the designated scan period from each of the searches. In addition, we undertook a focused review of selected specialist online sites: Climate Diplomacy, the Centre for Climate and Security, Environmental Peacebuilding Association, New Security Beat and the Planetary Security Initiative. The results were shortlisted based on criteria of relevance, and summarised and presented around a set of emerging themes.

4.2 Climate-related security risks and vulnerable geographical areas

4.2.1 The Sahel region

Environmental degradation and continued dry weather conditions threaten food and wider security concerns in the Sahel, attracting the attention of regional organisations and UN agencies. Publishing the outcomes of its High

Key points

- Climate change represents a major cause for concern for international institutions, given its introduction of multiple security challenges: water scarcity, food insecurity, disruption to agriculture and energy infrastructure, livelihood insecurity, social tensions, conflict and displacement.
- Climate-induced challenges are expected to drive high rates of migration, increasing pressure on forage-rich areas, coastal areas, cities and host communities, which may experience heightened fragility risks and social tensions.
- Regions expected to face the greatest climate change impacts are often those worst equipped to deal with the challenge, often exhibiting poor resource management strategies, inadequate policy and a lack of strong governance structures.
- Climate-induced scarcity has been recognised to increase areas of ‘ungovernable spaces’ by contributing to economic hardship and fuelling social tensions that allow for increased recruitment into terrorist organisations and the potential to destabilise a region.

Level International Conference on the Sahel, the EU (2018) confirms its concern about the magnitude of the food and nutrition crisis. It pledges ongoing support to G5 Sahel countries’

stabilisation efforts through the EU Sahel Strategy and its Regional Action Plan.

The early warning action report of the Food and Agricultural Organization (FAO) (2018) ranks the Sahel as a high-risk region, identifying as a prominent cause the increase in migration to forage-rich areas – such as Mauritania, Mali, Senegal and coastal countries – contributing to the deterioration of local agro-pastoral lands. The work highlights that livestock overgrazing has led to increasing tensions between pastoralists and host communities.

The impact of climate change on stability within Mali is a cause of concern in a recent UN Security Council (UNSC) Resolution on the security situation in the country. UNSC Resolution 2423 calls for the Government of Mali and the UN to recognise the adverse effects of climate change, ecological changes and natural hazard-related disasters on the stability of Mali and to take these into account when preparing country activities, programmes and strategies (UNSC, 2018).

Examining these issues in more depth, a report published by The Clingendael Institute (Ursu, 2018) provides a study of Mopti region in Mali's Inner Niger Delta, where, in recent years poor resource management has exacerbated conflict over access to natural resources.

The Lake Chad region is facing multiple security risks related to climate change, natural resource conflicts, livelihood insecurity and social tensions. This insecurity has given rise to an increase in international concern, political action and humanitarian and development funding. Both the Climate Fragility Risk Assessment of Lake Chad (Nagarajan et al., 2018) and the Expert Working Group on Climate-Related Security Risk's Climate-related Security Risk Assessment (Vivekananda and Born, 2018) (which was informed by the former) focus on the region. Both publications aim to support practitioners working in Lake Chad to understand the interplay between climate and security risks and to plan, design, implement and evaluate programmes to respond positively to these.

Focusing on armed group recruitment in the region, Ashafa (2018) explores the role climate change has played in fuelling the Boko Haram insurgency in Nigeria, arguing that the drying of Lake Chad has contributed to economic hardship,

which has fuelled social tensions, leading to the successful recruitment of youths as fighters.

4.2.2 The MENA region

As with the Sahel, food insecurity, vulnerability to climate change and conflict converge in the Middle East and North Africa (MENA) region. The UN Development Programme (UNDP) (Twining-Ward et al., 2018) has published lessons learnt from its adaptation work in four sub-regions – Mashreq, Maghreb, the Arab Gulf and the Horn of Africa – addressing the challenges posed by rising levels of conflict, displacement, water scarcity and food insecurity. Interventions aim to improve natural resource governance and management while balancing socioeconomic needs and environmental protection.

In terms of individual countries in the region, Iraq features prominently. Price (2018), for the Institute of Development Studies reviews the major internal and external environmental risks Iraq has been subject to, noting that it is one of the countries that have been hardest hit by climate change in the Middle East. In a similar vein, the Planetary Security Initiative (PSI) (2018) explores the question of how EU External Action Service policies in Iraq (and Mali) are considering the climate–security nexus. The authors find that the policies on Iraq pay only limited attention to the impact of climate change, water security and development, and that there is a need to strengthen climate security, particularly through adaptation measures. The issue of water security in relation to Iraq also featured in a report for Clingendael: examining regional, national and local water challenges, von Lossow (2018) calls for greater attention to political realities and their links with water challenges.

Iraq also features alongside Djibouti in a report for the World Bank, on conflict-sensitive approaches to climate change in the MENA region. Lia Carol et al. (2018) focus on initiatives addressing climate challenges in fragile and conflict contexts, such as Iraq's Social Fund for Development.

4.2.3 Asia

The intersection between climate change, security and development is also considered in relation to Asia. The UN Economic and Social Commission

for Asia and the Pacific (UNESCAP) (2018) analyses development challenges pertinent to the region's 36 least developed countries, landlocked developing countries and small island developing states. It finds that multidimensional risks – from poverty to climate change – must be addressed by multidimensional risk mitigation through the integration of economic, social and environmental policies for sustaining peace.

Babson (2018), for the American Security Project, explores the threat of climate change to livelihoods and security in Southeast Asia. She proposes that the impacts of climate change in already fragile countries may increase areas of 'ungoverned spaces',³ leading to an opening-up of new territory to what the author defines as 'terrorist groups'. Babson argues that this has the potential to destabilise a region critical for global trade.

A report by Displacement Solutions (2018) focuses on the potential displacement of communities as a result of climate change in the Myanmar states of Ayeyarwady and Mon. The authors look at the emerging work of the Myanmar National Climate Land Bank, which aims to prepare the country and people for climate displacement. The bank will identify plots of land to be used as relocation sites for coastal communities that have agreed to relocate.

Exploring the relationship between regional stability and climate in Central Asia, Suleimenova (2018), for UNESCAP, refers to the link between climate change and water security to warn that variations in water stocks and flows may intensify competition and tensions over water resources. Suleimenova highlights that tensions in the region, such as the unresolved conflict in the Nagorno–Karabakh basin, continue to obstruct collective efforts to address water security.

4.2.4 Coastal communities and island states

The vulnerability of coastal communities and island states also comes up. De Souza et al. (2018) explore the challenges facing coastal communities in the USA. The authors state that 3 feet of sea level rise by 2100 could place the homes of 4.2 million US citizens at risk, and threaten 128 military installations. They also

highlight that the effects of climate change are not just changing water levels but also disrupting agriculture, fishing, energy infrastructure, transportation methods and national security assets. The authors recommend a range of policy options, covering not only the USA but also the international community. These include providing incentives to keep communities from building or staying in harm's way through zoning, and continuing advances in understanding sea level rise and associated risks. In addition, the authors advocate introducing land use regulations and empowering coastal communities to develop their own climate resilience initiatives.

The specific vulnerabilities of coastal communities and island states are also framed within wider, regional climate change concerns. The Food Security Information Network (FSIN) (2018) and FAO (2018) both refer to the high rate of migration by pastoralists towards coastal countries in the Sahel as a result of changing climate conditions. Staying with the vulnerability of African states is a press statement by the African Union (AU) (2018). Following a meeting convened to explore the links between climate change and conflict in Africa, this press statement calls for particular attention to the vulnerability of island member states within the AU Commission's forthcoming study on climate change, peace and security on the continent.

Switching focus to coastal communities within Arab states, publications by both Twining-Ward et al., (2018) and UNDP and the Global Environment Facility (GEF) (2018) call for coherent action to support coastal communities to become more resilient to sea level rise and erosion impacts. In addition, regarding the afore-mentioned report by Twining-Ward et al. (2018), the authors refer to the support UNDP has provided to Egypt in accessing finance from the Green Climate Fund for Coastal Adaptation.

4.2.5 Urban areas

Urban areas are another geographical area of focus for the grey literature. Friends of Europe (2018) states that urban infrastructure is at the forefront of climate change risks. Building on this, Carius et al. (2018) highlight that rural–urban movement within countries is likely to

3 Areas facing a lack of oversight by the state.

increase pressure on cities, increasing fragility risks. Both reports reflect on the shift in power from the national to the subnational level that this represents, suggesting cities must manage and evaluate the infrastructure in place in an integrated way to improve resilience. However, strong governance structures – coordinated with national policies – must be in place to support this.

Rademaker et al. (2018), for Clingendael, attempt to quantify urban resilience at the subnational level by applying the Climate Resilience and Security Monitor. This uses data from two sources used to map resilience at the city level: the UN-Habitat City Prosperity Index and the 100 Resilience Index. Rademaker et al. use this to analyse the efforts of three cities – Bamako (Mali), Maiduguri (Nigeria, Lake Chad Region) and Baghdad (Iraq) – to build resilience, and feasible strategies to improve these. By focusing on these case study sites, the authors underscore the vulnerability of these regions.

4.3 The integration of climate and security agendas

4.3.1 International and regional level

Ways to address the challenges posed by the climate–security nexus within key geographical areas have also been explored. This has included increasing calls for the integration of climate change within security agendas, at international and regional level. On a global scale, the press statement from the G7 Foreign Ministers meeting in 2018 emphasises the need for ‘more innovative, integrated and flexible approaches to conflict management that encompass the whole peace continuum’ (G7 Foreign Ministers, 2018: 19). The statement also calls for enhanced multilateral cooperation to deal with climate and security. Staying with policy at the international level, Carius et al. (2018) focus on the role foreign policy has to play in achieving the Sustainable Development Goals. Carius et al. argue that foreign policy can contribute to the effective implantation of the Goals within fragile states, but to achieve this requires a deliberate and coherent foreign policy approach.

Focusing on international laws and the links between climate change, security and migration,

Key points

- Increasingly, the integration of climate change within security agendas can be seen in international, regional and national levels of governance, reflecting the need for more innovative, integrated and flexible approaches that encompass the whole peace continuum and utilise a host of multilateral alliances.
- Recognition of the relationship between climate change, security and migration has led to increased support for the provision within legal frameworks of special international protection status for persons displaced by the effects of climate change.
- Regionally, progress in terms of climate mitigation and policy is uneven, owing to the lack, or weakness, of shared institutions and mechanisms of conflict resolution among different national and regional groups.

Apapa (2018), for the European Parliamentary Research Service, looks at international law and the links between climate change, security and migration. Apapa highlights the potential for customary law to give persons displaced by the effects of climate change special international protection status.

The need for intergovernmental military alliances to consider climate security is also highlighted. Friends of Europe (2018) calls North Atlantic Treaty Organization (NATO) to develop a common strategy on how to integrate the mitigation of climate risks into national defence strategies.

The climate–security nexus is also explored on a regional footing. Beginning with Europe, climate change is being acknowledged and addressed through strategically important high-level forums. Fetzek and van Schaik (2018) call for the routinisation (consideration of climate security within institutions concerned with foreign policy, development and defence), elevation (making climate security a priority of senior authorities within foreign policy and security institutions), institutionalisation

(equipping governments with the means to carry out climate security analysis) and integration (considering the overlap between climate impacts and other security threats) of climate change within and across diplomatic, development and defence specialisations and policies.

In terms of platforms for the coordination of climate security concerns, Szöke (2018) explores the Visegrad Cooperation between the Czech Republic, Hungary, Poland and Slovakia. She argues that, while the post-Cold War era has facilitated the broadening of the concept of security – which includes environmental concerns – currently Visegrad countries lag behind those in western Europe in terms of climate mitigation and adaptation policy. Szöke states that the Visegrad Cooperation offers an opportunity to coordinate policies across its members.

From the African perspective, the importance of integrating climate change and security commitments for peace was highlighted at the AU Peace and Security Council meeting in May 2018. A press statement of the event by Amani Africa (2018) draws attention to the Council's concern around the lack or weakness of shared institutions and mechanisms of conflict resolution and management among different national and regional groups. Meanwhile, the AU (2018) press statement of the meeting confirms the Council's emphasis on the importance of mainstreaming climate change into all activities by the AU Commission, particularly in early warning and prevention of climate change-related conflicts.

4.3.2 National level

We are increasingly seeing the inclusion of climate change within national security strategies. The Netherlands Ministry of Foreign Affairs' Integrated International Security Strategy 2018–2022 aims to put in place a long-term, preventative approach to security. It looks at the root causes of terrorism – including climate change and poverty – while making clear links to the ambition to achieve the Sustainable Development Goals.

Australia's Foreign Affairs, Defence and Trade Committee led an inquiry into the implications of climate change for national security, the results of which were published in May 2018. According to the inquiry, climate risks are being factored into Australia's preparedness policies and procedures throughout the government, including defence departments. The report includes 11 recommendations for the Commonwealth Government, which include the development of a climate security white paper and the need for a dedicated climate security leadership position in the home affairs portfolio.

From the USA, the Working Group on Climate, Nuclear and Security Affairs (2018) focuses on nuclear safety, stating that multilateral regimes have been created separately to address nuclear safety and proliferation, and climate risks, with little interaction. The authors argue that this is a concern because nuclear trends, climate change effects and a multitude of security challenges are combining in specific countries, such as India, Iran and Pakistan. The authors present recommendations to address this disconnect, including consideration of climate change impacts to nuclear energy infrastructure in the US National Climate Assessment and the Intergovernmental Panel on Climate Change reports.

4.4 The generation of climate and risk information

4.4.1 Risk assessment and management strategies

The need for an improvement in the generation of climate and risk information for effective and timely responses has been identified as a key area for development. At the international level, Kohli et al. (2018), for the Swiss Agency for Development and Cooperation Climate and Environment Network, suggest that, although numerous international actors have recognised the nexus of environment, climate change, fragility and conflict,⁴ a dedicated international agenda is needed to improve the common understanding of the underlying dynamics.

4 The authors refer to NATO, the OSCE, the EU, the AU, the G7, the UN General Assembly and the UNSC.

Fetzek and van Schaik (2018) state that, to incorporate climate security risk management across EU foreign policy and security institutions, there is a need to develop and strengthen climate information, and the institutions that produce this data. In addition, the authors note that warning systems are only as effective at prevention as the responses they generate. Scaled climate security warning systems that identify long-, medium- and short-term risks and include clear ‘triggers’ for emergency action can help ensure foreseeable events are acted upon with appropriate levels of urgency.

Building on this point by providing examples of such systems in practice, Friends of Europe (2018) refers to the efforts of the International Federation of the Red Cross to utilise climate science forecasts to enable triggers to release funding so that food, water and hygiene kits can be distributed ahead of impact. In addition, climate and security information can be used to inform early warning systems to build resilience and reduce disaster losses and emergency response costs. For example, FAO (2018) highlighted new emergencies in food and agriculture between April and June in which significant deterioration was likely.

In Africa, the need for a clearer understanding of the relationship between climate change and conflict, leading to better climate risk assessment and management strategies, was raised at the AU Peace and Security Council session in May (Amani Africa, 2018). This was also a focus for the president of the UN Office for West Africa statement in June (Vivekananda and Born, 2018). Within UNSC Resolution 2423 on the situation in Mali, the Government of Mali and the UN were called upon to invest in adequate risk assessments and risk management strategies (UNSC, 2018). Within the African region, Nagarajan et al. (2018) provide an example of a risk assessment in practice. As part of a wider climate-fragile risk assessment, the authors highlight that the next step of the process is the collection of further primary data on the links between climate and fragility in Chad, Niger and Nigeria. Similarly, the UN Environment Programme’s (2018) outlook for South Sudan aims to gain a comprehensive understanding of the current state of environmental change, providing benchmarks for assessments, inventories, mapping and valuation of the country’s natural resources. UNEP indicates

Key points

- The need for enhanced climate risk information to inform effective and timely responses has been determined as a key area for development, with improvements to primary data collection identified as necessary to provide benchmarks for assessments, inventories, mapping and valuation of countries’ natural resources.
- Climate and security information can be used to inform early warning systems; reduce disaster losses; improve future planning and management of natural resources; build resilience; and identify areas at the highest risk of climate shocks that may threaten stability.
- The mapping of information remains a highly uneven process, with highly developed nations’ access to the infrastructure and funding necessary to maintain data collection and analysis far exceeding that of less resilient, developing countries.

that the information generated will be used for future planning and management of natural resources and environmental protection.

4.4.2 The role of mapping

Highlighting the importance of data collection in urban areas, Rademaker et al. (2018) argue that improved data collection and analysis can help estimate climate-related security risks and increase the ability of cities to cope with climate impacts that threaten stability. While highly developed nations tend to have the infrastructure and funding to maintain data collection and analysis, less resilient developing countries may not have access to these. In addition, the use of mapping may have a key role to play in generating climate and risk information. Rademaker et al. state that the use of such techniques is useful in helping identify which urban areas are at the highest risk of climate shocks.

On utilising mapping to protect critical infrastructure or facilities that house hazardous materials such as those related to the nuclear

energy sector, the Working Group on Climate, Nuclear and Security Affairs suggests combining climate change, nuclear and security data in a bid to ‘prioritise resources and drive early responses’ (Working Group on Climate, Nuclear and Security Affairs, 2018: 7). The authors note that current ‘interagency mechanisms’ can be called upon to support these measures.

On a much larger scale, the AU (2018) calls

for mapping to help identify vulnerable areas of the African continent. Relating to this, Cappelli et al. (2018), for the Basque Centre for Climate Change, present maps that represent the climate, conflict and socioeconomic characteristics across Africa. Although direct links to conflict appear weak, two maps do suggest correlation between changes in precipitation and climate and increases in conflict.

5 Review of climate change, conflict and security in the academic literature

This section examines the academic literature on climate change, conflict and security published between 1 April 2018 and 31 July 2018. It covers both qualitative and quantitative studies. Again, as this section is subdivided, the key points are included under each subsection, for clearer reading.

5.1 Methodology

The academic literature (predominately in English but including some articles written in Spanish) was sourced from Google Scholar and the International Bibliography of Social Sciences (IBSS). These databases were selected as they compile journals from a range of publishers and are considered more independent than those tied to individual publishers. We checked the databases to ensure they contained publication titles relevant to this topic – namely, those that have previously published special issues on this theme: Current Climate Change Reports, Climatic Change, Geopolitics, Disasters, Journal of Peace Research and Political Geography.

Each database was interrogated using a set of pre-selected keywords – climate change, climate change adaptation, climate change mitigation, natural hazards, climate extremes, climate

variability, disasters – in combination with each of the following secondary terms – conflict, violence, security,⁵ peace, fragility. In addition, the key phrase ‘climate security’ was searched for as a standalone term.

All literature sourced comes from the designated scan period, except journal articles that did not have a clear publication month but were published in 2018. These have been tracked to ensure they do not appear in future scans. In addition, some publications have an academic journal publication date and a separate date corresponding to when they first appeared online. Where this is the case, articles are included on the basis of the date of academic publication.

Journals were compiled and recorded and a shortlist was created on the basis of a ‘relevance’ criterion. The shortlisted articles were grouped into themes, which then became the organising structure for the summary below.

5.2 Climate security theoretical framings

5.2.1 Risk management

Climate change risk assessment presents a complex challenge. Traditional approaches have been based on historic data and events. Adger et

⁵ Using the search term security* within IBSS searches for the following terms: security, securitisation and securitization. Google Scholar does not support the * operator term, thus the search within Google Scholar used the following: security OR securitisation OR securitization.

Key points

- Traditional climate change risk assessments should be expanded to produce more complex assessments that consider the interactions between policies, actions and the ethical implications of interventions, to guide adaptation policies capable of addressing ‘real-world’ challenges.
- Geoengineering projects may have detrimental consequences for the environment and intra-state relations, as such technology may be utilised in aggression and self-defence. Stringent conditions should be placed on their use.
- New models and theoretical frameworks suggest alternative ways of assessing the drivers of environmental conflict by expanding on discussions to consider the theoretical and empirical complexities introduced by multidimensional historical, social, political and economic factors that may be exacerbated by climate change.
- There is a need to acknowledge different perspectives of climate change risks and understandings beyond the dominant approaches held within western modernity contexts, to begin a critical discussion that questions who uses these concepts and for what purpose.

al. (2018) argue that these assessments should expand to manage uncertainty and adapt to different contexts and actors. More complex assessment could consider interactions between policies and actions and address the ethical implications of risk interventions. Furthermore, since climate change risks interact with social, economic and political systems, risk assessments require more analytical approaches that can incorporate both complex and changing scenarios to guide adaptation policies.

Following a similar line of enquiry, Aven (2018) finds that risk analysis is increasingly important for addressing such ‘real-world’ challenges as climate change. ‘An emerging new risk analysis science: foundations and

implications’ highlights two types of knowledge useful for understanding, assessing and managing risks. The first is risk knowledge related to real-life events such as disasters. The second is knowledge on concepts, theories, frameworks and methods. Aven stresses the need for more development of this second type of knowledge around risk assessments in order to advance the field. For example, researchers could refine definitions related to disasters, and could conceptualise and characterise risk to improve understanding of what risk assessments can and cannot say.

Another potential new risk is that of geoengineering, or technologies that could counter climate change by removing carbon dioxide or reflecting sunlight. Chalecki and Ferrari (2018) suggest these technologies could have detrimental consequences not only for the environment but also for relations between states. The authors propose managing this through ‘Just Geoengineering’ theory, whereby states use such technology for self-defence only if they meet criteria on competent authority (states and intergovernmental organisations), proportionality (positive effects outweigh negative impacts) and discrimination (distinction between combatants and non-combatants) under preconditions for a crisis – such as a threshold in lives or financial costs. Chalecki and Ferrari further propose that this deployment require consensus that the security threat is publicly attributable to climate change, that mitigation and adaptation are infeasible and that any national decisions have international consent.

5.2.2 Measuring and assessing climate-related conflicts

Climate change may also influence state stability, and yet current fragility measurements – such as the Fragile States Index – fail to account for the impact of climate shocks. New models suggest ways to measure, assess and theorise this connection. Liu et al. (2018) construct a new measurement for state fragility – the Fragile States Metric System (FSMS) – which, in addition to traditional indexes used within the Fragile States Index – such as economic, political, social and cohesion – includes an adapted Climate Change Metric System, which

incorporates a Climate Change Performance Index. By including climate indexes, the authors argue the FSMS makes it possible to understand the bearing climatic factors have on those indexes traditionally associated with the Fragile States Index.

New theoretical frameworks may also help unpack complex drivers of conflict and interactions with human systems. Navas et al. (2018) examine the diverse drivers of environmental conflicts and consider how multidimensional types of environmental violence – direct, cultural, structural and ecological – overlap across historical, political and economic contexts. This approach allows us not only to see visible forms of violence but also to consider ‘slow’ violence, which may occur over a longer period of time before the effects are felt. The authors argue that, while slow violence may be less evident, it still poses a threat to both human and natural systems, and livelihoods.

Conflict has a negative impact on climate-dependent livelihoods. Arias et al. (2018) discuss more complex and multifaceted ways in which conflict affects household decision-making in agricultural communities. They separate conflict occurrences into violent shock occurrence and uncertainty of potential conflict that may persist with the presence of non-state armed actors in the area. Households may adapt to conflict and adjust agricultural decision-making differently depending on whether they expect or face conflict shocks or longer temporal uncertainties of the occurrence of conflicts or violence. Looking at conflicts in Colombia, Arias et al. argue that uncertainty of (future) risks can have a greater negative effect on agricultural incomes than conflict shocks. This highlights the importance of reducing uncertainty in post-conflict communities to help farmers boost productivity.

5.2.3 Society, ethics and justice in climate security

Climate change has been framed as a threat multiplier to human, national and international security. Viewing climate security research

using a human-centred lens or one focused on society–nature relations presents new theoretical frameworks and ways to approach these security challenges. Hoffmann (2018) presents a social energy approach, where energy is treated not only as biophysical matter but also as a historically and geographically specific set of social relations. Social energy relations could include elements of public life such as nutrition and healthcare provisions, which could move energy beyond the hydrocarbon link.

Oswald-Spring (2018)’s Human, Gender and Environmental (HUGE) security framework offers a deepened and widened understanding of security. The framework places people in vulnerable situations at the centre of science and policy agendas and emphasises the need for empowerment from below. Through this approach, climate mitigation, adaptation and disaster risk management become methods of tackling threats from patriarchal systems and of enabling resilience-building.

Further accounting for the experiences of vulnerable populations, Azpíroz Manero (2018) considers how climate change and security are perceived, interpreted and communicated by social actors, such as indigenous populations, religious organisations, women and youth. Such perspectives may deepen understanding on the risks, needs and expectations of different social actors.⁶

Marconetto and Bussi (2018) further acknowledge and theorise different perspectives of climate change risk. They highlight the need to question other perspectives and understandings of the world, opposing the western modernity, bringing in ethnographic and archaeological theories to do so.⁷

Redclift (2018) highlights the need for improved theoretical understanding of concepts such as sustainable development. He notes that sustainable development processes are contextual, based on political agendas and technological advancements, and finds that sustainable development related to climate change is used in three main ways: 1)

6 Article reviewed was written in Spanish

7 Article reviewed was written in Spanish

development of a bio- and eco-centric position of actors – moving beyond anthropocentric and individualistic positions and placing nature above human well-being; 2) economic growth as the main factor contributing to increased social inequalities – this prioritises human welfare and sustainability of ecological systems over short-run economic gains for privileged social groups; and 3) climate denials as a new wave of populism. Understanding these different usages may improve critical discussion on who uses these concepts and for what purpose.

5.2.4 Mechanisms of causation

Several articles explore the relationship between climate change and the onset of conflict. Ahmed et al. (2018) provide an overview of possible explanations for the link between climate change and increased risks to global peace and cooperation. Climate change is expected to increase intensity and frequency of disasters such as floods and droughts. This may lead to a number of destabilising factors for societies, such as increased water insecurity, reduction of agricultural production and a rise in food prices. In turn, these events could have a detrimental effect on livelihoods. Climate change may further increase mass migration and displacement. All these effects may increase the pressure on political and economic systems – nationally and globally – through increased poverty, illness, insecurities and violent conflicts.

Reviewing existing econometric research on climate variability and intra-state conflict – such as civil war, inter-communal violence and riots – Koubi (2018) finds scarce evidence for a strong direct link between climate change or climate variability and conflict. However, climate change can act as a ‘threat multiplier’ – potentially exacerbating existing (and interacting) conflict drivers such as high population growth, resource scarcity, poor governance, political exclusion and unmanaged migration. Koubi theorises that this may occur through three main causal pathways. First, climatic conditions can reduce economic and agricultural income, which can lead to conflict by decreasing the opportunity cost for

rebellion. Second, climate-driven economic downturns can also exacerbate actual or perceived economic and political inequalities in turn, increasing the likelihood of conflict. Finally, climate-induced migration may lead to conflict in the receiving areas via increased competition over resources, ethnic tensions, distrust or fault lines. Nevertheless, there is little or ambiguous evidence that climate migration causes conflict; the article points to concerning assumptions that have not been contested. Finally, Koubi highlights the need to further contextualise results. She finds it more likely that climatic conditions will increase the risk of violent conflict in agriculture-dependent regions, in combination with other socioeconomic and political factors.

Van Lange et al. (2018) look at why societies exposed to a warmer climate experience more aggression and violence than societies with colder climates. They apply the Climate Aggression and Self Control on Humans (CLASH) model, which is built on the theory that, in harsh and unpredictable conditions, humans adopt a ‘fast life strategy’, whereby they are more likely to adopt survival strategies based on immediate gains. In contrast, cooler conditions facilitate a certain level of predictability, allowing for future planning and self-control, both factors the authors identify as acting as ‘inhibitors of aggression and violence’ (ibid: 459). The model aims to understand differences in aggression and violence within and between countries in relation to climate. The authors consider an association between climate and culture, and focus on time orientation and self-control as two important factors in understanding the relationship between temperature and violence.

5.3 Politics, governance and securitisation debates

5.3.1 The securitisation of climate change

We are increasingly seeing the inclusion of climate change within national security agendas. In May 2018, the Australian Foreign Affairs, Defence and Trade Committee published ‘The implications of climate change for Australia’s national security’.⁸

8 See Grey Literature review.

Key points

- The securitisation of climate change is potentially problematic owing to its narrow focus on traditional conceptions of security. In addition, the presence of more immediate security concerns, lack of political advocacy and the dominance of pre-existing narratives have all contributed to the limited success of the securitisation of climate change in the global south.
- The empowerment of emerging powers and horizontal political movements in the form of transnational collaborative operations at the subnational level could help overcome competing interests and vertical hierarchies in the global system to enhance climate change and resilience.
- Uncomfortable discussions of historical responsibility and climate justice may be essential to the long-term legitimacy of climate change agreements, given the trans-boundary nature of the associated risks and the interconnected issues of security and globalisation.
- There is a need to diversify the means of disseminating scientific findings to the public and to include new actors in political debates of climate change within the USA core electorate, who, although they recognise the potential impacts in terms of economic disruption, feel distrustful of mitigation efforts and alienated by the sustainability discourse.
- In order to overcome issues of social justice introduced by processes of socio-technical change, we should promote the liberation and democratisation of technology, in addition to polycentric social movements capable of lobbying multiple targets simultaneously and empowering marginalised groups.

In the debate that is likely to follow, Farbotko (2018) argues that the input of geographers – not just those traditionally associated with climate risk – will be critical to provide ‘evidence to

support, or critique, emerging policy’ (ibid: 249). For example, understanding potential security risks will require policy-makers to acquire knowledge in areas that fall under the expertise of geographers – such as vulnerability and resilience. Farbotko uses the example of migration, which is often referred to as a climate-related security risk. Evidence suggests that human security, rather than national security, is at greater risk, thus promoting national security may be best served by solutions that traditionally fall outside of its domain.

Whether and how climate change is securitised has implications beyond academic debate: it can legitimise certain actions. Exploring this argument, McDonald (2018) – ‘Climate change and security: towards ecological security?’ – questions the framing of climate change as a national security concern but argues that the conceptualisation of human security also falls short. While acknowledging that each may differ in terms of its ‘ethical assumptions and implications’ – both focus on ‘human communities’ (ibid: 187) – McDonald advocates for ecological security, which considers ecosystems as a whole and the rights of future generations. There are, however, obstacles to such a move, as few currently advocate the stance of ecological security. While political actors may be more familiar with narratives of national security, the concept of ecological security challenges traditional practice – meaning that currently there is little understanding in terms of how to approach it. However, McDonald argues that, while the securitising of climate change continues, ecological security offers opportunities to think beyond traditional security concerns.

In an article that advocates new modes of military thinking, Hayden (2018) assesses the ability of institutions responsible for national security – in this case the US military – to meet the future challenges presented by climate change. In examining this challenge, Hayden calls on the US military to apply ‘complex systems modelling’ within its planning. Hayden argues that the need to respond may outweigh its capacity – not only because of the loss of military bases –but also owing to increased instability in different regions of the world. In a bid to prepare, a major role of the military would be to ‘monitor’ regions most affected by climate

change, before potential crisis erupts. This in practice would mean identifying certain ‘social indicators’ (ibid: 349–350). Hayden refers to the example of the Centers for Disease Control as an operating comparison.

While case studies exploring the security risks associated with climate change often come from countries in the global south, the securitisation of climate change within these contexts remains under-researched. Von Lucke (2018) explores this issue in relation to Mexico, arguing that attempts to securitise climate change there have been largely unsuccessful, and that this experience offers broader lessons for the framing of climate change in the wider global south. First, immediate security concerns often overshadow ‘soft’ security concerns such as climate change. Second, advocates of climate security are often absent from the political space in developing countries. External parties then often become the primary actors, which can be perceived as ‘securitisation from the outside’ (ibid: 342). Finally, where there has already been successful ‘politicisation’ of climate change under another dominant framing – such as human security – other narratives may struggle to take hold.

In the case of China, Trombetta (2018) highlights that the increasing presence of securitising narratives on non-traditional threats – such as environmental concerns – does not necessarily mean they will become a concern of national security. Trombetta finds a coexistence of non-traditional and traditional security threats without the ‘transformation of security logics’ (ibid: 198). Such an occurrence, Trombetta argues, only serves to highlight the distinction between the two. In line with traditional securitisation theory, in China concerns of national security are associated with ‘exceptional security measures’ (ibid: 196). Non-traditional security threats are dealt with by ‘normal politics’. Using the example of China’s energy policy, Trombetta describes how its dependency on foreign oil supplies means access to foreign oil is considered part of national security, at the expense of environmental considerations.

5.3.2 The national vs. the global common interest

Nyberg et al. (2018) explore how to understand the dynamics of competing interests and hierarchies that define politics of climate change. The authors identify obstacles to collective solutions to climate change, which are often the result of a global vs. local dynamic. Though the impact of climate change is felt at the global level, solutions may lie in the actions of individual states. These responses are often constrained by self-interest, however, which is often the result of short-term economic interests. One solution may lie within ‘horizontal’ political movements, which Nyberg et al. argue can provide a means to bypass ‘vertical’ political structures. These forms of movements – such as those associated with de-investment in fossil fuels – have had some success in connecting local and global causes. Nevertheless, such movements are often denied access to international decision-making processes.

Applying International Relations theory, Symons (2018) examines potential Classical Realist ethical responses to climate change and implications for policy. He argues that Classical Realist analysis of climate change helps raise questions around the ability to achieve more ambitious mitigation targets, in the face of national self-interest. States retain a large degree of influence over climate governance, and many foreign policy-makers identify Realism as the main theoretical framework. Therefore, there is value in addressing some audiences using a Realist lens. By outlining the evolution of Classical Realist engagement with climate policy and providing a Classical Realist analysis of the Paris Climate Agreement, Symons demonstrates that the approach can expand state definition of national interest to integrate ‘cooperative system-preservation alongside traditional security concerns’ (ibid: 1). In doing so, he argues that the individual needs of the state are met through pursuing policies – such as low carbon innovation, adaptation and mitigation agreements – that also achieve a common good.

Staying with Realist thinking, Albuquerque (2018) explores the relationship between

emerging powers and the current global order, arguing that the expectation is for emerging powers to present a challenge to the current workings of the international system. However, in referring to Brazil's foreign policy on climate change and international peace and security frameworks – treated as separate areas of concern – Albuquerque suggests the opposite is true. Instead, we see Brazil adopting a 'legalistic position' (ibid: 425), whereby it is said to adhere to – or reinterpret – current conventions and treaties. Using the example of Brazil's 'concentric circles' proposal in 2014 – which was later adopted as part of the Paris Agreement – Albuquerque illustrates that it was in line with mitigation efforts laid out in the UN Framework Convention on Climate Change (UNFCCC), of the 'principle of common but differentiated responsibilities' (ibid: 432). In practice, Albuquerque argues, it is often existing powers that challenge the current operating frameworks that govern the international system.

In an article that reviews the impact of non-traditional security threats, including climate change, on the global international society – particularly relations between major states – Cui (2018) argues that China's New Model of Major Country Relations (NMMCR) reflects the changing nature of global international relations. Cui examines NMMCR's capacity to contribute to global initiatives to combat climate change and states that, far from being an empty 'slogan', it can instead be viewed 'as a creative initiative that attempts to reflect the changing environment of GIS [Global International Society] as it faces ever expanding and complex global governance challenges' (ibid: 256). Cui also notes that, despite recent state-level tensions between China and the USA, the two countries nevertheless continue to cooperate on climate change initiatives at subnational level, and concludes that 'bottom-up leadership' (ibid: 253) enhances the resilience of climate change cooperation.

5.3.3 Developing countries, and global cooperation

As developing countries face pressure to contribute to global mitigation action, debates about historical responsibility and climate justice intensify. Klinsky (2018) addresses a gap in the

existing literature to examine opportunities to address issues of historical responsibility in debates on climate change by 'looking at the structural similarities and differences between the global climate regime and traditional transitional justice contexts' (ibid: 752). Klinsky identifies several transitional justice practices – including a combination of amnesties and litigations, truth commissions and reparations and institutional change – as areas where transitional justice may provide relevant insight for the climate context. She concludes that 'insight at the heart of a transitional justice approach is that including uncomfortable reckonings with the past may be essential for the long-term legitimacy of forward-oriented agreements' (ibid: 762).

Chopan and Lone (2018) also raise the concerns of developing countries, arguing that policy-makers often face difficult trade-offs as they pursue policies that target economic growth while trying to be mindful of long-term environmental impacts. Since the decline of Cold War politics, environmental factors have been pushed to the forefront of international politics, with varying degrees of success. Chopan and Lone argue that the trans-boundary nature of the risks climate change presents will require the involvement of 'sovereign states, international law and organisations' (ibid: 727), thinking across issues of security, climate change and globalisation.

5.3.4 Climate change and the USA

The current political climate in the USA is leading to deep divisions with regard to scientific research, in particular on climate change. Kaufman et al. (2018) explore what they describe as an 'openly hostile' (ibid: 6) relationship emerging between the scientific community and the public. One of the defining problems is that scientific research findings are often communicated to a wider audience through what the authors refer to as the 'biasing filters of political, cultural, economic and religious ideologies' (ibid.). Kaufman et al. believe part of the solution may require scientists to communicate their research through direct engagement. This dialogue should include the dissemination of lessons from history to instruct the present. The authors highlight

several historical examples of social and political upheaval as a result of societal failure to adapt to environmental change: '[P]olicymakers may see value... in understating the policies past leaderships have implemented that either succeeded or failed in preventing radical shifts in socio-political organization' (ibid: 9).

Part of the solution may also lie in new actors entering politics. Jaffe (2018) explores the current US government's 'so called war on science' (ibid: 1655). The article highlights that we are seeing an increasing number from field of Science Technology Engineering and Mathematics (STEM) involved in politics. Jaffe explains that these campaigns have been assisted by the grassroots organisation 314 Action, which has provided both funding and training. The organisation helps identify those in office considered to have a poor record on scientific issues.

Addressing the USA's decision to withdraw from the Paris Agreement, Goldstein and Greenberg (2018) call for acknowledgement that the complexity of sustainability issues – including global climate change and challenges associated with mitigation efforts – requires greater engagement with the public's 'so what?' questions, rather than traditional pollution issues. The authors propose that 'an effective way to discuss the "so what?" of GCC [global climate change] is to describe its many impacts on standard environmental concerns such as air and water pollution and food safety' (ibid: S78). Goldstein and Greenburg posit that confronting the decision to withdraw the USA from the Paris Agreement requires greater positive engagement with the president's core electorate, many of whom are often distrustful of mitigation efforts and alienated by sustainability discourse.

Feldman and Hart (2018) also explore how to engage with the US electorate, looking at the impact of how topics are framed on support for low-carbon energy policies among Democrat and Republican voters in the USA. The authors used a stratified sample of 1,000 respondents and selected policies with variable degrees of public support and division along bipartisan lines, such as revenue-neutral carbon tax and tougher fuel. They find that framing messages around reducing air pollution and increasing energy dependency – while avoiding overtly

mentioning climate change – results in greater support for the policies among Republican voters. The impact on Democrat support is limited. While avoiding discussions on climate change may increase support for these policies among Republican voters, such messages may inadvertently reduce public awareness of climate change and sow doubt in climate change science. The authors therefore propose to design messages that promote alternative benefits of clean energy without explicitly avoiding discussion of climate change.

Switching focus outwards towards US foreign policy, analysing security through changing state interests, Hudson (2018) observes the increased US focus on major power politics and the rampage on securitising current global threats such as climate change.

Concerns related to the impact of climate change and natural hazards on critical infrastructure within the USA are also a theme under consideration. Jaffe (2018) refers to the campaign run by Elaine Luria, who was seeking election in southern Virginia, which is home to the Norfolk naval base. During the campaign, Luria had highlighted that 'engineering solutions and resources' (ibid: 1655) were needed to address the vulnerability of the Virginia coastline to sea level rises. The impact of such rises, Luria had warned, threatened not only the US militaries 'readiness' (ibid.) but also the local economy in Norfolk, which is heavily dependent on the naval base.

Rose et al. (2018) focus on the potential impact on US seaports, which play a critical role in managing crude oil imports. The authors note that, while previous studies have considered the impact on supply to the USA, their study was concerned with the economic ripple effects to regional economies reliant on seaport activity, oil refinery operations and associated goods and services. Moreover, Rose et al. consider the resilience tactics in such disruptions, including the ability to redirect ships to other ports or moving refining operations elsewhere. The study found minimal impact in the areas under consideration. These areas – and the strength of national resilience to disruptions – had been boosted by a resurgence in domestic crude oil supply. However, the authors warn that

disruption to larger facilities could have more significant effects. Rose et al. also highlight that there were certain limitations to their study, noting that future studies would need to consider elements of ‘uncertainty both about the disruption and response’ (ibid: 596).

5.3.5 Social justice and civil society activism

In reviewing cases of climate change litigation globally, Klautt (2018) identifies opportunities for integrating climate change accountability into existing national legislative framework in Canada. He reviews unsuccessful climate litigation in Canada, contrasting it with successful efforts in other countries, including the USA and Pakistan. A framework for integrating climate change into Canada’s domestic legislative framework is outlined through the Charter of Rights and Freedoms, guided by the ‘living tree’ growth doctrine. Klautt contends that a ‘strong living tree Charter has a further role to play in providing cover to protect climate progress and promote future successes’ (ibid: 243).

Along a similar line of inquiry, Jenkins et al. (2018) consider how ‘energy justice frameworks’ may support energy transitions that are ‘socially just’ – in that they deliver energy access that is ‘safe, affordable and sustainable’ (ibid: 66). While interest grows in new social and technical solutions within transition frameworks – including at government level in Denmark, Switzerland and the UK – there is often a failure to consider the integration of energy justice and transition frameworks. Jenkins et al. thereby adopt a multi-perspective lens to consider opportunities for combining an energy justice framework with a sociotechnical framework. They find that social justice issues arise within the process of sociotechnical change and that ‘inattention to social justice issues can cause injustices, whereas attention to them can provide a means to examine and potentially resolve them’ (ibid.).

The liberalisation of access to the new technologies has led to the rise of satellite-based activism. Rothe and Shin (2018) consider how non-governmental organisations (NGOs) concerned with monitoring political causes such human rights abuses and war crimes are

now adopting this satellite-based imagery. It is also being used in issues of environmental governance, through the ‘detection and monitoring of large scale environmental changes that would otherwise remain hidden’ (ibid: 417). Through the Global Forest Watch project, the World Resources Institute has utilised satellite imagery to shed light on illegal deforestation. While Rothe and Shin note that much has been made of the power this hands NGOs in terms of challenging state power, they highlight that certain restrictions – security access, high costs, expertise – mean the power of such tools is concentrated. In particular, non-state actors can fall victim to ‘reproduc[ing] a dominant, state driven satellite gaze’ (ibid: 436). However, the authors argue that further ‘democratisation of satellite technology’ – such as ‘commercial micro satellites’ (ibid.) may provide more radical NGOs with the means to challenge this position.

Staying with the theme of social activism, Tormos-Aponte and García-López (2018) build on earlier work that explores how political conflicts shape collaborative and adaptive governance and polycentric social movements – defined as ‘many centres of decision making that are formally independent of each other’ (Ostrom, cited in Tormos-Aponte and Garcia-Lopez, 2018: 284). Using the example of the climate justice movement, the authors analyse to what extent, if any, it has been able to integrate polycentric arrangements and discuss the impact on the movement. They find that associated groups have been successful in integrating various movements, from both the developed and the developing world, into a set of ‘decentralised, semiautonomous coordinated units’ (ibid: 284) – a move that presents both opportunities and challenges for the success of the movements’ outcomes. In terms of the benefits, Tormos-Aponte and Garcia-Lopez argue that this provides movements with the means to lobby multiple targets while at the same time empowering previously marginalised groups. However, this presents challenges in terms of coordinating multiple causes, strategies and geographically dispersed groups, in a ‘sustainable’ (ibid: 291) manner.

5.4 The intersection of disasters, climate, conflict and security

5.4.1 Disaster recovery, displacement and resettlement

Original research by Akbar and Aldrich (2018) finds that social capital plays an important role in post-disaster recovery, with the implication that disaster management should seek to support social networks of victims, as integration benefits disaster recovery. In the context of the 2010 Pakistan floods, ‘life recovery’ was correlated with the social capital of victims in the Punjab Province. The authors’ findings also point to something else – that disaster-affected communities reported ‘local government agencies were neither willing nor able to challenge feudal landlords and political parties that used aid distribution to exercise influence over their constituents’ (ibid: 476).

The evidence reinforces other research that illustrates how social capital is an important component of resilience and recovery, and in doing so challenges the notion that recovery is related solely to the quantification of material disaster damage. Akbar and Aldrich (2018) find that social capital can aid recovery, in spite of the extent of material damage. Their findings indicate that the flood ‘disaster exposed or perpetuated the vulnerabilities inherent in Pakistani society’ (ibid: 489), which they articulate as being related to mistrust of government, systemic inequalities and political isolation.

In another expression of societal breakdown, Tanyag (2018) explores the gendered impacts of disaster displacement, specifically gendered security threats, in the context of 2013’s Typhoon Haiyan in the Philippines. Building on literature documenting increased sexual and gender-based violence in post-disaster contexts, Tanyag finds relief and reconstruction processes are gendered processes that problematically rely on and reinforce constructions of women as primary care-givers and social reproductive labour. Using a critical feminist political economy analysis, the research reveals how discourses of resilience may strengthen certain political, economic and cultural conditions, which lead to increased vulnerability among women. The findings have implications for the design and

Key points

- The importance of social capital in post-disaster resilience and recovery is recognised regardless of the extent of material damage; however, disasters are also recognised as perpetuating inherent vulnerabilities, including systematic inequality and political isolation.
- In the recovery and resettlement period, planners should consider the importance of livelihood viability in addition to radical resilience, recognising an individual’s ability for autonomous self-management.
- Tailored approaches are necessary to overcome interpersonal, sexual and gender-based violence, maltreatment and victimisation in the post-disaster space, with a particular focus on the disproportionate impacts and social stratification facing women, ethnic and racial minorities, and the elderly.
- The popular view of the post-disaster space providing opportunities for terrorist groups is challenged by findings that rebel groups may be forced to focus on recovery and reorganisation rather than recruitment.
- Despite the continuing securitisation of migration, evidence to support narratives of ‘climate refugees’ remains inconclusive, with economic performance, population growth and political stability above climate change often identified as primary drivers for relocation.

delivery of post-disaster interventions, especially where female altruism is employed to divert responsibility for response away from the state.

The state often takes an active role in disaster resettlement programmes. While the intention is to help reduce disaster risk, there have been varying levels of success and of social, economic and political impact. Oft neglected, livelihoods are an important consideration in such programmes, as Guo and Kapucu (2018) explore in the case of the Qinling Mountains in China. Taking a livelihoods perspective, Guo and Kapucu reveal how institutions focusing

on resettlement in reaction to severe risks may be at odds with those relocated, whose more immediate priorities include viability of livelihoods. This disjuncture reveals differences in perceptions of risk and risk tolerance. And, if these are not taken seriously, conflicts may result during and after the resettlement programme – especially between government institutions and resettled communities. To prevent conflict manifesting or escalating, Guo and Kapucu suggest resettlement programmes need to take livelihoods seriously, as well as the importance of effective risk communication.

In a similar vein, situated in the context of post-disaster recovery, Jon and Purcell (2018) argue that planners would benefit from deeper understanding of the concept of ‘radical resilience’ – because it reveals insights into individuals’ autonomous self-management. Building on critiques of technocratic approaches to disaster risk management, and technocratic criticisms of the resilience agenda, Jon and Purcell utilise radical planning theories to explore how conflicts between ‘the governed’ and ‘the governors’ can lead to autonomous self-management, especially in post-disaster situations. They suggest planning practices could benefit from deeper engagement with the concept of radical resilience, which seeks to support individuals’ capacities to ‘manage their affairs for themselves’ (ibid: 236). Empirical cases of the 2004 Indonesian tsunami, 2005’s Hurricane Katrina in New Orleans and the 2010 earthquakes in Haiti are used to explore the idea that more effective disaster recovery plans could be achieved through timely support to autonomous self-management. This leads to a critical questioning of what constitutes an ‘effective’ disaster recovery plan.

Finally, rather than conflict as an outcome or a context in which disaster impacts play out, Harrowell and Özerdem (2018) explicitly investigate parallel post-disaster conflict processes. Using post-conflict and post-disaster reconstruction processes in Nepal – following the Comprehensive Peace Agreement in 2006 and the earthquake in 2015, respectively – they reveal how two entirely parallel processes missed opportunities to share lessons. The authors highlight how post-disaster reconstruction is

framed and delivered in a more technocratic manner relative to post-conflict reconstruction, as a response to ‘acts of god’ rather than ‘acts by man’ (ibid: 188). Their analysis of the post-disaster reconstruction process reveals how even attempts to adopt conflict-sensitive approaches failed to make the necessary connections to the lessons learnt from post-conflict reconstruction processes almost a decade prior.

5.4.2 Psychosocial resilience

Psychosocial resilience and recovery in post-disaster settings represent another theme under consideration. Two articles explore the long-term impacts of ‘natural disasters’, human conflict and related geographical displacement on psychological health. Working with children and young adults (CYAs), Myles et al. (2018) provide a comparable analysis of the experience of trauma and self-reported psychological health in two contrasting circumstances: the aftermath of Hurricane Katrina in New Orleans (2005/06) and the mass arrival of refugees into Berlin (2015/16). In both cases, a standardised tool from the National Child Traumatic Stress Network was used on a convenience sample of CYAs presenting at health/support facilities. Refugee CYAs were much more likely to have been separated from their family members and/or to have witnessed family members being injured or killed. Moreover, Myles et al. found that refugee children were also more likely to have experienced greater trauma the older they were, whereas no association was found between trauma and age in the Hurricane Katrina group. CYAs in the refugee group also reported significantly more psychological symptoms following their traumatic exposure. Myles et al. note that the additional stressors of language acquisition, being in a new country and fear of deportation may have increased the psychological stressors. The findings from the study reinforce the growing evidence that ‘man-made disasters’ – those causing displacement by conflict – often carry greater trauma and psychological impacts than ‘natural disasters’, and that the intensity and types of trauma experienced may be proportionate to the intensity and types of subsequent psychological impacts.

Using cross-sectional data from the US National Survey of Children’s Exposure

to Violence, Merrick et al. (2018) explore different measures of instability in a child's home environment and how these can predict maltreatment and victimisation. The standard measure of early instability is 'residential mobility' – which is often defined as an excessive number of moves since birth and can act as a catalyst for, or indicator of, other forms of instability within families. However, Merrick et al. note that there are many other potential indicators for future victimisation that do not involve moving – for example parental incarceration, military deployment or remarriage. The authors therefore expand the standard measure of residential mobility to include incarceration, deployment and homelessness, among other factors, including 'natural disasters', and explore the relationship of these indicators, defined as 'lifetime destabilisation factors' (ibid: 485), to a wide range of victimisation outcomes. These include experiencing property crime, physical assault and child maltreatment – as well as sexual victimisation – and witnessing family or community violence. The results highlight that, the more forms of instability a child experiences, the greater their likelihood of being victimised in the past year. Moreover, residential mobility became insignificant when other forms of non-mobile instability were accounted for. This suggests residential mobility is just one of a wide range of instability types and support services should take non-mobile forms of instability into account.

Different vulnerable sections of society have their own specific recovery needs. Cohen and Gadassi (2018) review the characteristics and patterns of children's play following political violence or 'natural disasters' and examine the association with later risk of and resilience to negative psychological consequences. They find that play observation is a good way to diagnose blockages in trauma processing with young children. They also note that enabling play in the immediate aftermath of and ongoing reconstruction from disasters is a critical part of children coming to terms with their experiences. However, practitioners in disaster contexts have found that encouraging play in an environment of recent tragedy and/or resource scarcity can be

challenging or even unwelcome. Therefore, the study warns that deep cultural sensitivity will be required in order to meet the needs of younger children to express their anxieties and work through their trauma experiences with play.

Ellor and Mayo (2018) review the vulnerabilities of older people in relation to 'natural' and manmade disasters in the USA. The article notes the greater physical, cognitive and emotional challenges this societal group faces and how this affects their needs. For example, Ellor and Mayo highlight that older adults tend to have multiple co-occurring physical and cognitive impairments that can be quickly exacerbated by sudden disruptions to their environment. In addition, they may find emotional adjustment to change much more difficult – such as the loss of a family home in the case of dementia sufferers. In these cases, social support from recognised family and friends is critical for older adults to readjust and rebuild some quality of life. Referring to other studies, Ellor and Mayo highlight evidence that suggests older adults – particularly those who have successfully navigated prior traumas in their lifetime – are more resilient than younger ones. However, the authors note that it is inevitable that older adults will typically have more complex needs – relating to health, interruptions in physical location, consistency of medication supplies and emotional support – in times of crises. Therefore, it is important to develop age-appropriate coping mechanisms to meet these needs.

In analysing the factors that can mitigate the impact of trauma and instability on the later development of negative psychological conditions and post-traumatic stress disorder (PTSD), with respect to formalised interventions Cohen and Gadassi (2018) summarise the latest results from child play therapy models, which aim to encourage a healthy revisiting of traumatic experiences. For example, the authors highlight recent studies that have combined art and expressive play – along with techniques from Cognitive Behavioural Therapy – to encourage the development of coping strategies. These sessions may also gently reintroduce potentially triggering stimuli, such as boats or sea animals for tsunami survivors. Importantly, any session involving a re-visitation of the

traumatic experience should end with some form of soothing activity. Cohen et al. also reveal that the involvement of significant care-givers in these play sessions is linked to therapeutic success – particularly where the care-giver and the child are able to co-create a shared narrative of their experiences.

Conducting a literature review and meta-analysis of published and unpublished randomised controlled trials, Purgato et al. (2018) explore the impacts of psychosocial interventions on stress, depression and anxiety in people exposed to traumatic experiences in humanitarian settings. They find that individuals undergoing psychosocial interventions report significantly fewer PTSD symptoms and less anxiety than controls who are on waiting lists, being given treatment as usual, attention placebo or no treatment. However, Purgato et al. (2018) also stress the need for higher-quality trials that study the effects of interventions over longer time periods.

5.4.3 Post-disaster settings and gender-based violence

Lee (2018) carries out a secondary literature review of gender-based violence and ‘natural disasters’ to reveal significant gaps in current disaster research. Few global sources provide statistics on the topic in either pre- or post-disaster situations, suggesting a likely corresponding neglect of gender-based violence in disaster management considerations. Lee argues that addressing this data gap would be a necessary and useful starting point, through which formal actors responsible for disaster management as well as affected populations could become better equipped to address this challenge.

Gearhart et al. (2018) explore the relationship between post-disaster interpersonal violence and the specific difficulties victims face as a result. Using data from reported assaults in Florida, they find longer exposure to disasters is associated with an increase in the number of assaults and expected assaults. The findings point towards the need for greater consideration of domestic violence in disaster recovery. These findings build on the existing literature, which points to disproportionate disaster impacts and social stratification especially for women, ethnic and racial minorities and the elderly.

Moving from actual experience to perceptions in a contrasting exploration of gendered dimensions of post-disaster situations, Farmer et al. (2018) take the alleged exaggerated reports of crime and violence in post-Hurricane Katrina as a starting point to investigate perceptions of fear of victimisation and fear of crime among North Carolina residents. In the context of public shelter and safety, they uniquely bring together disaster studies with criminology to offer insights on residents’ views of safety and crime – which may in turn affect individuals’ evacuation decisions. The findings point to strong gendered dimensions, with female respondents expressing concerns over the potential for sexual crimes in public shelters. Disaster management specialises should consider the fear of criminal victimisation alongside technical aspects of shelter (such as the structural integrity of the shelter or sanitation provision). Farmer et al. also reveal how exaggerated media portrayals should be tackled, as this will likely affect the effectiveness of public shelters in future disaster situations.

Staying with the USA, Zuromski et al. (2018) find that individuals who have previously experienced interpersonal violence may be particularly vulnerable following further traumatic events – such as disasters. As such, suicidal risk should be considered further in post-disaster situations for those who have suffered interpersonal violence. Tailored approaches are required.

Other literature that is relevant but not covered in detail includes articles that seek to deepen our conceptual understanding of risk, vulnerability and power. For example, Laguarda Ramírez (2018) studies the 2017 Hurricane Maria in Puerto Rico using the lens of power, privilege and unequal relationships through which to understand contemporary working-class Puerto Ricans’ responses to colonial capitalism and forms of structural violence. Oswald Spring (2018) on the other hand proposes a human, gender and environmental security approach, which requires participatory governance, in order to pursue disaster management, adaptation and resilience. She explores this, among other issues, through the relationship between safety, social violence and criminality, and gender violence, in the context of hydro-meteorological events.

5.4.4 Contested disaster risk governance and socio-political conflict

Nightingale (2018) explores questions of state formation and public authority. The article uses Nepal's forestry sector to explore how governance is claimed and contested, and how in some contexts the state is unable to provide stable governance or function effectively – yet, concurrently, conceptions of instability help facilitate the Nepali state as a governing body. Nightingale explores how, historically, the Nepali state has managed to exist in spite of major political change, and how legitimacy to govern is constantly being reshaped by a myriad of institutions and actors. Set in the post-2015 earthquake context, disaster risk management, climate change adaptation and mitigation – state and NGO-led interventions – form part of the backdrop against which public authority and the state itself manifest.

Scepticism over the effectiveness of formal governance structures – namely, Village Development Committees – has prompted donor-funded implementation directly through community forestry user groups. Nightingale (2018) highlights that this presents a dynamic, complex and sometimes contested set of governance arrangements, wherein NGOs are authorised in the governance of forest resources. Adding to this complexity, Nightingale found that donor funds were supporting new forestry institutions to implement climate change programmes.

Delina and Cagoco-Guiam (2018) use two disaster events in the Philippines to explore the relationship between climate change, disasters and social conflict. They cite well-documented impacts of extreme weather events – such as the failure of basic service delivery and the breakdown of social ecosystems – as well as forms of conflict resulting from the collapse of social and physical infrastructure. In contexts of weak governance, this can lead to social conflict. Delina and Cagoco-Guiam thus attribute climate change to creating conditions that undermine social harmony, cause social and resource stress and can lead to forms of social conflict. Situating this within the climate change discourse, Delina and Cagoco-Guiam frame the 2013 Typhoon Haiyan affecting Tacloban

and the 2016 El Niño drought in Mindanão as extreme weather event-induced conflicts, with future preventative actions requiring a focus on climate-vulnerable communities.

5.4.5 Armed group recruitment

The links between rebel group recruitment and natural hazard-related disasters have also been explored. Paul and Bagchi (2018) take as their starting point the idea that post-disaster situations present opportunities for terrorist groups – particularly in contexts where pre-existing socio-political weaknesses exist. Addressing a gap in the literature, they provide ideas for better understanding whether terrorist attacks increase following a disaster – the magnitude of which they measure through the extent of property damage, for domestic terrorism and transnational terrorist attacks. They find that transnational terrorism increases with a lag, but domestic terrorism does not increase.

Walch (2018) uses the case of the Philippines to explore an alternative hypothesis to those normally presented. Research to date posits that disasters lead to increased rebel group recruitment and in turn increased incidents of conflict. In contrast, Walch finds that Typhoon Bopha in 2012 and Typhoon Haiyan in 2013 weakened the New People's Army. Two interrelated reasons are presented: that increased government and international presence limits rebel recruitment opportunities, in part because of loss of territorial control; and that disaster negatively affects rebel groups' supply lines and organisation structure. In the post-disaster space, the New People's Army focused on recovery and reorganisation rather than recruitment. Walch also warns that an inadequate response from the state provides an opportunity for rebel groups to not only respond to victims but also recruit.

5.4.6 Migration, security and conflict

Concerns relating to large population movements have long been at the heart of debates on security relating to climate change. At the theoretical level, reviewing current research, Pigué et al. (2018) find certain biases in the geographical focus of research on environmental migration, towards researchers and funding from the global north, focusing on countries in the global south.

One explanation may lie in the higher degree of vulnerability of populations, but Piguet et al. argue the geographical imbalance must – in part – also be viewed in relation to the increasing securitising of migration. They claim that population movements are seen intrinsically as a problem emanating from the south, presenting a security threat to those in the north. They illustrate this point with the spike in interest in the topic in the early 2000s, correlating with a number of reports from military circles.

Following a similar line of argument, Cons (2018) finds that the securitisation of migration is also influencing policy responses to climate change. He interrogates an emergent genre of development projects that seek to instil resilience in populations likely to experience severe impacts of climate change. Cons theorises ‘heterodystopias’, defined as spaces managed in anticipation of a world of dystopian climate crises that are stages for future interventions and present-day spectacles of climate security. Looking at the Bangladesh delta, he argues that international NGO and donor responses focus on ‘emplacement’ (ibid: 271). This contrasts with the concerns of local populations, which focus on livelihood security. This offers conflicting views – between the needs of those directly dealing with the impact of climate change and outside concerns for security. This juxtaposition requires us to ‘think resilience beyond narrowly securitised visions of emplacement’ (ibid: 287).

Exploring what is referred to as the ‘climate–conflict–refugee nexus’, Owain and Maslin (2018) argue that current narratives of ‘climate refugees’ appear in relation to climate change and conflict – despite inconclusive evidence. They compare social, economic and climate data and violence in East Africa over several decades and find that, in terms of ‘total numbers of displaced people’ (ibid: 1), contextual factors – economic performance, population growth and political stability – play a far more important role than climatic factors. A correlation is found between increased population movement and periods of drought. While Owain and Maslin find it difficult to discern whether population movements will occur in the absence of the three contextual factors listed, they conclude

that in fragile contexts the role of climate change should be considered in relation to ‘enforced migration’ (ibid: 8).

Continuing with the theme of migration and conflict, Mbih et al. (2018) focus on farmer–pastoralist conflicts in the Western Highlands of Cameroon. They reveal that, over the past three decades pastoralists have witnessed a transformation in their livelihood strategy, from a nomadic to a primarily sedentary lifestyle. Mbih et al. state that, while this is seen as an adaptive strategy to decreasing pasture in the face of external pressures – including climate change – there have been positive outcomes. It has facilitated improved agro-pastoral production and development at community level, which has encouraged positive interaction with farming communities. However, Mbih et al. warn that such positive developments have been hampered by increased competition over land. An increase in climate variability is resulting in ‘confusion’ (ibid: 791) between farming periods and use of land by pastoralists for their livestock. In practice, this has meant pastoralists using transhumance zones during extended periods of drought. Solutions are said to lie not only in addressing the land tenure system but also in improved weather monitoring and forecasting systems.

5.5 Energy, food and water security and natural resource management

5.5.1 Energy transitions, sustainability and conflict

The overlapping dynamics of the development needs of vulnerable communities and the transition to renewable energy sources (RES) are explored by Hills et al. (2018). Based on a case study conducted in Fiji, the authors conclude that decision-making processes surrounding the implementation of RES – in this case off-grid solar energy – must think beyond simply ‘technological deployments’ (ibid: 24). Decision-makers are encouraged to consider cultural settings, which often shape technological ‘innovation diffusion’ (ibid.), to aid positive outcomes. The authors’ own study revealed that projects failed to account for sustainability,

Key points

- In terms of renewable energy sources, policy-makers need to think beyond technological deployments to consider the overlapping dynamics of development needs of vulnerable communities; environmental commitments; and energy security.
- Despite its transformative potential for conflict resolution, empowerment of marginalised groups and strengthening of land tenure security, REDD+ has been limited by land tenure insecurity; conflict; poor governance; and the interests of powerful socioeconomic and political actors.
- The relationship between natural and human systems has undergone a radical transformation in line with more intensive methods of production and exploitation of the earth's resources to support human activities, such as agriculture and war.
- In order to mitigate changes in the natural system and meet the interrelated demands of food and water security, a portfolio of adaptation measures is necessary, which looks beyond the direct impacts of natural hazards to consider other factors such as the availability of transport infrastructure and the political marginalisation of women and ancestral farmers.

leading to a 'tragedy of the commons... where by each household tried to maximise its benefit from a finite resource' (ibid: 20).

In addressing criticism of their previous research, Goetz et al. (2018) reiterate their stance that biofuel production continues to suffer from issues relating to sustainability. Upon reviewing the evidence, the authors strongly call for acknowledging that, given current international consumption levels – even within only one sector such as transport – 'sustainable bioenergy production and use is impossible' (ibid: 663). Moreover, the authors call for establishing feedback mechanisms between other sectors of society in biofuel policy and evaluation.

In a bid to address the challenge of ensuring energy security while being mindful of efforts to address climate change, the use of RES continues to be at the forefront of efforts to reduce the use of fossil fuels. Such transitions will require significant investment in infrastructure – in which enterprises promoting RES can play a key role. Andreopoulou et al. (2018) argue that, in today's internet age, 'new business practices' have emerged, whereby business enterprises seeking new investment increasingly target today's 'internet society' (ibid: 32). However, the authors indicate that 'small-medium sized enterprises' are failing to adopt 'e-commerce at the same speed as large counterparts' (ibid.). In recognising this, Andreopoulou et al. review EU and Greek energy policies and use Preference Ranking Organisation Method for Enrichment Evaluation (PROMETHEE II) methods – which help monitor internet traffic – to identify superior features of websites promoting RES among 30 enterprises operating in the Greek prefecture of Thessaloniki. They argue that their findings can be used in efforts to design 'an enhanced website for a RES enterprise' both effective and efficient and well adapted to the new 'information era' (ibid: 31).

An overview of challenges to the deployment of renewable energy technologies and potential mitigation strategies is provided by Yadav et al. (2018). Highlighting that renewable energy technologies have the potential to contribute towards sustainable development by enhancing energy security and energy access, the authors highlight that market failures, lack of awareness and environmental and institutional challenges are among the factors that may undermine the contribution of renewable energy technologies towards sustainable development. Yadav et al. conclude that solving these challenges will require developing a global approach towards policy-making.

Karttunen and Moore (2018) look at differing views relating to renewable energy and world trade agreements. They use the example of India's solar cells World Trade Organization (WTO) dispute to argue that 'rapid expansion of the number of renewable energy WTO disputes calls for a clear position of the Appellate Body (AB) with regard to climate change to

ensure predictability of trade in renewable energy products in particular' (ibid: 235). In this dispute, India appealed to invoke General Agreement on Tariffs and Trade (GATT) rules on economic and legal terms, intending to prioritise domestic solar cell manufacturing as part of a broader national policy on achieving sustainable development goals. The USA, however, argued that, while sustainable development policies should be promoted, India should respect WTO rules and consider broader sustainable development agendas over narrow sectoral interests. Karttunen and Moore conclude that the AB's decision to reject India's appeal to invoke GATT rules on economic and legal terms was correct, as India had failed to make a convincing case for prioritising domestic producers over upstream manufacturers.

Given that China is both the world's largest emitter of CO₂ and its biggest oil importer, Wang et al. (2018) argue that the transition towards renewable energy is a way of both targeting China's energy security concerns and tackling climate change. They highlight that the transition could also help address development challenges, such as job creation, energy poverty, educational opportunities and air pollution. Wang et al. apply a Divisia Index composition model – which helps understand the development of RES over time in relation to the exchange of goods and services. In addition, they carry out 'scenario analysis' through 'grey relation analysis' to gain greater understanding of future trajectories in terms of renewable energy uptake. While the authors find that RES consumption is increasing, it is not occurring at a rate that surpasses oil imports. One explanation offered is that economic growth is still being given precedence over sustainable development. The authors call for greater 'synergy between energy security and renewable energy policies' (ibid: 193) and appeal to the 'popularity of climate change and air pollution' to drive an 'acceptance of renewable energy' (ibid.).

Exploring the impact of different systems of governance on energy transitions, Simpson and Smits (2018) evaluate the impact of two environmental NGOs – the Renewable Energy Association of Myanmar (REAM) and the Thailand Climate Justice Working Group (TCJ) – on the transition of their respective country

to energy and climate security. In both cases, the environmental NGO's ability to influence the agenda was largely inhibited by limited government access and ability to organise, and constrained by government's continued emphasis on hydropower development and fossil fuels. REAM had a limited impact under different illiberal regimes in Myanmar, whereas TCJ had various degrees of success under different regimes, with significantly less under recent military rule.

Framing the transition towards renewable energy in Mexico in relation to conflict, Dunlap (2018) uses a counterinsurgency lens to analyse the tactics employed by the state and private actors in support of the 'green economy'. Based on qualitative research, Dunlap highlights how such tactics were used to quell local opposition to the development of a wind farm, by drawing on tactics of 'violent repression, sowing social divisions and wining hearts and minds' (ibid: 648). The author argues that such tactics should be viewed within wider power dynamics, whereby the 'green economy' is used to legitimise 'wider projects of control' (ibid: 649) – including economic opportunities such as mining or land concessions. He warns that terms such as 'green' can act as a 'pacification device' (ibid.) to avoid opposition in the acquisition of land at the expense of local communities. While climate mitigation projects enjoy a certain level of legitimacy, Dunlap argues that those who wish to continue with traditional forms of life 'are all too aware of the negative impact of wind energy parks' (ibid.).

While current energy supply and production are linked to the increase of emissions contributing to climate change, energy supply characteristics can influence production policies. Sharafat et al. (2018) argue that such energy production policies and implementation may lead to conflict. The authors propose an evolutionary Graph Model for Conflict Resolution ('evolutional GMCR') for energy–environment policy conflicts. Sharafat et al.'s approach allows for reaching solutions that account for dynamic and changing conditions of real-world conflicts by taking all decision-makers into account, including the public. The authors further argue that energy policies need to be in line with

environmental commitments and policies, as well as energy needs.

5.5.2 The interplay between human and natural systems

Profit and war alter the way we perceive our environment, leading us to exploit the earth in new ways. Park (2018) argues that ‘systems of mediation’ – modes of production and exchange – have governed the relationship between human and natural systems. Capitalism, Park argues, has transformed the natural world into a commodity – altering the relationship between it and humans. This transformation has functioned as a two-way process, with the interchange between modes of production and the natural world also altering societal relations. Conflict is also considered to have played an integral role in transforming the natural environment. The function of war is said to have led to a revaluation of the natural world, whereby the need to fight led to natural resources becoming ‘vital for winning battles’ (ibid: 367). Park argues that appreciating the elements of ‘systems of mediation’ may serve an important role in understanding both environmental and climate change.

Ooi et al. (2018) explore how human systems adapt to change in relation to evolving natural systems in relation to the tourist industry. The industry represents an important livelihood source, which in many regions is dependent on the natural environment, leaving its prosperity vulnerable to environmental change. The authors argue that tourism itself can also act as catalyst for environmental change. This can lead to tensions with local communities, particularly when the presence of a tourism industry results in increased competition over natural resources with local livelihoods. In response to the challenges the industry faces, Ooi et al. call for adoption of a ‘proactive’ form of adaptation, which learns from both tourist behaviour and environmental change.

Interaction between human activity and environmental governance has led to calls for the improvement of information systems relating to changes in land use. Globally, the disappearance of forest cover presents challenges in terms of both loss of biodiversity and carbon emissions. Roitman et al. (2018) argue that, particularly

in tropical regions, the sheer size of the area covered makes it difficult to monitor such losses. Assessing the role national information systems have to play in environmental governance, they study the impact of Brazil’s Rural Environment Registry. This relies on geo-referenced data to identify property boundaries and monitor land use change. The authors highlight that the system has played an important role in policy development and call for greater integration into areas such as ‘agricultural production and sustainable management’ (ibid: 96).

5.5.3 Farming practices and resilience-building

Several articles explore issues relating to natural resource management, farming practices and resilience-building. Mukute et al. (2018) analyse how ‘transgressive learning’ (ibid: 229) can support the transition towards sustainable farming practices in Zimbabwe. They highlight that the country is considering how to move towards ‘climate-smart agricultural’ practices – given that the impacts of climate change are threatening both individual livelihoods and the national economy. Mukute et al. explain that Cultural Historical Activity Theory can support development processes that target ‘unjust and unsustainable norms and practices that have become normalised’ (ibid.).

Staying with transitions towards more sustainable farming practices, Pradhan et al. (2018) highlight the role Conservation Agriculture (CA) has to play in improving agricultural productivity without further land degradation. Within certain regions of India, the combined pressures of population growth, lack of arable land, inefficient farming practices and climate change threaten both food and livelihood security. The authors compare traditional farming practices with four CA trials; results show an adaptive approach of reduced tillage and a system of intercropping significantly increased productivity and soil preservation. Importantly, engaging multiple stakeholders – including the farmers themselves – ensured the ‘cost and benefits of CA’ (ibid: 34) were fully understood.

In rural China, Huang et al. (2018) use ‘complete household and farmer data’ (ibid:

141) combined with a ‘full range’ of adaptation measures – defined as all measures currently available to farmers – to estimate that between a third and a half of damages associated with climate change can be mitigated against. Huang et al. argue that the importance of the study is twofold. First, by excluding farmers’ adaptation measures, studies risk ‘dramatically overestimat[ing] the damages of climate change’ (ibid: 158). Second, exploring farm and household characteristics in combination with current adaptation measures provides greater insights into factors that determine adaptive capacity, and with it ‘effective adaptation policies’ (ibid: 139) to manage capacity gaps. Huang et al. identify ‘household-level capital’ and ‘farmland size’ as important factors determining ‘farmers’ adaptive capacities’ (ibid.).

Shifting the focus towards the relationship between farming methods and river systems, Le Thuy et al. (2018) assess the impact of agricultural practices on ‘hydrological regimes’ in the Vietnamese Mekong Delta. The authors warn that the combined pressures of food security, economic development and climate change present significant challenges to water resource management in the region. In trying to understand the impact changes in land use have had on hydrological regimes, Le Thuy et al. (2018) analyse spatial and temporal changes. They discover there has been a ‘substantial evolution in land use’ (ibid: 279) in line with more ‘intensive’ (ibid.) rice production – which has included the building of water control infrastructure. They argue that, where once natural systems governed the region’s natural landscape, since 1995 it has increasingly been altered by development and policy.

5.5.4 Tensions relating to land tenure and global fisheries

Tensions arising from land tenure insecurity and REDD+ are also an area of concern. Kane et al. (2018) argue that, while aiming for positive outcomes, REDD+ programmes often operate in contexts characterised by conflict, tenure insecurity and poor governance. Outside actors may have some bearing on these factors, particularly when they act as sources of ‘impairment’ to forest communities’ access

to resources. Based on nine case studies across four countries in South East Asia, Kane et al. show that, although REDD+ does carry conflict risks, it also contains ‘transformative potential’ (ibid: 1) in terms of conflict resolution: REDD+ has the potential to empower marginalised groups and strengthen tenure security. Kane et al. highlight that the evidence from their own study but also other research supports ‘the importance of clarifying tenure and rights’ (ibid: 14). In efforts to achieve this, they recommend the following ‘governance initiatives’: Free, Prior and Informed Consent (FPIC), Forest Law Enforcement, Governance and Trade –Voluntary Participation Agreements (FLEGT-VPA) and the UN Voluntary Guidelines on the Governance of Tenure (VGGT).

Sunderlin et al. (2018) also explores land tenure in relation to REDD+. They argue that, although REDD+ often prioritises land tenure security, this is ‘the single most difficult challenge’ (ibid: 377) in its implementation. Sunderlin et al. identify socioeconomic and political conditions, conflict and divergent interests and goals – or ‘business as usual interests’ (ibid: 376) – as major obstacles. In addition, national governments often lack interest in addressing tenure security, often granting ‘privileged access to economically and politically powerful actors’ (ibid: 377). Drawing on evidence from Brazil, Cameroon, Indonesia, Peru and Tanzania, Sunderlin et al. find that, while in some areas there are signs of improved land tenure security attributable to REDD+, overall there is little evidence in this regard. Given the contextual factors listed, the authors argue that REDD+ initiatives are often trying to resolve issues ‘whose origin and scope are far beyond the borders of their own site’ (ibid: 378).

Hein et al. (2018) also address difficulties addressing land tenure and impacts on implementing REDD+. Despite early signs of promise and continued expectations from countries with tropical rainforest, the authors argue that progress has been hampered by questions related to financing and drivers of deforestation – such as palm oil, soy and cattle ranching – both of which receive little attention in Intended National Determined Contributions (INDCs). As indigenous peoples’ rights and land tenure remain ‘contentious issues in the domestic

policy area' (ibid: 10), Hein et al. argue that it is perhaps unsurprising that little progress has been made. Despite being a prerequisite to REDD+, land and forest governance gain little political support. Through analysing 162 INDCs, Hein et al. highlight that, of those that reference REDD+, only 18% make reference to these issues. Only 7% refer to social and environmental safeguards put in place to 'ensure that indigenous and other local communities fully understand, and agree, with the terms of their involvement in REDD+ projects' (ibid: 9).

Moving away from tensions over natural resource management on land, the relationship between marine management, climate change and conflict is explored by Pinsky et al. (2018). The authors argue that, while conflict over fisheries is already common, the rise in sea temperatures is likely to make the situation worse, as marine habitats relocate to cooler polar waters. With this, warmer regions of the world – such as the tropics – could witness an outmigration of fish stocks, which would have consequences in terms of food and livelihood security. The authors warn that current systems that govern international fisheries are 'substantially underprepared' (ibid: 1189) for these changes and that, without cooperative fisheries management, we could witness disputes over fisheries 'spill over into other, non-fishery areas of international politics' (ibid.).

5.5.5 Changing precipitation patterns

The impact of changing precipitation patterns on livelihood and food security emerges as a dominant theme within water security. The effects threaten food production systems, with knock-on effects on both the urban and the rural poor. Despite these concerns, according to Londhe (2018), there is currently a knowledge gap in terms of the 'likely' (ibid: 24) impact of climate change on the agricultural sector. Londhe argues that '[g]lobally, over 80% of agriculture is rain fed and the shift in mean precipitation patterns will affect vulnerable rain-fed agricultural areas' (ibid: 28).

In seeking solutions for food production in Sri Lanka, Rivera et al. (2018) note that climate change, and increasing demand for food and water, will stress irrigation water supply and, in turn, agricultural yields in affected areas.

The authors compare two datasets – historical irrigation patterns and rice production – suggesting that shifting the time of planting provides a 'low cost-adaptation strategy for reducing water needs in resource-strained environments' (ibid: 474). They find that adopting such methods reduces water usage by up to 6%. Such findings, Rivera et al. argue, highlight the importance of historical datasets in relation to natural resource management, in the absence of 'high skilled forecasts' (ibid: 466).

Looking at the development of adaptive methods in an attempt to secure sufficient crop yields, with a focus on agriculture in Benin, Ezin et al. (2018) report that increasing temperatures, changing precipitation patterns and increasing salinity in agricultural fields are having a negative impact on productivity. In addressing the challenge, Ezin et al. call for the development of seeds that are tolerant to natural hazards and negative environmental conditions.

Flooding and drought from changing precipitation patterns pose a threat to water quality, which in turn has implications for food use. In a study of 10 Honduran communities, Keller et al. (2018) found that floods and heavy rain had the most significant impact on food use, by causing sediment and agricultural pollution to run into water sources. This was particularly problematic where sanitation services were limited. Furthermore, prevalence of water-borne diseases can impede food digestion and prevent income-generating activity, further affecting diets. Additionally, Keller et al. report that understanding the 'resilience of food systems' (ibid: 10) requires us to think beyond direct impacts to natural resource availability. This includes considering factors such as poor road infrastructure, which acts as a barrier in terms of access to markets – restricting local communities' ability to sell and buy produce.

Focusing on measures being taken in China to strengthen water security, Xiao-Jun et al. (2018) discuss the implementation of a strict water resource management system introduced in 2010. Similar policies may prove helpful over the long term in China as well as in other countries and regions dealing with water scarcity. In addition, Xiao-Jun et al. highlight that setting water use limits and creating

a system for ‘coordinated monitoring and management of water resources’ (ibid: 907) has proven particularly helpful in implementing the system. The authors argue that this shows the potential in controlling and increasing the efficiency of water use, and also reducing water pollution in regions where it is implemented.

5.5.6 Water management and urbanisation

Addressing water management in Cape Town, McIntyre-Mills (2018) calls for more innovative policy approaches to complex drivers of water insecurity, which has been compounded by increased migration to the city and a lack of measures to address the impact on water demand. McIntyre-Mills touches on the interplay between energy security and water security, arguing that plans to build a desalination plant failed because of unreliable energy infrastructure. However, she highlights that these failures have been ‘offset’ through ‘rapid adaptation’ – whereby at the ‘household level’ we have begun to see attempts to address to conserve water usage.

Also focusing on African urban centres, Nkrumah (2018) explores the impact of potential increases in flood and drought conditions on food security. The resulting disruptions to the food supply chains from hinterland farms to cities could have significant knock-on effects, particularly on the urban poor. Nkrumah proposes policies to encourage urban agriculture in cities and suburbs to strengthen communities and improve resilience. He argues that currently strict regulations and the bias against urban agriculture have prevented widespread uptake and success in many African cities.

Outside of cities, the combined influence of urbanisation and climate change is increasingly affecting land and water use in peri-urban environments. Shrestha et al. (2018) report that discussions of rights and access to water – as well as ‘notions of legitimate water use’ (ibid: 1) – will be important topics to address in developing regions. The authors find that women and ancestral farmers in Kathmandu, Nepal, are more vulnerable to changing water rights and use norms. Additionally, ‘[w]hile it is clear that in a situation of growing scarcity and water insecurity, the potential for conflicts also

increases, these changes cannot be understood from a linear causal scarcity–conflict perspective’ (ibid: 10). Their analysis indicates the importance of understanding water security issues, conflict and cooperation within individual contexts, rather than making generalisations.

5.5.7 Interrelated risks and vulnerability of food systems

While reviews of the direct impact of natural hazards often highlight links between food and security, a full understanding of risks to food production systems requires us to think of the interplay between climate change and other drivers of vulnerability. Based on findings from Sri Lanka, Esham et al. (2018) argue that, while traditional food security concerns focus on direct impacts on crop production, areas such as ‘food utilisation’ and ‘food access’ are often ignored dimensions of food security.

Along a similar line of argument, Chaudhari et al. (2018) also identify drivers of vulnerability beyond the direct impact of natural hazards. The authors highlight that post-harvest storage and transportation are also cited as points of vulnerability within the food system. As argued by other authors within this Scan, Chaudhari et al. advocate the development of crops that are resilient to soil salinity, high temperatures and drought conditions. In addition, they highlight that precise climate forecasting is key, in allowing regions to predict and prepare for extreme weather events.

Han et al. (2018) also highlight the importance of weather forecasting systems, through the use of early warning systems to deal with extreme weather events. The authors study agricultural production in the West Delta area of the River Nile in Egypt, an area that is vulnerable to extreme weather events. By adopting several methods – numerical modelling, satellite imagery, field experiments, advanced calculations – they hope to design a simulation that can inform the design of an early warning system that can assist the region in coping with such events.

Addressing vulnerability in food systems will also require an understanding of the unintended effects of climate mitigation policy in attempting to limit overall global warming to 1.5°C or well below 2°C. While such policies are a key

development in global efforts to address climate change, Fujimori et al. (2018) warn that it will be important to ensure mitigation actions do not have adverse effects on food security. Looking to the impact of afforestation and biofuels on reducing land area used for agriculture, Fujimori et al. stress the importance of creating ‘inclusive climate policy packages’ that achieve ‘stringent climate goals without adverse food security effects by aligning and including appropriate food security measures’ (ibid: 7).

5.5.8 Food security and household vulnerability

Exploring the intersection between drought, food security and household vulnerability, Anu et al. (2018) develop a Food Security Index based on ‘polychoric principal component analysis’ of rural households in Odisha state in India. The authors argue that the study of food security needs to consider structural factors such as access to land, assets, health and malnutrition, rather than purely focusing on food consumption. Anu et al. find that a family’s education, migration history and health insurance are all key variables in determining

food security. Strengthening the ‘demographic profile’ of a household appears to be one of the most influential interventions for increasing food security by influencing decision-making at the household level.

Assessing household vulnerability in relation to climate-induced food price variability on households in Ethiopia and Ghana, Wossen et al. (2018) highlight that the effects could be felt unevenly. They predict that increasing food prices will harm farm householders that are net buyers but the impact could hold potential benefits for farm households that are net sellers. Using an ‘agent-based modelling approach’, Wossen et al. also find that, although adaptation measures taken at household level have some effect overall, they are ‘insufficient to mitigate the adverse effect of variability, implying the need for policy intervention’ (ibid: 7). The authors identify that using a ‘portfolio’ of adaptation measures proves effective. For example, in Ethiopia, household resilience increased with the ‘provision of the production of credit and access to improved seeds’ (ibid.). With regard to Ghana, along with credit, ‘existing irrigation facilities’ (ibid.) proved key.

6 Reflections from a quadrimester

The intersection of climate change, conflict, security and resilience is in some ways niche and in others all encompassing. For the past decade, it has been the concern of a select few in policy and research circles. And yet the lived experience of this intersection has for many arguably always been a lived reality.

It may come as a surprise that the methodology designed for this review identified more than 350 pieces of literature released in just a 4-month period (April 2018–July 2018). Of these 350, 146 were shortlisted for in-depth review and are summarised in this Scan. Keeping intentionally broad parameters for how the intersection is defined allowed us to uncover new topics and ideas that may not have come to the fore conventionally through policy-makers, researchers and practitioners who engage in this topic.

Some of the themes identified in the academic literature will be familiar, with high-quality if often debated research findings on the climate change, conflict, security and resilience nexus permeating development and humanitarian discourse. Readers may already be accustomed to themes such as the theoretical framing of climate change and security, or debates around securitisation. Themes that may be less familiar to those in this space include psychosocial resilience and gender-based violence in the post-disaster space.

Meanwhile, an assessment of grey literature helps bring to the fore evidence that is more implementation-orientation, such as on the generation and use of climate and risk information, the policy impacts of the coming together of the climate and security agendas and implications for patterns of migration.

The blogosphere arguably provides more critical insights into the discourse of the time,

and into the diversity of opinions related to understanding and acting on the intersection of climate change, conflict, security and resilience. Moreover, often as timelier pieces, blog posts reveal the questions around which there is a concentration of attention. Blog posts can be more provocative and straight-talking – at least, when done well – which can help us understand the tensions associated with integrating climate change into national security agendas, the need for more advanced regional responses to climate security challenges given the trans-boundary nature of risk and progress still required to ensure adequate safeguarding of children in the post-disaster space.

Finally, the global reach and accessibility of Twitter makes it a useful forum for assessing the diversity of perspectives on the topic. Perhaps unsurprisingly, we find most Twitter activity concentrated around key moments, be these UN Security Council discussions, conferences and events on climate security or the release of research reports. Meanwhile, there are methodological challenges associated with assessing the thematic coverage of a topic that could be framed in any number of ways. The hashtags #climatesecurity and #climateandsecurity thus provide an entry point for those wanting to engage further. To maximise the use of Twitter, it would be useful in the future to see more emphasis on debate, discussion and encouraging a diversity of voices on the intersection of climate change, conflict, security and resilience. Rather than confining the debates on how this nexus is experienced, researched and addressed through policy in specialised forums, we could enhance the value of the medium – connecting individuals across the globe in ways that would otherwise not come to fruition. A

more enlivened debate would help bridge the lived experiences and policy directions that at present orientate in discrete circles.

The importance of getting to grips with the intersection of climate change, conflict, security and resilience is rarely debated; it is increasingly being taken as a given. The challenge that lies ahead is how to understand the nexus, and what to do about it. This Scan reveals how translating evidence into tangible policy and programmatic action raises questions related to whose interests

the actions prescribed are being implemented in. And, for those in the development and humanitarian sphere, evolving the intersection in ways that are pro-poor remains a critical trajectory that is far from guaranteed without sustained effort. As the first in a series, this Scan hopes to allow those deep in this space to step out of the ‘echo chamber’, and for those new to the topic to find new and innovative entry points through which to bring their experience, ideas and evidence to bear.

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