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Dear Readers,

Welcome to the 2021 CMDR COE Proceedings. It is a great pleasure to present it to you as it symbolizes our Centre's adaptive approach to the new requirements deriving from the intricate security environment at present. This issue of the Proceedings provides our experts with the opportunity to analyze in detail the COVID-19 pandemic, which has posed a significant risk to the crisis management and disaster response domain. By continuously developing our expertise, we strive to transform this global challenge into an opportunity for constructive change and improvement.

Another important topic addressed in the present edition is the close connection between Climate Change and Security. As a hub of subject-matter expertise, we place utmost importance on anticipatory planning, innovation and continuous improvement. Therefore, the present issue of CMDR COE proceedings provides a venue for some articles related to this overarching topic and it is our hope that this will stimulate the further research on adequate solutions to reduce the negative impact on the climate.

By presenting you this book, I would like to highlight our persistent efforts to ensure the successful adoption of the comprehensive approach to crisis management and disaster response, as stated in the vision of our organisation. Furthermore, the expertise provided by distinguished authors with vast experience in the aforementioned domain represents our determination to foster the fruitful collaboration between academia and key CMDR stakeholders. I really hope that you benefit from the published articles and that the efforts of the authors are appreciated.

Welcome once again and enjoy your read.

Orlin NIKOLOV,

CMDR COE Director

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THE PANDEMIC YEAR OF 2021

CMDR COE

Acknowledgement

The presented paper is a brief report extracted from the CMDR COE annual summary and based on open-source information streams, accumulated and assembled by the end of October 2021. Predominantly the referential materials consist of official documents published by the World Health Organization, governmental pages, and virtual statistical databases. All views are solely retrospective and do not present any official position nor policy of the Centre. Thus, it does not bear responsibility for incomplete or incorrect facts cited or referred to hereinafter.

In overall

The year of 2021 has been a game-changing year for the humankind and we retrospect a period in which a stalemate spread across the world and humans have had to adapt to new ways of working and preserving.

The appearance of an atypical form of severe pneumonia in December 2019 first surprised the health service worldwide and a crazy race has begun since then – the science started looking for the causative agent of this mysterious disease and for ways to combat it. On February 11, 2020, the disease was coined as COVID-19, and three days later, the pathogen causing it was

named the SARS-CoV-2 virus. The World Health Organization (WHO) on March 11, 2020 announced that world is dealing with a pandemic, an epidemic with a global dimension.

As to August 10, 2021, cases of COVID-19 have been reported in every country on the globe as the recorded number in total is 204,813,802 (Worldometer[1]), and fatalities on a global scale are 4,327,356 people.

There have been no précised estimates of the incidence and occurrence of the COVID-19 features, their relationship to age, sex, or severity of infection, and the extent to which they are specific to the coronavirus. Characteristically all viruses, including SARS-CoV-2, have mutation over time. Mostly changes have from moderate to no-impact on the virus' properties. However, some may affect the virus's properties, such as how easily it spreads, the associated disease severity, or the performance of vaccines, therapeutic medicines, diagnostic tools, or other public health and social measures.

The WHO and its international networks of experts are monitoring the mutations so that if significant changes are occurring to identified and inform the public about. At any change circumstances it is needed to react and prevent the spread of the new variant. Globally, systems have been established and are being strengthened to detect 'signals' of potential Variants of Interest (VOIs) or Variants of Concern (VOCs) and assess these

[1] https://www.worldometers.info/coronavirus/

based on the risk posed to global public health. National authorities may choose to designate other variants of local interest/concern. Presently, the expert group convened by WHO recommend using labelled using letters of the Greek Alphabet, i.e., Alpha, Beta, Gamma, which will be easier and more practical to be discussed by non-scientific audiences.

WHO label	Pango lineage	GISAID clade/lineage	Nextstrain clade	Additional amino acid changes monitored*	Earliest documented samples	Date of designation
Alpha	B.1.1.7	GRY (formerly GR/501Y.V1)	20I (V1)	+S:484K +S:452R	United Kingdom, Sep-2020	18-Dec-2020
Beta	B.1.351 B.1.351.2 B.1.351.3	GH/501Y.V2	20H (V2)	-	South Africa, May-2020	18-Dec-2020
Gamma	P.1 P.1.1 P.1.2	GR/501Y.V3	20J (V3)	+S:681H	Brazil, Nov-2020	11-Jan-2021
Delta	B.1.617.2 AY.1 AY.2	G/478K.V1	21A	-	India, Oct-2020	VOI: 4-Apr-2021 VOC: 11-May-2021

Implications

The pandemic affects the human society and causes disruption and anxiety, even stigma. It has effects on the behavior. The transmission of the virus resulted in the enforcement of restrictions in order to tackle the spread of the disease. Isolation and social distancing help break the chain of transmission. However, such measures have affected the societies, labour power and individuals in mentality and habits. Across the globe

governments have taken required measures to provide support as prescribed by the experts. We witness different political systems all over the world are uniting exclusively to fight the disease.

Nevertheless quarantines and isolation also have caused some negative impacts on communities. The separation, loss of freedom of movement, and uncertainty put at risk and may lead a deterioration in society cohesion. People that are separated from their environment and fellow mates or colleagues, respond to such kind of a pressure in different ways. Some common behavioral changes may be:

- Excessive anxiety and annoying behavior.
- Increased sadness, depression, or worry.
- Difficulties with concentration and attention.
- Unexpected changes of mood.
- Changes in eating habits.

To help mitigate negative effects, it is required authorized services and agencies to remain trustworthy, deal with the situation calmly, and answer all of the citizen's questions to the best of their abilities. Because above all, the situation requires a clear understanding of the impact on the mental stability in the society, to preserve social cohesion of people from different social, professional, age groups.

Examples of states' policies:

Brazil has a robust healthcare system and historically handled public health emergencies quite well. Brazil declared the COVID-19 pandemic a public health emergency in early March 2020 but endured incongruous responses from public health officials and President Jair Bolsonaro. Despite a history of efficient responses to public health emergencies, Brazil quickly became an epicenter of the COVID-19 pandemic. Given the uncertainty of future aid from governmental programs, other foreign investments and actors have stepped in to provide millions of dollars in COVID-19 relief aid. This is providing hope for further poverty reduction in Brazil. Brazil's chaotic response has deepened political polarization among supporters and critics of the president. Hospital systems have largely coped with the crush of patients, but the virus has taken a devastating toll on health care workers. Dozens of nurses and hospital technicians died after contracting the virus at work. Instead of conclusion.

In **China**, personal rights, freedoms and the protection of personal data play virtually no role which is crucial for implementation of all COVID 19 measures in the country. The authorities create digital profiles of all people, use the data from the video surveillance cameras and population of China are not obliged to comply with the principles of the rule of law. There is no public debate in China – neither about the measures imposed nor about the roots of the pandemic (unlike in Europe). These

measures have allowed regional governments to block an area or conduct mass tests when necessary. In part, this more productive response to the virus in China - and elsewhere throughout Asia, including Hong Kong, Taiwan, South Korea and Japan - is due to the different reactions of the population compared to Europe.

Borders between provinces and regions, which were previously almost invisible, are now more visible, so that public transport can be restricted or stopped completely in the event of an outbreak. Entry into China from abroad is also severely restricted, with strict quarantine measures upon arrival. Restricting the spread of the coronavirus has also been helped by the constant wearing of masks and adherence to the rules of public hygiene, which are strictly controlled by the Chinese authorities.

China remained on high alert even after the situation normalized in late-2020 and was able to respond quickly to new clusters and track anyone potentially infected via QR codes. Chinese authorities had epidemic plans to deal with potential outbreaks and did not have to argue to take action. And while China has been criticized for initially tackling the Wuhan epidemic - censoring news and downplaying its seriousness - after being recognized as a national threat, the response to COVID-19 was swift and decisive, in contrast to the fluctuations seen in Europe and the United States even when the potential for a global pandemic was realized.

The number one priority for the global fight against the Covid-19 pandemic is to expand and accelerate mass vaccination, which rests on boosting vaccine production and promoting equitable access. The country is now scaling up production to ensure smooth progress of its inoculation campaigns, while also exhausting all means to offer an assistance to the international community, particularly those in the developing world.

China is facing yet another COVID-19 outbreak raising questions over the sustainability of the country's stringent zero-covid strategy. China has largely stopped the spread of COVID-19 but new outbreaks continue to occur in various parts of the country. A delta variant outbreak in July and August spread to several provinces, raising concern about new and more contagious variants. While the lockdowns and other stern measures have taken a toll on the economy and daily life, most of the country has overcome the impact of the initial outbreak. Even with 91% of students and teachers vaccinated nationwide, it is still recommended students do not leave their home provinces and stay on guard.

China's border restrictions and mandatory quarantine requirements for overseas arrivals are among the strictest in the world. This has caused a discrimination among the countries and a confusion on the criteria adopted by China to issue visas to people from different countries. For more than a year, China had largely contained COVID-19 by tightly sealing its borders and containing local outbreaks with zero tolerance for infections. But

despite stringent measures, a dozen cases of the Delta variant were detected among cleaning staff at Nanjing airport and soon spread to more than half of China's 31 provinces which disrupted the recovery of the world's second largest economy over the summer.

On 27 February 2020, **Denmark** confirmed its first case and went ahead of the COVID-19 curve through a combination of planning and foresight, mass testing and tracing programs and early lockdowns. It was among the first European countries aiming to put the lockdown into gradual reverse, just as it was one of the first to impose restrictions. The spread of coronavirus was under control and the government got the economy going again. Denmark are now continuing to progressively respond to keep the virus under control.

The Danish government unveiled a set of financial bailout measures to support workers and businesses affected by the Coronavirus crisis. Although Denmark was one of the first European countries to impose extensive lockdown measures in response to the COVID-19 pandemic, economic activity in the first quarter of 2020 proved more resilient than previously expected. It is highly likely due to Denmark's government "swift, effective and recently stepped-up policy responses", such as the new recovery package, had improved its outlook for the country since its earlier spring forecast.

According to the Dane's national plan, the vaccination has initially set to persons in specified risk groups and to selected key

workers in the health, elderly and social care sectors. All residents of Denmark, Greenland and the Faroe Islands have been enlisted to the national vaccination plan. A time scale for the plan is estimated at “most of a year” by Danish Medicines Agency director. In the meantime, social distancing requirements and other measures used to reduce virus spread remained in place.

The neighboring **Finland** could be considered successful in restraining the pandemic. Compared to many countries, the pandemic landed in Finland late. That allowed early implementation of restrictive regulations and recommendations. However, these measures which have been obeyed well by the population have probably had several negative, unintended consequences.

Of the Nordic countries, Sweden is usually held up as a role model. But in these times it's worth taking a look at Finland.

Another factor that may play a role is the personal comfort zone — how close you want to get to another person. "It may well be that the Finnish comfort zone is slightly bigger than in other European countries," they like to keep 3 feet distance between them and the next person. Otherwise they feel uncomfortable."

Finland’s priority was to immunize the whole population. Only vaccines that meet strict standards for vaccine quality, safety and efficacy were granted a marketing authorisation. Vaccination is voluntary and free of charge for all, including healthcare workers.

The government approved the proposed COVID-19 vaccination strategy that is based on scientific evaluation and research evidence. It defines the main principles of COVID-19 vaccination prioritization in Finland. COVID-19 vaccines are offered on the basis of medical risk assessment. In the first phase, vaccines were offered to specific priority groups.

The regular state budget for the year 2020 included some funding for preparing for large infectious disease outbreaks and other unforeseen events. It focused on covering expenses incurring from the COVID-19 pandemic and on easing the financial situation of firms by emergency measures. Later on the government has issued other supplementary budgets. In the Finnish context, the economic shock of COVID-19 is often compared with the deep recession of the early 1990s. The main effects stem from decreased economic activity and consequently diminished tax incomes as well as the measures aiming at compensating economic losses and to stimulate the economy back to the path of growth. Extensive measures have been taken to help the society to cope with the effects of the pandemic. Opening the society and loosening restrictions step by step are seen as paramount for the economy and for the general wellbeing of Finnish residents. However, the effects of loosening the restrictions are yet to be seen.

France is one of the most severely hit by Covid-19 countries in the world. The country had three wave of infections – one with peak in November 2020, second with peak in April 2021 and the

last with peak in August 2021. Currently the number of daily cases is in decline.

The French government has introduced very strict restrictions. Nevertheless, the results are not very good and currently the number of infections is more than 7 mln and more than 116 000 death cases as of 30 September 2021. Around 65.9 % of the population is fully vaccinated against Covid-19.

Even if the promising vaccines from Pfizer Inc. and Moderna Therapeutics — whose trials have shown to be more than 90% effective — continue to work and be safe, those alone will likely not entirely stop the pandemic, due to production limitations and storage challenges, including the need to store the doses at extremely low temperatures.

In the meantime, treatments and other forms of prevention are still needed as the world faces an increasing number of cases, with no end to the pandemic in sight.

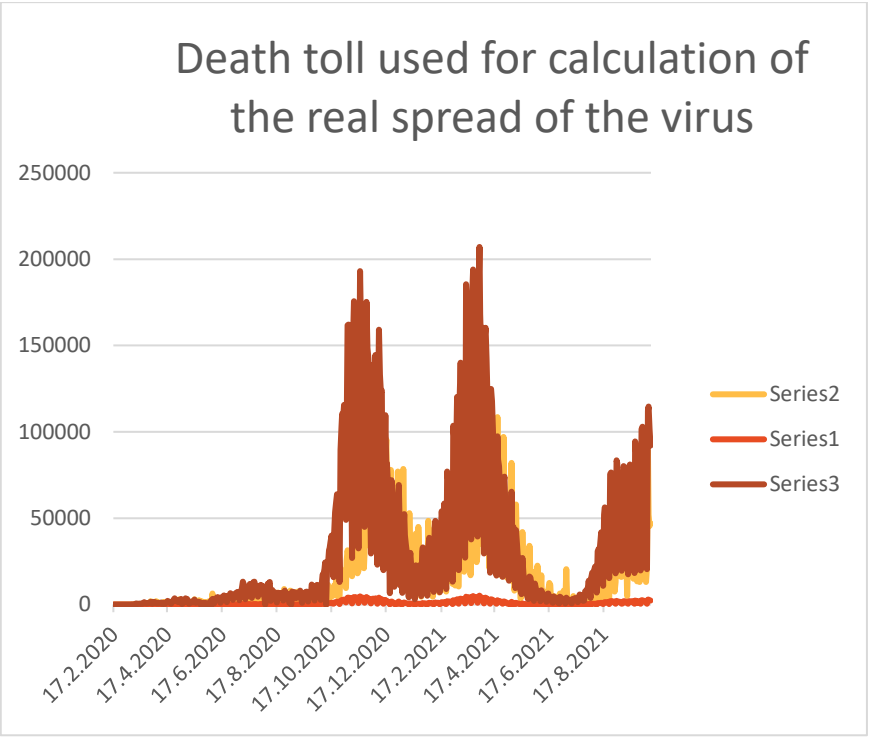
Mass testing, a full/partial lockdown, vaccination and strict monitoring of the chains of infection: these are the main tools of the Israel authorities in the fight against coronavirus. For the implementation of these measures, neither effort nor staff are spared.

Restrictions in Israel have been gradually eased but infection rates are again on the rise. Now we should expect that the government will impose another lockdown.

Israel experts say the zero-Covid strategy is facing a problem of diminishing returns as the pandemic is prolonged. Experts say, it will become more and more difficult to sustain that approach, in terms of the time, the organizational energy, and the financial and economic pains it takes to reset cases to zero. No matter how stringent the travel restrictions are, imported cases are likely to trigger outbreaks in the country. This even triggered a highly politicized debate in Israel and a widely trusted voice on the pandemic, told a concerned Israel public to prepare to live with the coronavirus for a longer duration.

CMDR COE's Operation Laboratory

The CMDR COE's OpsLab has been working constantly on the COVID-19 Pandemic analyses since the beginning of the crises. Specific tools and filters were built in order to understand the data reported about the virus distribution. Some models were developed and their coefficients gave another perspective and way of understanding of the crisis. Because of the logical approach, some of the filters were lately independently replicated by other organizations. During the period of monitoring and analyzing, were reported predictions, analyses and conclusions. On the graph bellow is shown the evolution of the crisis in Bulgaria. Specific filters, developed in the OpsLab are applied.

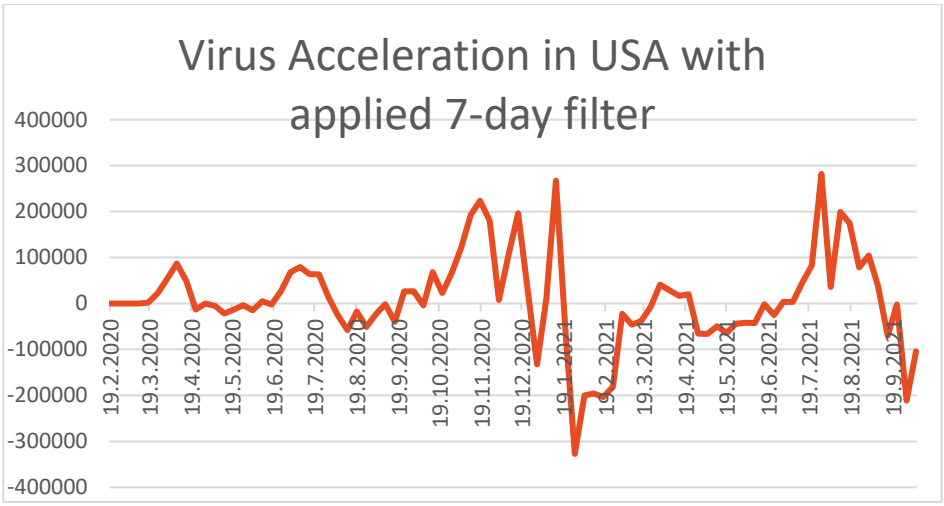


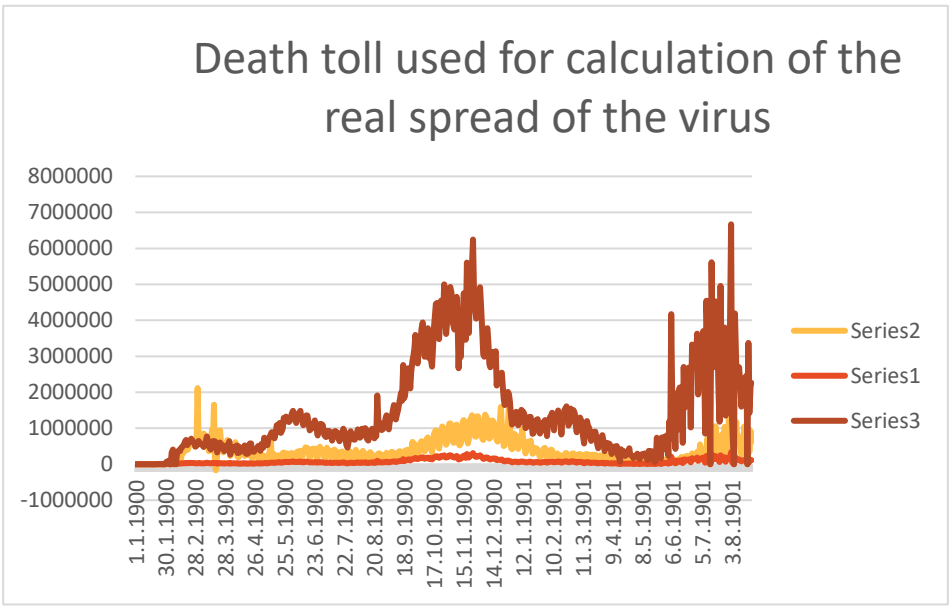
The obvious correlation between the reported and computed data is easily visible and proves the concept. It means that we can understand good enough the physical nature of the virus and can't react in proper manner as global society.

As an example we could analyze the second graph. There are several spikes illustrating the different waves of the virus. Actually, the "waves" are periods with positive acceleration and the term was spread in the media. The first three waves are not so detectable due to the scale of the next ones and we have to apply additional filtration in order to view them better (like logarithmic scale for example). All they are related with specific

change of the environment or/and the virus parameters. The difficulties of the process logical understanding and elaboration are very similar to the mathematical challenge of the three-body problem. The classical equational computation of the trajectories is not possible and the task is solved based on the chaos theory. In the case of COVID-19 we have also three bodies – the virus, the human society and the authorities. They are tightly bounded and activity performed by one of them cause a reaction by the other two.

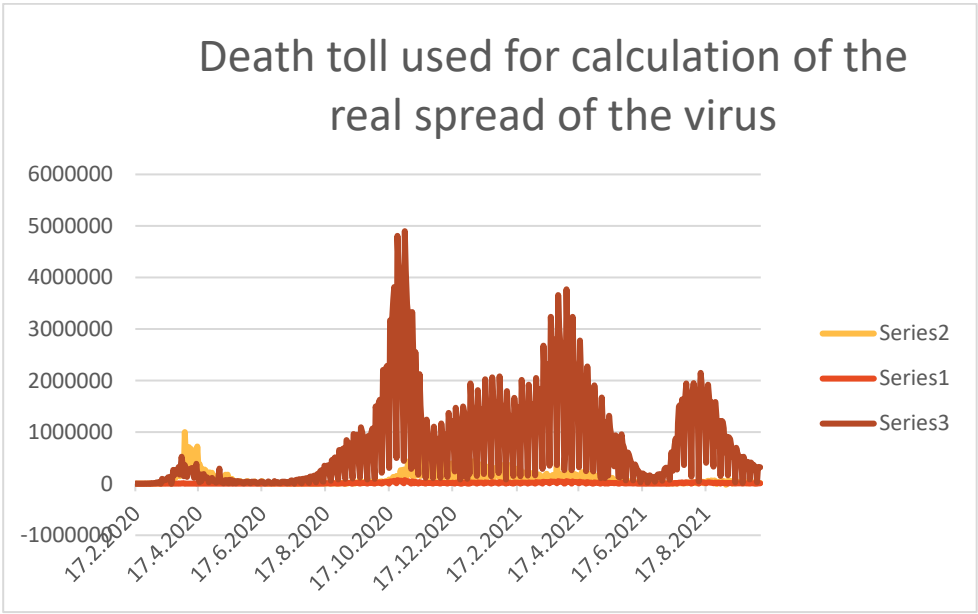
One of the conclusions from the virus acceleration graph analyses is the different value of the peaks and the relative cause of them. It is seen that the bigger “waves” are caused by occurrence of new strains. The smaller peaks are caused by the change of the other two bodies – the society and the authority (actually the applied or lifted measures). The strain waves appear at different time in some countries which is related with the time necessary for the virus to travel and then to distribute. Following the time shift we could find out the exact place of the new strain occurrence.

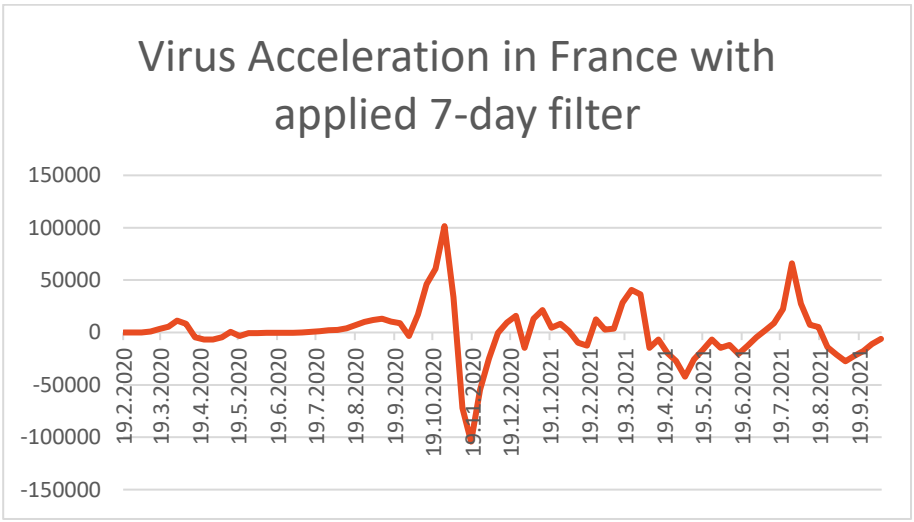




Looking at the graphs of France and USA we can find that the vaccination technology works and it is related with the decreased death rate. In order to keep the relationship between the statistical data and the computed by the model we have to change the coefficients. In Bulgaria the previous parameters of the mathematical model still works due to the slow vaccination

process – the death rate is close to the values of the fourth and fifth waves.





The virus vector hasn't changed significantly its direction, but just its scale. The concept of the virus is not changed, just some coefficients. It makes it more predictable. The advantage of the virus in the specific situation is the brute-force development technology. It means that the virus develops itself replicating numerous times. Specific number of the virus instances are slightly changed covering sequent areas from the possible variants domain. The media for the replication is the human society. Interesting question is the ratio between the replication number and the ratio of intelligence between human-being and the virus. In order to calculate it, we have to multiply the number of the generated replicas of the virus from one human body by the number of infected people at specific moment of time and later to divide it to the number of the planet population. After uncomplicated calculations we discover that as human society we are just approximately four million times clever then the virus, which is noticeably immature.

Advantage of the human-being approach is the applying of feedback. We could adjust out course of action according the achieved results by our efforts. The virus is one-way technology – the better replicas survives and the bad ones just died. Interesting for measurement and assessment is the coefficient of the change of the virus for each instance. Too low coefficient will mean that the virus will change itself very slowly – it is bad for long term of time due to the adaptability of the host. Too high coefficient will cause very high ratio of "unsuccessful" instances.

At same time it is dangerous due to the chance of development of completely new strains.

A solution for the crisis management is the proper modelling of the three body's behavior – the virus, the human society and the authorities. Such modelling could compute the scenario plurality giving us the answer for the crisis.

Reflections and conclusions

More than 200 million people have been reported by the World Health Organization to be infected by the novel coronavirus globally and more than 4 million have died. Infections have been reported in more than 210 countries and territories since the first cases were identified in China in December 2019.

The first Delta case was identified in December 2020, and the variant soon became the predominant strain of the virus in both India and then Great Britain. By the end of July, Delta was the cause of more than 80% of new U.S. COVID-19 cases, according to CDC estimates.

Approximately 2.24 billion people around the world have received at least one vaccine shot.

Living with COVID-19 will require ongoing effort due to the risks associated with spread of COVID-19 and the unintended social and health consequences of restrictive public health measures must be carefully balanced.

Global restrictions imposed to limit the spread of this violent

disease and the resulting social distancing and isolation could be harmful and might lead to mental disorders for many people.

Long-term prospects for the pandemic probably include COVID-19 becoming an endemic disease, much like influenza and we may need to live with it.

Tracking remains difficult in many countries as the spread of COVID-19 depends on many factors, such as social contact structure, testing rates, identification of COVID-19 suspects, anti-pandemic measures such as lockdown and sealing of hot-spot, etc. taken by the governments. Lockdowns and curfews, both at national, state and big cities levels have proved to be a good decision for the containment and should be extended further but only when absolutely necessary in order to have minimal impact on the economy.

There is continuous need of building and maintaining an epidemiologic situational awareness on national level and around the globe. Robust surveillance activities, regularly monitoring and reviewing of circulation as well as rise of new variants and other co-circulating variants, such as Delta is crucial for curbing of the disease.

The recovery of the economies depends not only on the COVID situation, but also on the resilience of the global economy and the oil prices. As in many countries at this point an exact prognosis is impossible to give and the situation remains unprecedented.

The crisis and the imposed quarantine and lockdown have caused a reduction in outputs, household spending and trade. The global value chains have been disrupted and this will lead to a steep decline of GDP.

In every country, society is divided over how to deal with the COVID-19 pandemic. However, the number of people who have passed away since the start of the pandemic has acted as a factor that significantly reduced the skepticism about the vaccinations.

It is likely that COVID-19, which emerged nearly two years ago, will be recognized as a common disease in the future. Potentially externally dangerous and highly broadcasted in media situation also has its positive aspects. One of them is probably increased awareness to hygiene in everyday social relations.

There have been confusions and misunderstandings about vaccines, but vaccinations are very important part of the public health anyway. All the 2021 researches have shown the vaccines help reduce your risk of getting seriously ill or dying from COVID-19 and reduce spreading COVID-19 as well.

EXAMINATION OF ONLINE TRANSFORMATIVE LEARNING

David Bates[1], Ian Corrie[2]

Abstract: An examination of how on-line transformative learning has been applied to create individual development and organisational capability in order to counter natural and man-made environmental threats within a Public Health context. The University of Cumbria has embedded a transformative learning, disruptive pedagogical approach (Hayes and Corrie, 2020) into its health and social care continuous professional development programmes.

Mezirow (1991 and 2000) posited a transformative learning theory that provides the academic framework through which these programmes develop students' critical thinking and their reflexive practise. Many learners engaged in this programme are mid-career professionals who bring with them a depth and breadth of previous experience, or tacit knowledge. Hayes and Corrie (2020) recognised that this can be both a facilitator and a barrier to learning if individuals have insufficient critical self-awareness realised through reflective practice (Ahmadi et al, 2015; Couper and Worley, 2017). A disruptive pedagogical approach supports the transition of self-knowledge from implicit to explicit creating a higher level of critical thinking or 'meaning making' that fully exploits Mezirow's (1991 and 2000) theory.

This is not limited to their current module or programme but provides an educational platform on which they may continuously develop their crisis management and disaster response capability through shared experience as defined by Wenger's (1998) communities of practise. Blended learning (Kneebone et al, 2017) supports these techniques enabling students to shape their liminal space unconstrained by geography or time. This paper will illuminate how this praxis has been applied within a disaster response and humanitarian action higher education programme.

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Key words: blended learning, crisis management, disaster response, disruptive pedagogy, humanitarian action, reflective practice, tacit knowledge, transformative learning, communities of practise and centres of excellence.

Introduction

The University of Cumbria's Disaster Response Module emerged from a requirement that originated from the county Fire and Rescue Service. It approached this Higher Education Institute in early 2016 to develop an education programme which would shape their operators to function in an all-hazards, multi-dimensional mission space in cooperation with other first line emergency responders as directed by the Civil Contingencies Secretariat (UK Gov, 2004). It was agreed that an educational wrap around was required that would facilitate students to fuse their previous education, training and experience into a coherent whole that sets the conditions that will optimise their future practise. Van Merriënboer (2017: 162-169) endorses this educational strategy recognising the employment of integrated objectives, whole task approaches ensuring that learning is transferred to the workplace.

There is strong evidence that recognises the importance of reflective practise in problem based or active learning where mature students can learn to restructure new information and experience with their prior tacit knowledge and experience to create new theories (McManus, 2001) particularly in the health and care professions (Lachman and Pawlina, 2006). In addition to this there is a strong school of transformative learning that has

been nurtured within the Institute of Health over the last decade which has helped to shape its curricula (Hayes and Corrie, 2020). A curriculum then emerged by combining these learning strategies with a community focused, or public's health based philosophy (WHO, 1986 cited in Naidoo and Wills, 2009), and a strategic framework of disaster response and humanitarian action principles that can be applied to any context (Coppola, 2020). The disaster response module and its more recent humanitarian action and security siblings were validated in 2019 for five years alongside their overarching degree and post-graduate programmes in disaster response.

This paper will illuminate how this praxis has been applied within the subject modules and programmes whilst making recommendations of ways to enable continuous learning and peer support through networked information technology. It is envisaged that this holistic approach will make a major contribution to capability as a whole by capturing lessons identified in near real time allowing communities of practice, faculties or centres of excellence to analyse and act upon them rapidly. This could ultimately save lives and money.

Philosophy and the Public Health Context

This Institute's disaster response and humanitarian action modules and programmes were validated in September 2019 along with the rest of the continuing professional education prospectus. This important component of curriculum

development guarantees their academic relevance until 2024 when they will be re-validated (Helm-Alabaster, 2018). Part of the revalidation process is to clearly articulate the ontology and epistemology of the approach to learning. Many of the modules were already immersed in a philosophy of social reality and moral responsibility or a 'publics' health approach' as illustrated in Figure 1 (WHO, 1986; Gagne and Lapalme, 2016). These were formally presented in the programmes' and modules' information submitted to the external validation committees. These are what drives the research methodology which is ethnographic (and should be participatory) and mainly qualitative by definition as peoples' opinions based on their experience in their world is more important than quantitative data derived from measurement. Validated programmes must be dynamic to remain relevant so building a research framework into the evaluation stages enables the teams to continuously develop their programmes.

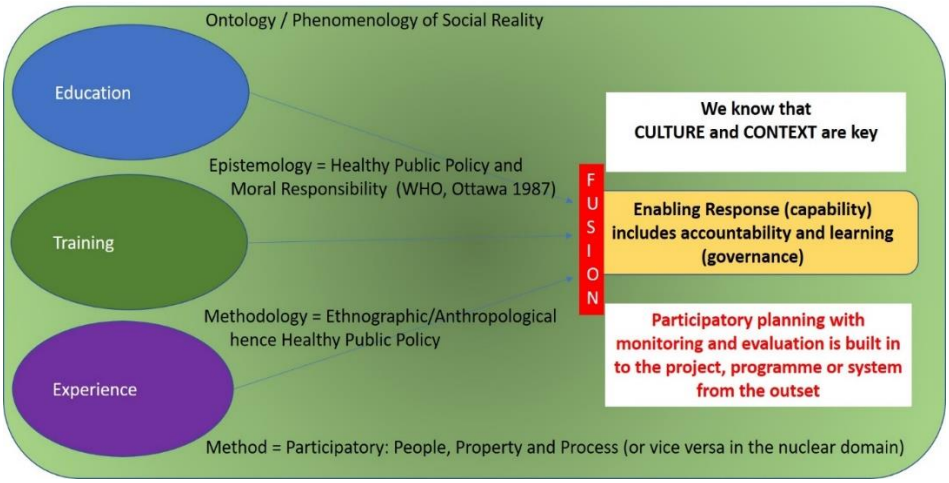

Figure 1: Teaching and Learning Philosophy

Gagne and Lapalme (2017) summarise the WHO Ottawa Charter for Health Promotion through the lens of the Vienna Declaration which was forged at the 9th European Public Health Association Conference in November 2016 and the WHO Shanghai Declaration on Promoting Health in the 2030 Agenda for Sustainable Development (WHO, 2016). These charters and declarations mandate that human security factors (food, economic, health, physical security, environment culture and community, political and information) constitute peoples' needs and wants at the tactical level (Figure 1) which may be frustrated by threats and vulnerabilities at the operational or strategic levels. Ultimately these feed into the Sustainable Development Goals (SDGs) (ibid) as does the Sendai Framework for Disaster Risk Reduction's seven goals: reduce mortality, reduce numbers of people directly affected by disasters, reduce economic loss and damage to infrastructure (UNDRR, 2020). It also aims to increase the number of countries with disaster risk reduction strategies, enhance international cooperation and increase the number of multi-hazard early warning systems as reported by Murray et al (2016). Their study fully endorses the publics' health approach to disaster response (Potvin, 2012) whilst setting the conditions for exploiting the fusion of education, training and experience or eliciting tacit knowledge, in order to craft meaningful capability and build capacity in communities (Hayes and Corrie, 2020a: 80-81).

Problem Solving and Decision Making as the Foundation of Transformative Learning

Capability requirements for disaster response, humanitarian action or other capability systems are firmly based on community and individual need. This demands a framework based on participatory assessment, planning, implementation, monitoring and evaluation first established by Warren Smith (1973). Russ and Davis (2014) commentary on recent post disaster field experience recognises the importance of accountability and learning in this framework and sent out a call to action for all stakeholders to ensure that it is embedded into their planning systems. People acting as capability planners and operators need to develop the educational tools that will allow them to make meaning of the intelligence data and information that they acquire from their practise experience. Škėrienė and Jucevičienė (2020) consolidate this into the fundamentals of problem solving and decision making establishing the foundation for values based capability or campaign planning irrespective of the development models or systems employed. This demands a more intelligent and agile individual and organisation that can take tacit knowledge and make meaning with it by applying it contextually to problems or disorienting dilemmas as defined by Meziow (1991).

Colonel John Boyd's observation, orientation, decision, action (OODA) loop is a simple decision making model designed to assist his fighter pilots to transform their capability during the

Korean War following a rapid conversion from piston engine to much faster jet engine aircraft (Coram, 2004). The latter demanded a more agile operator to win a dogfight and Figure 2 demonstrates that tactical and political constraints cause friction (red arrow) which frustrate the individual's ability to decide and act as classically defined by von Clausewitz (1989).

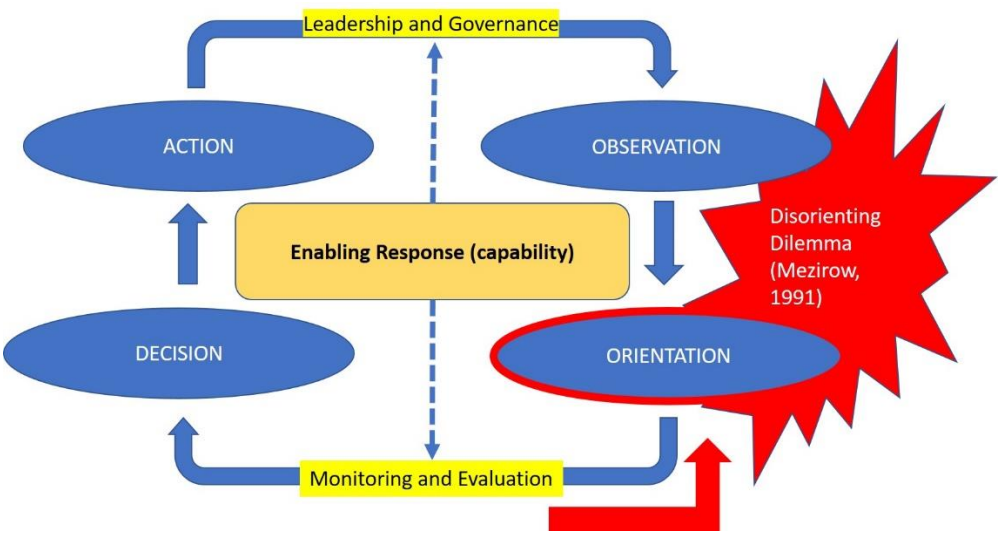

Figure 2: Improving Decision Making

Boyd's intent was to give his pilots the tools that they needed to achieve decision advantage if not decision superiority in a fast moving scenario, the challenge was how to unlock the 'orientation' stage of his loop which is analysing the problem or disorienting dilemma which will elucidate the courses of action that allow the operator to reduce the friction and continue the mission (Gunther, 2012). At the macro level this is also facilitated by good leadership and governance which is enhanced further

by continuously feeding the outcomes of monitoring, evaluation and learning into the system. This institute recommends a blend of Boyd with a proven critical reflective practise model to unlock the orientation 'bubble'. Figure 3 shows David Kolb's reflective practise model (Kolb D et al, 2000; Kolb A and Kolb D, 2008) conjoined with Mezirow's (1991) transformative learning model which provides gearing to accelerate learning in addition to achieving its aim to deepen learning by bringing in the emotional dimension. Teaching reflective and reflexive practise by exploiting transformative learning not only improves the individual's own tactical ability but is a travellator or escalator that will contribute to the creation or enhancement capability. It teaches individuals not to rationalise problems away and promote a false representation but to rigorously challenge assumptions (Deangelis, 2019).

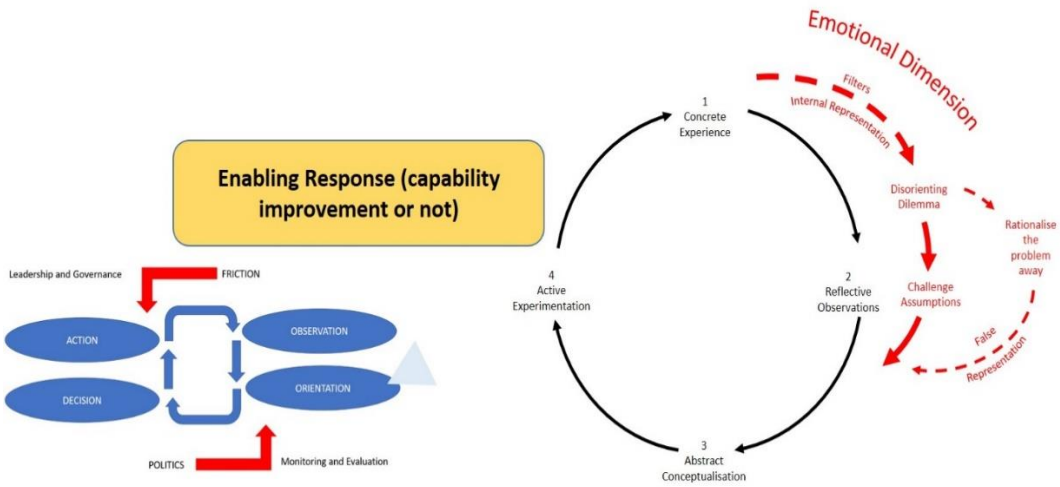

Figure 3: Improving Problem Solving and Capability

Deangelis (2019) defines this as a disruptive pedagogical approach to teaching and learning that turns implicit knowledge into explicit knowledge, skills and attitudes in order to make meaning. It employs recognised qualitative research methods such as the RAND Delphi technique, interviews, focus groups, oral histories and direct observation to gain insight into peoples' experience and opinions which they will fuse with their own to synthesise new knowledge. Contrary to a classical pedagogical approach the teacher and learner empower each other creating autonomy akin to that of mission command in the military which allows fleeting learning opportunities to be exploited without didactic instruction which again is what Boyd's pilots needed to achieve to be battle winners (Gunther, 2012).

Transformative learning is best summarised in Mezirow's (1991: p 161) own words: *"an enhanced level of awareness of the context of one's beliefs and feelings, a critique of their assumptions and particularly premises, an assessment of alternative perspectives, a decision to negate an old perspective in favor of a new one or to make a synthesis of old and new, an ability to take action based upon the new perspective, and a desire to fit the new perspective into the broader context of one's life".*

Principalisation of Disaster response and Humanitarian Action

The University of Cumbria has been offering a validated disaster response module since September 2017 (Bates, 2018). Nearly 400 students have successfully completed the three months learning as part of their continuous professional development programme. These students are drawn from all professions that have a role or responsibility to deliver components of emergency, disaster or crisis response in the United Kingdom and overseas. Drawing on the evaluation data from these modules and contemporary evidence emerging from the field (Coppola, 2020; Hoppe and Williamson, 2018; Russ and Davis, 2014) it was realised that there were gaps in the education of individuals and teams responsible for humanitarian action and the safety of deployments despite a wide prospectus of free on-line courses and literature. Revalidation of the Disaster Response Module in September 2019 was an opportunity to explore the range of learning required based on student and operator critical reality derived from their socially or artefactually real experiences (Fleetwood,2016). This defined the requirement for two new modules: Humanitarian Action alongside Safety and Security for Disaster Response, Humanitarian Action and Reconstruction Workers. All three modules may be accessed as a stand-alone module at Certificate to Masters levels, as a continuous professional development programme module or as part of a

specialised University Advanced Diploma or Post Graduate Certificate in Disaster Response (UoC, 2021).

The data collected via student papers and evaluations importantly demonstrates a set of principles demonstrated in Figure 4. Although more analysis needs to be completed and the results critically discussed the themes are consistent and coherent with contemporary evidence (Pollock, 2013; Kerslake, 2018).

INTELLIGENCE	
KNOWLEDGE	
PROBLEM SOLVING	
DECISION ADVANTAGE/SUPERIORITY	
DR and HA PRINCIPLES	ALL HAZARDS/MULTI-DIMENSIONAL
COMMUNICATION	BUOYANCY versus RESILIENCE
NETWORKING and PARTNERSHIPS	SHIBBOLETHS (traditionalists) versus MAVENS (iconoclasts and innovators)
OUTREACH by INFORMATION ACTIVITIES	

Figure 4: Principles of Disaster Response

Teaching these principles allows individual practitioners the autonomy and freedom to apply them in their own practise as organisational systems are heterogeneous. This flexibility also encourages deep learning of the all-hazards approach with an emphasis is estimating risk and understanding the multi-dimensional nature of disasters. This approach has provided a clear advantage during the current CoViD-19 pandemic where intelligence data and information has been incomplete but

operators have applied there previous education, training and practise experience using the principles as a framework to develop efficacious, safe quality solutions to problems and feeding their reflections and learning back in to create new knowledge and capability. Although the pandemic has been running on for at least twenty months there is still evidence of innovation (Ahmadi et al, 2015; Couper and Worley, 2017). Principles do not change but complications and complexity do change the context as the mission increases in severity or scale.

Blended Learning and the Role of Communities of Practice, Interest and Centres of Excellence in Continuing Professional Education

The principles of disaster response were already being delivered entirely on line by the University of Cumbria prior to inception of the CoViD-19 pandemic in late 2019 and early 2020. This institution is able to deliver a full suite of blended learning capabilities including synchronous, asynchronous and embedded on-line with face to face on campus or in the field if appropriate (Ellaway, 2017). The pandemic has stimulated the acceleration and enhancement of the development of on-line technologies and their engagement by the wider Higher Education Community who would not employ these techniques routinely (Kneebone *et al.* 2017). This department had supported others across the Institute and wider academic community to adapt their programmes to the blended learning environment

making them not only safe but also wider reaching, more flexible and affordable.

Delivering modules and courses based on principles is relatively straightforward but developing interventions that would invoke or resurrect disorienting dilemmas was a challenge. It was the evaluation and reflection of the modules that demonstrated this was already happening and simply need to be formalised. The students had been revealing their disorienting dilemmas during their reflections which proved the model offered in Figure 3. The next stage in the development process was to identify how to collect evaluation data on alumni performances following the education event. There are often unanswered questions at the end of modules and programmes and no mechanism to back in touch with the learners as they are busy working on other education modules or training courses as well as being operationally busy. This has had a particularly heavy impact during the CoviD – 19 Pandemic. As the desired educational outcome is fit for purpose not just fit to pass the is an ambition to maintain the educational engagement with alumni, encouraging continuous development through informal reflective practise with fusion of other education and training experience (Knox, 2016).

Providing a platform where problem solving challenges and disorienting dilemmas could be shared would serve both requirements. It would also be a focus for good practise to be shared and critically discussed. Remembering that the majority of these learners are mid-career professionals transitioning

between learning styles. There are many examples of good practise that could be collated and debated in an appropriate forum one which was communicated recently was the Salisbury Novichock attack in early 2018. The multi-professional team managing that incident followed the principles of the all-hazards approach, treat what you see until you know the cause and learn as you go to optimise results (Baxter C, 2021). Wenger's (1998) communities of practise provides a solid foundation for an alumni community that continues to learn and share its learning. Similarly Centres of Excellence such as the NATO family in Allied Command Transformation and Faculties also serve to promote continuous learning in the community along with rapid transition of that learning into practise with subsequent changes to doctrine and development of the capability in multi-professional and societally interdependent communities (Frenk et al, 2010). They also provide an opportunity to deliver contextually appropriate coaching and mentoring which has proven anecdotally to be highly beneficial during the current CoViD-19 crisis. Even simple peer support or having a critical friend who understands the context of the problems or disorienting dilemmas has proved to be effective. Findings and learning may generate research questions with examples of good practise potentially being shared through lecturing, presentations and publishing.

Conclusion

This paper contributes to the growing discourse and specific praxis of transformative learning in the context of developing

capabilities that will address disaster response through an ‘upstream’ public health approach. The authors believe that approaching teaching and learning from a macro level enables students and practitioners to interpret the principles of disaster response for application within the context of their own mission space or communities. This in turn creates the conditions for a bottom up approach to problem solving and decision making based on current social reality and driven by the moral responsibility to do the best job possible given the constraints of the mission including limited intelligence and information. It is recommended that these observations are noted and that further research is supported in order to progress this important aspect of crisis management and disaster response.

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THE SECURITY IMPLICATIONS OF EU DECARBONISATION POLICIES

Radostina Primova[1]

Abstract: The global climate and energy challenges have become a significant source of geopolitical and geoeconomic instability. The degradation of natural environment and exacerbating competition over natural resources along with the population growth are perceived as the key peace and security challenges of 21st century. The contribution will address the emerging geopolitical and security issues in response to climate change challenges and energy transition, such as material-intensive green technologies', the EU's excessive dependence on the import of raw materials from developing countries, its strategy for securing the supply chains of minerals and metals necessary for the production of wind, solar and storage technologies, as well as the implications of its external trade policies for questions related to food security, human rights and socio-economic impacts on local communities. Finally, the article will shed light over the security risks associated with geoengineering solutions to the climate crisis, as well as their planetary implications in the future depending on who controls these kinds of technologies.

Key words: climate security, rare-earth metals, cyber-attacks, geo-engineering solutions.

The degradation of natural environment and exacerbating competition over natural resources along with the population growth are perceived as the key peace and security challenges of 21st century. The COVID crisis has once again underscored the importance of incorporating environmental factors, including the increasing deforestation, wildlife intervention, the aggravation

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of the global agri-food system, as a trigger for a spiral of public health, resource, economic, political crisis and social tension. Navigating through these waves of crisis requires an expanded horizon on the interlinks between different sectoral activities and innovative solutions taking into account the different dimensions of security.

As a climate pioneer and world leader in many green technologies, the EU has a strong track record in safeguarding environmentally security and sustainable development within the EU and beyond its borders. During COP21, the EU has played a decisive bridge-building role between developed and developing countries in leading a strong climate coalition, including its close transatlantic climate cooperation during the Obama administration[2]. EU climate diplomacy has been building up over the past years to create a momentum for COP26 climate negotiations in Glasgow next year, which could be seized as an opportunity for e new climate-resilient recovery plan after the Coronavirus crisis and a last chance to address global climate emergency.

As part of its commitments to implement the Paris agreement, the EU has launched an ambitious package of policy measures as part of the European Green Deal to reach a zero-carbon economy by 2050. The EU has also been active on the diplomatic

[2] Primova. R./ Glastra, K. 2016. "The Paris Agreement: What does it mean for the EU's Domestic Energy Policy and External Climate Strategies". https://eu.boell.org/en/2016/01/26/paris-agreement-what-does-it-mean-eus-domestic-energy-policy-and-external-climate-1

front cooperating with the U.S. and other countries to extend the ambition of a low-carbon energy transition across the globe. Climate-friendly policies in the U.S. such as the federal Production Tax Credit (supporting wind investments) and the Clean Power Plan (aiming to reduce CO2 emissions by 32% by 2030) have also contributed to a gradual shift in energy sector priorities.

The global climate and energy challenges have become a significant source of geopolitical and geoeconomic instability. At the same time, the decarbonisation of the energy system is posing new challenges in the context of the global competition for resources and access to technology. The concentration of oil and gas production, as well as the mineral resources used in renewable energy technology in the hands of few authoritarian states such as Russia and China would significantly increase energy security risks and could undermine the viability of the energy transition. The transformation of the energy system in Europe will also lead to a shift in energy security challenges internationally. EU's decreasing dependence on fossil fuels over the next decades will also lead to re-shifting energy geopolitical dependencies that will impact the relations between producer, transit and consumer countries. The transition away from hydro-carbon dependent economies will have major implications for gas and oil producing countries, including Russia and the OPEC countries. The electrification of the system and the local production of electricity from renewables will diminish the role of

states in the international arena who will become “prosumers” and eventually join an encompassing “grid community”[3]. This energy transformation will inevitably enhance other security threats such as the increasing vulnerabilities shared among all participating countries in a single grid and the need to defend critical infrastructure in a context of geographically shifting objects of protection (for example from sea passages and choke points to power grids).[4].

The energy transition will be also impacted by the digital transformation and its impact on critical electricity infrastructure. A digital transformation is underway that creates vulnerabilities for critical infrastructures. As a result of the variable RES supply, new risks related to the disruptions of the electricity system are emerging, including a significant increase in cyber-attacks since the start of the COVID-19 pandemic that could lead to financial and human-related impacts.

As the access to low-carbon technologies will be a key factor for social welfare and prosperity in the future given the technology-driven character of the new energy wave, the economic and technological misbalances between the Global North and Global South could be another major challenge. With the re-scaling of global value chains and relocation of production activities to the

[3] Goldthau, A./Keim, M./Westphal, K. 2018. “The Geopolitics of Energy Transformation Governing the Shift: Transformation Dividends, Systemic Risks and New Uncertainties”, SWP Comment Nr. 42, October 2018. https://www.swp-berlin.org/publications/products/comments/2018C42_wep_EtAl.pdf
[4] Ibid.

local level, the international division of labour and the world trading system is also changing as a result of the different flows of goods[5].

The so called “technology rents” could turn into the decisive driver not only for the success of the global transformation of energy systems but also for the future welfare of societies[6]. Although the steepest growth in energy demand is expected to occur in the Global South, around 90 per cent of investments in RES technologies are made in the Global North[7]. As a result, developing countries might face the risk of limited access to capital flows and technological progress. Inclusiveness in this new energy paradigm would mean also sharing the benefits of RES technologies, facilitating the technology transfer, building capacities on the ground with more local engineers, economists and entrepreneurs, which will automatically empower local communities to develop their own prosperous-oriented decentralized projects.

Another risk area is also related to the competition for raw materials necessary for the low-carbon transition, which is likely to lead to a new reallocation and redistribution of territories. The decarbonisation of the world economy would also have serious implications for the demand in rare earth metals and exacerbating global completion over it that could lead also to

[5] Ibid.
[6] Ibid.
[7] Ibid.

resource conflicts in some regions. The UNEP report from 2017 predicts that low-carbon technologies would require over 600 million tonnes (Mt) more metal resources up to 2050 in a 2°C scenario, compared to the 6°C scenario where fossil fuels use continues on its current path[8].

The exacerbating global competition for access to rare earth metals and raw materials could have negative repercussions for the local ecosystems, human rights, local communities and lead also to land grabs. The IEA Net Zero Emissions Report demonstrates a significant rise in demand for critical minerals such as copper, lithium, nickel, cobalt and rare earth elements that are essential for many clean energy technologies. Several potential vulnerabilities could hinder the adequate supply of these minerals and lead to price volatility[9].

The high concentration of mineral's production and processing operations in a small number of countries could lead to high vulnerability of supplies to political instability, geopolitical risks, corruption and misuse of government resources in some cases. China currently holds a near monopoly on rare earth production, as well as the refining process of cobalt materials, as it produces

[8] IRP. 2017. "Green Technology Choices: The Environmental and Resource Implications of Low-Carbon Technologies". Nairobi: United Nations Environment Programme. https://wedocs.unep.org/bitstream/handle/20.500.11822/20761/green_technology_choices.pdf?sequence=1&isAllowed=y

[9] IEA. 2021. "*Net Zero by 2050"*. Paris: IEA. https://www.iea.org/reports/net-zero-by-2050

more than 80% of the cobalt salts needed for batteries[10]. The concentration of the production and reserves of cobalt in the Democratic Republic of Congo (DRC) and the Chinese domination of the market over most of cobalt output raise serious concerns among investors about the cobalt supply. In 2016, seven of the 10 largest cobalt producers in the DRC were Chinese-owned[11].

At the same time, the global demand for lithium more than doubled in the past 7 years. Over 70 percent of the world's lithium resources is geographically concentrated in the so-called Lithium Triangle: Chile, Argentina, and Bolivia, causing also inevitable conflict coming between water availability and mining[12]. While extraction in the three countries is progressing at different speeds, they local populations face significant uncertainties over the actual environmental impacts that this industry has on local ecosystems.

The extraction of resources in countries with weak environmental and social regulations, as well as rule of law could also lead to increased land-use changes, land grabs, competition for scarce water resources, human rights abuses, including the use of child labor, and capture of the whole process by oligarchic structures. The IEA report also raises concerns about the rapid increase in

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[10] Timperley, Jocelyn. 2018. *"Explainer: These six metals are key to a low-carbon future"*. London: Carbon Brief. https://www.carbonbrief.org/explainer-these-six-metals-are-key-to-a-low-carbon-future

[11] Ibid.

[12] https://energytransition.org/2019/06/latin-americas-lithium-industry/

demand as a result of the long lead times of critical mineral projects that could lead to a serious mismatch between supply and demand[13]. To prevent the adverse consequences of this misbalance and ensure reliability of mineral supplies, the adoption of an adequate international trade and investment regime supplies, as well as international co-ordination and the enforcement of rigorous environmental and social regulations will be key for managing these risks.

A foresight study about the availability of critical raw materials for strategic technologies and sectors in the EU, as well as the bottlenecks for their supply reveals that China's dominance in the market renders the value chains for rare earths extremely vulnerable[14]. Among all rare earths, dysprosium is considered to be at a higher supply risk as a result of the higher demand growth and lower proportion in rare earth ores. Although the short-term supply of lithium is less of a concern compared to nickel and rare earths, the need for large investments to avoid a significant market deficit beyond 2025 would be more challenging for the EU market. The biggest bottlenecks for the EU occur in the raw materials stages and the Li-ion cells production, where China,

[13] IRP. 2017. "Green Technology Choices: The Environmental and Resource Implications of Low-Carbon Technologies". Nairobi: United Nations Environment Programme.
https://wedocs.unep.org/bitstream/handle/20.500.11822/20761/green_technology_choices.pdf?sequence=1&isAllowed=y

[14] European Commission. 2020. "European Commission, Critical materials for strategic technologies and sectors in the EU - a foresight study". Luxembourg: Publications Office of the European Union.
https://ec.europa.eu/docsroom/documents/42881

Africa and Latin America provide 74% of all battery raw materials. When we look at the supply chain for wind generators, the highest risks could be observed at the raw materials stage, as the EU only provides 1% of the raw materials for wind energy[15].

To address the supply shortage and misbalance between supply and demand, EU trade policy will become a key instrument in achieving the EU sustainable mobility targets. It is essential that all future EU trade agreements and external investments are monitored in terms of their coherence with the sustainable development goals and comply with the high environmental, social, and human rights standards that are part of EU internal legislation [16] . The EU should also guarantee funding for technological development and improve the recyclability of products containing CRMs. A key challenge in Europe is the lack of a legal framework for the recycling of lithium batteries. Currently, no lithium is recovered in the EU because the process is considered non-efficient. Although recovered lithium cannot be used again in batteries, it could be applied in other sectors such as ceramics, glass, and others. Since recycling is crucial, more ambitious battery legislation would be key to incentivize the reuse of some materials and address potential hotspots in the battery value chain. In addition, binding due diligence rules, especially for the raw material extraction phase,

[15] Ibid.

[16] https://energytransition.org/2019/01/road-transport-the-problem-child-of-european-decarbonization/

would be imperative in order to prevent battery production from migrating to states with lower environmental and safety standards. The EU should adopt due diligence rules that would allow the import of batteries only if equivalent environmental and social standards are met by third countries.

For fuel cells, the authors of the EU feasibility study suggest improving the reliability and reducing the cost through R&D through reduced use of platinum from the fuel cell catalysts[17]. As far as the wind sector is concerned, the recycling of rare earth metals is recommended to preserve EU capability in magnet manufacturing[18].

Finally, another major security challenge issue is related to geoengineering. The IPCC report already includes negative emissions technologies in its scenarios and solutions for reaching the 1.5-degrees objective. Geoengineering like solar irradiation, but also carbon capture and storage and BECCS could have actually not only serious environmental, social and human rights impacts but also very serious planetary and security implications in the future depending on who controls these kinds of technologies. Geoengineering, the large-scale manipulation of the Earth's natural systems and the climate, is being offered as a solution to limiting global warming and

[17] European Commission. 2020. "European Commission, Critical materials for strategic technologies and sectors in the EU - a foresight study". Luxembourg: Publications Office of the European Union.
https://ec.europa.eu/docsroom/documents/42881
[18] Ibid.

suppressing the impacts of climate change[19]. Geoengineering refers to the large-scale interventions in our global ecosystems, with potentially catastrophic consequences for humans and biodiversity. The term is associated with a group of technologies that reply on computer-simulated interventions and aim at removing greenhouse gases from the atmosphere or cooling the Earth by interfering with its radiation balance. Another example of such intervention is ocean fertilization[20]. If deployed at large scale, these technologies could bring massive risks and result in climate and social injustice within and between states, the violation of human rights in some cases and lead to security risks. Therefore, these risks need to be regulated better at EU and international level.

[19] https://www.boell.de/en/2018/09/11/faq-15degc-target-geoengineering?dimension1=ds_geoengineering
[20] Ibid.

CLIMATE CHANGE, CASCADING IMPACTS, AND MIGRATION

Ben D. Wallace[1]

Abstract: Climate change impacts both vulnerabilities and hazards in complex ways that are not fully understood. Direct impacts receive the most attention, but complex and cascading events can cause indirect and systemic consequences far beyond obvious initial problems. As practitioners attempt to adapt to changing conditions, their analysis should include these additional factors. Relying on isolated analyses of changes and using past conditions as a baseline is no longer acceptable when developing risk portfolios. Climate-related vulnerability, changing hazards, socioeconomic trends (e.g., resource shortages, aging populations, urbanization, unbalanced wealth distribution), and ineffective mitigation efforts creates a situation in which vulnerable populations will face increased risk. Political instability, conflict, and large-scale migrations are expected, but can be mitigated. Risk management efforts should consider context-sensitive solutions that acknowledge the complex, systemic impacts of climate change and mitigate with carefully-targeted vulnerability reduction efforts.

Key words: climate change adaptation, disaster risk reduction, disaster mitigation, climate risk, vulnerability

This article addresses a critical aspect of climate change adaptation: how cascading impacts from climate change on vulnerabilities and hazards will be a destabilizing force that causes conflict and mass migration. Since vulnerabilities and hazards are the key components of risk, many stakeholders will

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see complex changes in their risk portfolios. Drought, heat waves, flooding, forest fires, storms and many other hazards are linked to climate change. Simultaneously, climate change is expected to have devastating impacts on some economies, render some current mitigation efforts obsolete, and cause irreversible damage to protective ecosystems (e.g., coastal wetlands). These are just a few of the ways climate change will increase vulnerability.

Because of the central role vulnerability plays in disasters, stakeholder analysis should consider changes in vulnerability alongside changes in hazards. Additionally, they should look well beyond direct impacts by embracing a systemic perspective that can analyze how interrelated cascading impacts influence both vulnerability and hazards. Cascading impacts and complex events are not new concepts, but they are particularly relevant in climate change risk assessment. In this context, a key aspect of this is the potential for cascading impacts from complex events to result in mass migration that destabilizes countries far from the location of the event. The article provides some concepts, highlights key aspects of this issue, and addresses some ways that stakeholders can approach this subject.

Uncertainty

A key part of this issue is uncertainty. Assessment of future climate conditions and efforts to adapt is generally limited, unable to properly address vulnerability, and complex. Modeling only

captures a limited number of factors, and even this limit is impossible to reach since there are many unknown variables such as future greenhouse gas emissions, potential conflicts, and tipping points for feedback loops.

Since predictions and modeling often focus on hazards, information on how climate change will impact vulnerabilities may be less available. Reassessing baselines will also be necessary because past frequencies and magnitudes will no longer be a reliable predictor of future risk. These are a few examples of areas where emergency managers can focus when they must act with limited information built on ranges and probability. This uncertainty is exacerbated by compound events and cascading impacts, which can cause consequences far from the geographic location of the event.

Feedback loops are an important aspect of a more systemic perspective that considers cascading impacts. A commonly cited feedback loop is that as the climate warms, permafrost melts, more greenhouse gases are released into the atmosphere, and this causes the climate to warm even more. Another example is ice and snow melting which results in less energy being reflected back into space, which turns into heat and causes more ice to melt. Since this kind of loop can have a relatively large impact on both vulnerabilities and hazards, it should be considered in analysis. Notably, even with very high quality analysis, decisions must be made despite potentially uncomfortable levels of uncertainty.

Vulnerabilities: Socioeconomic Risk and Ineffective Mitigation

Many researchers see vulnerabilities as the root of disasters, and, if they are correct, then addressing vulnerability is a critical aspect of climate change adaptation. For example, a hurricane in the middle of the ocean is a hazard, but not a disaster. Using this perspective to focus efforts on vulnerabilities could improve risk assessments and mitigation efforts. An important outcome of this approach is that carefully targeted disaster risk reduction efforts can lower risk related to multiple hazards by addressing specific vulnerabilities. For example, stabilizing a critical piece of infrastructure, providing a key resource, or supporting development programs could maintain stability in a region.

Socioeconomic Risk

Climate change is expected to have widespread impacts on local, regional, and national economies. Loss of agriculture, tourism revenue, and general environmental damage are only some of the ways climate change can destabilize large areas through increasing socioeconomic stress. Resource shortages can cause conflict, and vulnerability can drive people to migrate. Practitioners may be limited in their ability to address broader socioeconomic vulnerability, but targeted actions could be effective.

Much like physical infrastructure and the general built environment, sociopolitical efforts should consider not just how

conditions are expected to change in the future, but also how they have already changed. In order to properly adapt to this developing risk, practitioners should assess the impact of extremes on vulnerable populations using community participation and local knowledge (Tozier de la Poterie and Baudoin, 2015). Notably, there are other factors influencing future vulnerabilities (e.g., environmental damage, technological changes, aging populations, migration to vulnerable coastal areas, increasing inequality).

A recent World Bank report predicts that cascading impacts from climate change will be more harmful than immediate impacts, that 800 million people will live in “dangerous climate hotspots” by 2050, and that in some locations GDP will drop by over 10% (Glasser, 2018). These same people could also be facing resource shortages and ineffective disaster mitigation efforts that increase their vulnerability.

Ineffective Disaster Mitigation

While disaster mitigation is typically an efficient way of lowering risk, ineffective disaster mitigation can have no impact or even increase risk. For example, some physical measures designed to divert hazards merely shift the risk to another location, like a coastal wall that diverts storm surge into a nearby town. Other mitigation efforts could create a sense of safety in dangerous areas when the measures are only delaying the inevitable. New Orleans experienced this when levees collapsed during

Hurricane Katrina. The levees had provided a sense of safety and promoted development in the area which ultimately led to more people being in an extremely dangerous situation. A third example is suppressing all wildfires. While this can remove immediate danger, it allows fuel to build on forest floors that would normally be burned away occasionally. In some cases, this can lead to a much larger fire than the area would experience if typical fires were allowed to burn, or if the area was managed.

Despite the potential for unexpected consequences, there are critical areas where action is required. For example, in order to keep coastal flood loss at the same relative size to the economy in Europe, flood defense structures must be developed that protect these areas from 0.5-2.5 m of sea level rise, and without these actions the damages are expected to increase by two or three orders of magnitude (Vousdoukas et al., 2018).

Another problem related to disaster mitigation under climate change is that previous work in this area was conducted with an assumption that past conditions are a reliable predictor of future conditions. For example, planners might work with an assumption that a certain level of hazard (like flooding) has typically happened an average of once every 500 years. In some places this approach is now not only ineffective, but potentially increases risk. If a large residential complex is built with an assumption that storm surge from tropical cyclones is unlikely to impact it, but then the sea level rises by a meter and the frequency of the most intense hurricanes increases, many lives

could be lost when this building is destroyed by a tropical cyclone.

In the U.S. the average dam or levee is 50 years old, and it is not the only country where aging infrastructure is exacerbating a problem. Generally speaking, transportation infrastructure is vulnerable to flooding damage from scour, erosion, and wave action, energy infrastructure faces risk to fuel and electric infrastructure near water, and structures in low-lying and poorly drained generally face additional risk. As decision makers confront changing conditions, they should carefully consider the planning horizon for their efforts.

Because of its complex impacts on risk portfolios, climate change is a critical input in some disaster mitigation risk calculations. Practitioners should use modeling and systemic impact assessments in order to develop their understanding of changing future conditions in order to attempt to adapt to the complex impacts of climate change. As part of this approach, addressing critical, context-dependent vulnerabilities is an option decision-makers should consider if they want to prevent destabilization, conflict, and migration.

Hazards

Climate change can impact a range of hazards, and there are often causal links between them. The increasing length of heat wave seasons, an average of 47 days longer than in the 1960s (Climate Change Indicators: Heat Waves | US EPA, 2021), is one

of the more obvious changes in risk, and a notable secondary impact is power outages due to electric grids failing under the load from air conditioning. Heat waves are already one of the most deadly disasters. Sometimes related to heat waves, and one of the most serious hazards driven by climate change, droughts can have extensive and complex cascading impacts, including agricultural loss that leads to economic damage and increased vulnerability. Many droughts and heat waves are concurrent, partially due to inability to cool through evaporation.

This same dry, hot environment can allow deadly wildfires that cause further impacts by increasing the probability of flooding and landslides, as well as increasing vulnerability through economic damage, destruction of infrastructure, and other damage. The opposite problem can also be complex and deadly. Extreme precipitation and inland flooding can also lead to economic damage, destruction of infrastructure, and other damage.

Finally, disaster managers and other practitioners are faced with a relatively new hazard: Sea level rise. While coastal communities are often accustomed to tropical cyclones and other storms, the modern world has never experienced anything that compares to the expected rise in sea level, which will increase the damage from storms to unprecedented levels and displace hundreds of millions. These combined acute and chronic impacts could have devastating impacts on many areas, increasing vulnerability and causing conflict and migration. For example,

assuming 6 feet of sea level rise, almost 300 U.S. cities will lose 50% or more of their homes by 2100. The risk becomes even clearer when this is compared to a country like Bangladesh with its lower average altitude, denser population, and less resources to adapt. Some coastal communities will also see increased vulnerability due to marine ecosystem and habitat damage that drives food security by impacting both commercial and subsistence fishing (Barrow et al., 2018).

Compound Events, and Cascading Impacts

An important consideration in climate change adaptation, compound events are characterised by multiple failures that cause cascading impacts of increased risk (Gallina et al. 2016). The UN's Intergovernmental Panel on Climate Change (IPCC) recently said there are very few projections of compound extreme events, interactions between multiple drivers are difficult to predict, and environmental impacts can spread in unprecedented ways (Collins et al., 2019).

An example of an indirect impact is when reefs are damaged or destroyed due to climate change. This loss of natural protection services in coastal areas can trigger cascading risks (Collins et al., 2019). Indeed, wetlands provide over 23 billion USD per year in storm protection services (Costanza et al., 2008). Losing reefs, or other natural resources, can also have dire economic effects. For a town, losing a reef might mean the main source of revenue dries up: tourism. For a country or region, environmental loss

could mean resource shortages, conflict and mass migration due to increased risk.

Given the high probability of increasing resource constraints and the trend towards interconnected globalism, social destabilization and conflict is more likely to affect areas far away from the initial impact. Impacts from disruptions that occur far away are known as “societal teleconnections,” and these incidents can themselves cause additional impacts, which are magnified even more in large urban areas (Moser and Hart, 2018). So, proximity is not necessary for cascading impacts, and these teleconnections in an increasingly connected world mean governments must consider how climate change can cause these unexpected impacts in their risk portfolios.

Examples of the interconnected nature of disasters can be found throughout the world:

- A loss of medical supply manufacturing in Puerto Rico due to hurricanes threatened supply chains in the entire U.S. in 2017 (Thomas, 2017).
- The complex disaster at Fukushima where an earthquake destroyed barriers that could have helped stop the tsunami at the power plant.
- Flooding in Thailand closed many factories which impaired the global automobile and electronic industry (Kreibich et al., 2014).

There are also many examples of changing vulnerabilities and hazards causing mass migration that impacts entire regions. For example, Syria experienced its worst drought in at least 900 years from 1998-2011, including massive crop failures from 2006-2011, which scientists say was 2-3 times more likely because of climate change (Gray, 2016). People flooded and stressed cities when their rural livelihoods collapsed. This change in Syria's climate contributed to the war, and this led to the refugee crisis that caused instability in Europe. A link between this destabilizing force and larger geopolitical events like Brexit could be made. Indirect impacts like this are more obvious in hindsight, and if more systemic analyses can predict this kind of cascading impact, decision makers will be afforded critical opportunities to adjust strategy. If there was analysis showing these cascading impacts, it could have presented an opportunity to bolster social and political stability and mitigate the widespread impact of this drought and conflict.

Loss of critical infrastructure is a key driver of cascading impacts (Pescaroli and Alexander, 2018), and multiple elements of society can be impacted by compound events, leading to compound risk and cascading impacts (Collins et al., 2019). In a study of Los Angeles researchers found an apparent overconfidence in controllability of individual (yet interconnected) lifeline systems. As local climate impacts can lead to on-site and cascading lifeline disruptions, it is also important to identify each lifeline's upstream, long-distance (teleconnected) exposure to

climate change as these impacts will ripple through the system and affect the downstream utility's functionality (Moser and Hart, 2018).

Hypotheticals

This article cannot address all possibilities, and analysis is often highly dependent on context, but the following hypothetical demonstrates how initial hazards can cause disastrous unexpected consequences.

Heat Wave, Drought, Power Outage, Economic Damage, and Fire

The following purely hypothetical scenario is presented in order to demonstrate the causal linkage between a number of hazards and vulnerabilities: In a relatively vulnerable country, a heat wave is brought about by climate change, which then triggers a drought. The drought intensifies the heat wave through loss of cooling via evaporation, resulting in a heavy demand on an aging electrical grid caused by air conditioning. At the same time, low water levels cause loss of hydroelectric power and decreased thermal efficiency in power plants. As demand rises and supply falls, a widespread power outage leaves many people in an unprecedented heat wave with no clear path to power restoration. Heat waves are already one of the deadliest disasters, and in this scenario tens of thousands of heat deaths during the power outage overwhelm already thin resources, and the country experiences extensive agricultural loss. Finally, due to prolonged drought and lack of emergency management

resources, a wildfire burns out of control doing further damage to the economy and electrical infrastructure, as well as leaving areas more prone to flooding and landslides.

In this scenario, people are left in a situation with excessive heat, drought, major agricultural loss, thousands of deaths due to the power outage, growing economic stress, unstable landscapes, and damaged critical infrastructure. Many people attempt to reduce their risk by migrating away from the area, and this loss of tax base, economic damage from the hazards, loss of workers, and ongoing emergency management expenditures further increase vulnerability, leaving the area economically and politically vulnerable.

Clearly this is only a hypothetical scenario, the important concept here is that initial impacts can trigger compound events that include teleconnected, catastrophic cascading impacts throughout entire countries and regions. Applying aid early in this scenario could be an effective and efficient way to address this problem. For example, if this imaginary country had support adapting their agriculture and power grids, it is possible that mass migration could be averted.

Los Angeles

A second example of cascading impacts in a compound disaster is provided by a report developed for the City of Los Angeles (Moser and Hart, 2018). The report lays out a scenario in which a wildfire burns electrical infrastructure at night (the local street lights go out leaving responders in the dark), and the fire burns

local communications infrastructure (community members are unable to get warnings from emergency managers). The result is people in immediate danger from the fire due to a rushed self-evacuation that also clogs the roads needed by responders. These examples are not describing specific scenarios in order to give them special attention, rather they are demonstrating the concept of cascading impacts that modeling and planning often fail to capture. It is important to capture these critical connections between vulnerabilities, hazards, and each other in analysis and planning efforts

Discussion

Leaders must confront climate adaptation issues in all their complexity, and they can choose whether to prepare or not. As discussed, uncertainty is a key problem that confounds efforts to analyze and act on climate risk. According to the IPCC, compound events and cascading impacts are "... examples of deep uncertainty because data deficiency often prevents the assessment of probabilities and consequences of the risks from compound events." (Collins et al., 2019).

Participatory governance, risk mapping, and scenarios are familiar tools that can address compound and cascading impacts (Komendantova et al. 2014), so practitioners have established tools at their disposal. However, many researchers have supported a different approach, advocating for transformative adaptation with major societal shifts towards sustainability and

climate-resilient development (Moloney et al., 2017; IPCC, 2018; Morchain, 2018). Regardless of this support, critical transitions in social systems are already being driven by repeated and extreme compound events (Kopp et al., 2016). This can disrupt communities, and create "… cascading impacts consisting of short-term impacts as well as long-lasting economic effects, and in some cases migration." (Collins et al., 2019). Smaller countries in particular may have trouble dealing with changing risk through geographical redistribution (Collins et al., 2019). Since socioeconomic factors and policy will change regardless, a forward-leaning approach is needed if mitigation and prevention is preferred to unprepared response.

Whether driven by established tools or social transformation, a preventative approach can have considerable economic benefits. Researchers agree that disaster risk reduction investments have economic benefits, ranging from two to four times return on investment (Kull et al., 2013; Mechler, 2016) to about 400 times return in the case of flood early warning systems in Europe (Pappenberger et al., 2015). According to the US Federal Emergency Management Agency, increasing annual investment in flood management by 1% reduces damage by 2.1% (Davlasheridze et al., 2017). The key factor in this is how appropriate the decisions about this investment are. Practitioners can explore uncertainties under extreme scenarios, include these uncertainties and evaluations of cost effectiveness in their

modeling, and use these decision analysis frameworks to model socio-ecological impacts (Weaver et al., 2013).

Conclusion

We must improve our understanding of systemic climate change risks by predicting cascading impacts and connections between vulnerabilities and hazards. An important aspect of this systemic perspective is addressing vulnerability to effectively reduce risk. Despite limited modeling and information causing deep uncertainty, critical decision-making is needed. Science and policy communities need to strengthen multidisciplinary work and use iteratively-developed multicriteria frameworks to assess, prioritize, and monitor results. Multiple criteria should be analyzed so leaders can make the most effective use of limited funding by targeting key vulnerabilities that could cause cascading impacts. In some cases, resolving a key vulnerability can lower risk from multiple hazards (e.g., sustaining critical infrastructure).

Addressing these complex issues is interdisciplinary by nature, so information and perspectives from a variety of stakeholders will likely be needed to assess potential indirect impacts. With links to global research and best practices, improvements to resilience and adaptation efforts in large cities and countries continue (Aerts et al., 2014).

Direct and cascading impacts from climate change will impact social and political stability, changing regional climates and sea

level rise will drive mass migrations of many, many millions of people. Some researchers warn that “climate drivers that contribute to compound events could cross tipping points in the future” (Cai et al. 2016). Current disaster risk reduction practice tends to consider vulnerability and hazards as unchanging, but now they must begin considering changing future conditions (Gallina et al, 2016). Leaders have a window of opportunity now for critical analysis, prioritization, and risk reduction in an organized manner while mitigation is an option.

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ENHANCING SOCIETAL RESILIENCE THROUGH PRIVATE-PUBLIC PARTNERSHIPS

Joel Thomas[1]

Abstract: In this paper, Joel Thomas will discuss the essential role of private-public partnerships in supporting national level and community-based achievement of resilience baselines (e.g., energy, food and water resources, civil communications, transport systems, mass casualties, continuity of government and population movement) and modern private sector led approaches to prepare the whole society from neighborhoods to nations.

Keywords: resilience, whole of society, private-public partnerships, institutional capacity building, national, whole community.

Background

For decades, the United States government and the North Atlantic Treaty Organization (NATO) Allies and Partners have relied on cooperation with the private sector. The U.S. Defense Production Act (DPA) of 1950 was a response to the start of the Korean War focused on a broad civil defense and war mobilization effort. Despite clear progression of policy to facilitate cross-sector cooperation, for many years consensus had not translated into clarity about how such policies should be implemented and improved.

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The current development of private-public partnerships (PPP) in the U.S. gained significant momentum following the attacks on September 11, 2001, were reinforced by Hurricane Katrina in 2005, were updated in 2012 as part of Executive Order 13603 (National Defense Resources Preparedness) and accelerated during the record-breaking hurricane and wildfire seasons from 2016-2019 and the COVID-19 pandemic. This acceleration led to broad and expansive use of the DPA, which was activated for U.S. national COVID-19 response to support mass production and accelerate the delivery of COVID-19 tests, personal protective equipment, and vaccinations. These events have both informed and resulted in substantial changes to U.S. policy, doctrine, and operational frameworks in 2018-2021.

In 2019, the U.S. Government has recently published a new National Response Framework that includes a new Emergency Support Function 14 (ESF-14), focused on Cross-Sector Business & Infrastructure coordination. ESF-14 is co-led by a newly established Department of Homeland Security (DHS) Cybersecurity and Infrastructure Security Agency and Federal Emergency Management Agency (FEMA) Office of Business, Industry and Infrastructure Integration, which manages the National Business Emergency Operations Center (NBEOC). The NBEOC is a virtual clearinghouse to enhance information sharing between the private and public sector before, during and after disasters. Other recent U.S. developments in this area include the publication of National Emergency Management

Association's (NEMA) first PPP guidance for states and FEMA's first national PPP guidance and a certified course and community-based training for the whole community:

- Building Operational Public-Private Partnerships, July 2017 (NEMA)
- Building Private-Public Partnerships, July 2021 (FEMA)
- Whole Community Inclusive Economic Recovery Course PER-386, July 2021(FEMA)

Globally, PPP has become a key topic at NATO in relation to Collective Defense readiness, enablement of the Supreme Allied Commander Europe (SACEUR) Area of Responsibility, and the need for nations to provide Host-Nation Support in support of military operations. Building effective PPPs is both a significant challenge and huge opportunity as key civil resources and capabilities maintained by governments during the Cold War now largely reside in the private sector. This situation has been reinforced by the numerous challenges faced by the international community in responding to COVID-19.

The purpose of this paper is to discuss the 1) essential role of private-public partnerships in supporting community-based and national-level achievement of resilience baselines, and 2) examine how NATO can leverage PPPs to support emergency management, resilience, and to prepare the whole society from neighborhoods to nations.

Introduction to the New Normal

Following a record-breaking season of hurricanes and wildfires in the United States in 2017, FEMA published an After-Action Report which stated 'No jurisdiction or federal agency has all the staff and resources it will need to respond to a catastrophic incident. As a nation, closer partnerships with the private sector are crucial in providing commodities and support to survivors.' (FEMA 2018, p. iii) The acknowledgement of this critical reality by national government leadership paved the way for a shift in how the U.S. government approached planning and operations before, during and after disasters.

The 2017 hurricane season turned out to be very busy and the most expensive on record (Insurance Information Institute 2017, p. 1). The next few years of floods, wildfires, severe weather and a global pandemic has led many throughout civil society and government alike to wonder, "Is this the new normal? And if so, what should we do about it?" Barbara Humpton, CEO of Siemens USA said, 'Whether 2017 is the "new normal" when it comes to severe weather and natural disasters is frankly impossible to predict. We do know, though, that we have the technology tools and solutions to prepare for any outcome. Business will need to lead. At the same time, public and private sectors will need to continue working together - and working proactively - to address challenges.' (Humpton, 2017, p.1)

For far too long, societies have been too reactive and responsive to the disruptions that disasters bring to communities. At the 7th

Annual U.S. Chamber of Commerce conference titled “Building Resilience Through Private-Public Partnerships”, the CEO of NextDoor argued that ‘A key value-add of increased private sector involvement in disaster preparedness is helping shift the country from playing defense to playing offense.’ (Humpton, 2018, p.1) Playing offense requires a fundamental shift in mentality, in the game plan, and in the execution. An offensive mindset is not reactive, it is proactive. It is not waiting for the next disruption; it is planning how to disrupt and mitigate the impact of future incidents. It moves us from being a victim to being a survivor.

The new normal has less to do with things we cannot control (i.e., increased frequency, intensity and multiplicity of threats) and more to do with how civil society and governments will organize and work together to combat challenges that no single agency can do alone. John Plevin offers three reasons why public and private sectors are stronger together against disasters and crises. This includes 1) the public and private sector play complementary roles, 2) PPPs can support public sector objectives, and 3) PPPs help address new risk through new approaches (Plevin, 2020).

In the 2019 NATO Review, it states that, ‘resilience is the first line of defense’ (NATO 2019). Resilience is not only the responsibility of the government, rather of the whole society (Ladd, Resilience.org). As such, it is important for governments to acknowledge that employers and employees of businesses and

industries are on the front line of this battle, and as such, the 'private sector increasingly bears the brunt of disaster impacts in terms of damages and losses,' (APP 2018, p.7) and must be part of the solution. This realization has led to a shift from a "relief-centric" approach to an "investment-driven" approach focused on prevention, mitigation and preparedness. This shift requires more clearly defined roles and responsibilities of businesses, industries in resilience-oriented and disaster management-oriented activities alongside the conventional actors such as governments and non-governmental organizations. The Building Private-Public Partnerships Guide (FEMA, 2021) and Community Resilience Planning Guide Playbook (NIST, 2020) provide collaborative planning guidance. The shift also requires review of foundational legal frameworks, policies and programs that can best prepare communities to tackle these challenges. The Public-Private Partnership on Disasters Mitigation and Recovery is an example of such an effort convened by the National Conference for State Legislatures. (NCSL, 2021).

Last, governments must consider that engagement with the private sector must go beyond the narrowly focused scope of business continuity planning. 'While business continuity is essential, there is an even greater need for an integrated public and private domestic preparedness strategy, one that views the private sector not merely as a profit-making entity, but as an entity responsible (as the government is) for protecting life and

ensuring security' (Kayyem, Chang, 2002). This is the new normal.

Who Will Respond?

Resilience, readiness and response begin at the household level. Individuals and families require access to food, water, energy, transportation, communications and other resources to perform the basic functions of life such as buying groceries, producing work, attending school or obtaining medical care, as shown in Figure 1. In the United States and amongst most NATO Allies and Partners, the private sector owns and operates a vast majority of the critical infrastructure, community lifelines and supply chains that deliver consistent access and equal opportunity for residents (GAO 2009 p.1), (CATO 2017, p. 1), (NATO 2020). The critical functions provided by the private sector are essential to social and economic stability, and national security. As such, the government and the private sector have a shared responsibility to secure critical infrastructure. (Isles, 2018). Recent occurrences in the U.S. such as the Texas winter storm power outages (Bohra, 2021) and Colonial Pipeline cyber-attack (Turton, Mehrotra, 2021) underscore these realities. These occurrences draw into focus a critical question: "Is the private sector prepared and ready to respond?" Given the shared risk and consequences, many government organizations have created preparedness toolkits to support and encourage private sector readiness (City of Chicago).

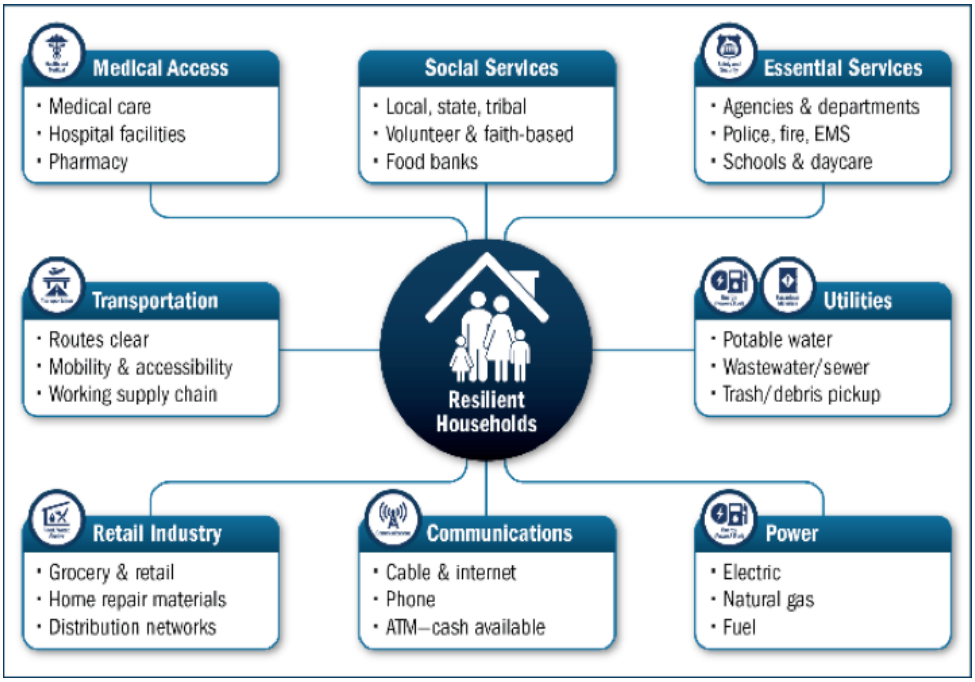

Figure 1: Resilient Households Are Foundation for National Resilience (FEMA, 2021)

In the NATO context, there are three primary civilian functions including continuity of government, continuity of essential services to the population, and civil support to the military. These three civilian functions have been translated into seven resilience baseline requirements, including: continuity of government services; energy supplies; ability to deal effectively with uncontrolled movement of people; food and water resources; ability to deal with mass casualties; telecommunications networks; and transportation systems (NATO, 2021). These resilience baseline requirements can be used to track the

readiness of a nation, the impact of disasters, and the progress of response and recovery activities. Use of these baseline requirements will provide decision makers with root cause and impact analysis for the most rapid recovery possible. These baseline requirements represent essential services and conditions that enable all other aspects of society to function, and when disrupted require decisive intervention.

In the U.S. and amongst NATO Allies and Partners, there is a universal need to pragmatically support preparedness and mitigation to the degree to which the private sector is responsible for national critical infrastructure and key resources. This can be achieved through collaborative engagement in pre-disaster planning, mitigation, and preparedness as well as post-disaster response and recovery. However, the examples of this actually taking place tend to be limited in scope and inclusion. If the role of the private sector can be fully acknowledged in achieving national resilience and response capacities, then nations must pivot to a proactive posture to anticipate, plan for and mitigate potential disruption to these resilience baseline requirements and the underlying supply chains. Because in the end, governments alone do not have the capacity to respond, private industry owns a large share of infrastructure that governments depend on for stability and continuity, and residents are most often the very first responders (Hoppe 2019), (Graham 2017) to incidents.

Private-Public Partnerships

"A private-public partnership is any informal or formal cooperative arrangement between two or more organizations from both private industry and the public sector for their mutual benefit, designed to ensure life safety, economic security, and community resilience. PPPs can support national objectives through participation of people, private sector, non-governmental organizations and public sector stakeholders. Because a P3 can help build a resilient nation for the families and businesses in a nation, P3s benefit entire communities.

The intended resilience outcomes of PPPs include but are not limited to (FEMA 2021):

- Shorter periods of disruption following a disaster;
- Efficient delivery of lifesaving and life-sustaining services;
- More resilient community lifelines, critical infrastructure and supply chains;
- Stronger national core capabilities and improved health and safety;
- Inclusion and equity in national resilience and disaster response efforts;
- Loss avoidance such as lives, livelihoods, property, business sales, or tax losses;
- Lower cost of insurance;
- Increased property values and improved property tax base; and
- New opportunities to create economic activity."

PPPs outcomes have traditionally been understood in the context of infrastructure and finance (World Bank, 2020), yet in the context of national resilience, they may take shape in

numerous forms to accomplish a variety of objectives. 22 examples of different kinds of PPPs are provided in FEMA's Building Private-Public Partnerships Guide, which offers a four-step process (i.e., Plan, Engage, Integrate, Assess & Refine) to build or enhance existing partnerships as depicted in Figure 3.

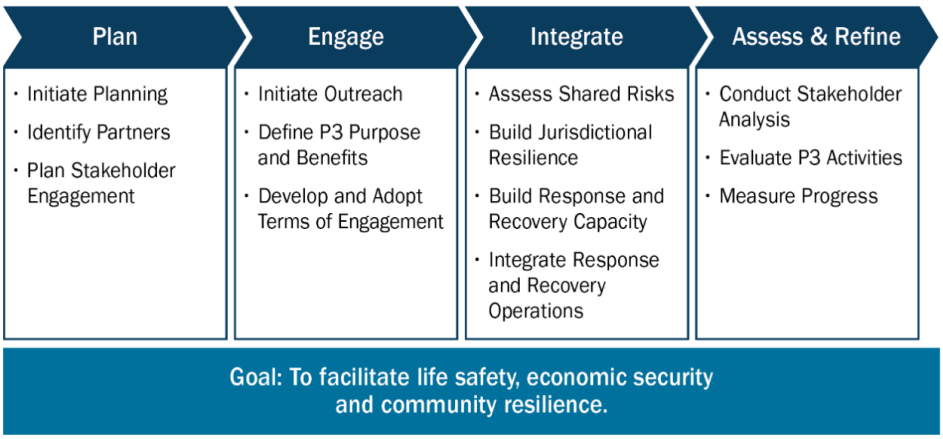

Figure 3: The Four Phases of PPP Development

"Public-Private Partnerships in a NATO Context" (NATO, 2019) provides examples of how PPPs have been used by nations to support military capabilities. There are three key elements examined in each of the case studies, including 1) determining which party (government or industry) is best placed to take responsibility for each activity or each identified risk, 2) how the performance of each party will be measured in a meaningful and timely fashion, and 3) how compensation and penalties can be best arranged to incentivize both parties to work toward shared goals. The conclusion of the case studies is that by appropriately structuring PPPs, nations can realize benefits not otherwise

achievable through traditional in-house or contracting solutions. An example of such a partnership is the NATO Industry Cyber Partnership (NATO 2014).

Whole Community Engagement Strategy

Engaging the whole community (i.e., grassroots leaders, businesses, NGOs, traditionally underrepresented groups) through PPPs builds local readiness, response and recovery capacity. Community engagement begins with understanding the culture and complexity of a community (i.e., demographics, economic profile), building purposeful relationships, strengthening partnerships, communicating effectively, integrating community assets, and empowering the community to take action and own their resilience objectives (FEMA, BCFS 2021).

Engagement should occur during “blue-sky” periods before a disaster occurs. Government stakeholders typically think in “top-down” terms, but as depicted in Figure 4, whole community and private sector engagement starts “bottom-up”, inviting stakeholders to the table (GFDRR, World Bank). Engaging the business community in disaster preparedness, response and recovery should be deliberately planned and executed. (PEMA), (RestoreYourEconomy.org), (Wang).

Figure 4: Whole Community Engagement Strategy

There are countless examples of how the private sector has stepped up in disaster response and recovery based on their assets, capabilities and capacity. The COVID-19 pandemic featured the essential role of the private sector, non-governmental and whole community stakeholders in filling gaps and meeting needs the government was incapable of addressing alone (Gleason 2020). Oxfam argued that the pandemic "shed new light on the meaning and purpose of businesses" (Vu 2020), while the World Health Organization published a revised private sector engagement approach (WHO 2021).

The following selection of examples show how PPPs at every level were indispensable during the COVID-19 pandemic response:

Globally, vaccine production and distribution efforts were coordinated to ensure equity (Clarke, Cocozza, Kanneganti, Seiter 2021), and nations shared resources (Keith 2021). Project Airbridge resulted in 249 flights from overseas, filling supply gaps in COVID "hot spots" with millions of N95 respirators, surgical masks, gowns, etc.

At a national level, private industry worked with the U.S. government (i.e., Defense and Civilian) as a national PPP to develop and scale production of tests, personal protective equipment (PPE), ventilators and create standup distribution centers. Testing companies such as Quest, LabCorp, Ford, pharmacies and other companies that responded to the call for action by the White House. The U.S. government lacked the capacity and expertise, but in partnership with the private sector, this challenge was able to be addressed rapidly and at scale (U.S. Department of Defense 2021). Furthermore, FEMA established a 5-year voluntary agreement with private industry to assist in pandemic response by using the Defense Production Act.

At a city level, a PPP model emerged in New Orleans, where cooperation between restaurants and FEMA resulted in meal production and delivery to residents ordered to stay-at-home. The program supplied two meals per day to 30,000 New Orleans residents and gave local restaurants an opportunity to stay open and generate new business. FEMA covered 75% of the cost, and the City of New Orleans paid for the rest (Ready.nola.gov).

In small cities and counties across America, production of personal protective equipment surged but overall lack of supply and last mile supply chain distribution challenges resulted in shortages. To fill the gap, PPPs comprised of children and adult volunteers, nonprofits and small businesses sewed cloth masks and shared with members of the community, including local hospitals, due to lack of available PPE. County councils stepped in and funded micro and small businesses that participated in reusable and washable mask development (Mottley, 2020).

Tech companies such as Zoom and many others offered free services to support business and government continuity of operations in a remote work environment (Arif, 2021).

Car manufacturers such as General Motors and Ford pivoted their production and assembly lines to produce ventilators (O'Kane 2020).

Nonprofits such as Meals on Wheels, delivered frontline food delivery support to vulnerable seniors. 9 of 10 programs reported increase in demand for meals since COVID began. This allows seniors to stay-at-home per government orders.

State Governments formed PPPs with Philanthropic organizations. The California State Disaster Relief Fund partnered with privately funded California Immigration Resilience Fund to provide financial assistance to families of undocumented immigrants who have been affected by COVID-19 and are

ineligible for unemployment benefits and disaster relief because of their immigration status (Mitchell, 2020).

In El Salvador, criminal gangs enforced virus-related restrictions due to shared interests with the government. MS 13 and Barrio 18 enforced stay-at-home orders, delayed extortion payments from local businesses, and even distributed assistance (Piché 2020).

These examples feature diverse examples of PPPs that emerged during a global pandemic. A critical task shared by both private and public sectors is to learn from this experience, build on what both exists and has worked well, and apply the lessons learned in the context of resilience, preparedness and mitigation. Furthermore, these realities draw into focus a key question: "What role does the private sector have in the national planning process?" Figure 5 provides a six step deliberate national planning process that should include private sector representatives as part of the core planning team.

Figure 5: Whole Community Planning Process

NATO 2030 Considerations

As part of NATO's strengthened resilience commitment (NATO 2021), a whole of society approach to resilience should build on existing PPPs and/or include the creation of new PPPs for each of the resilience baseline requirements.

Public education to train and equip citizens as first responders in a multi-threat environment is mission critical. The 2019 NATO Review stated that "New technologies (PlanetReady.com) offer historic opportunities for strategic advantage and for the enrichment and betterment of society." To that end, understanding risk and vulnerability will compel citizens to act, and partnership with the private sector is critical to reach the general public in an integrated way (UNDRR 2008).

Therefore, it is recommended that NATO:

1) Build a PPP body of knowledge and expertise;

2) Prioritize PPP capacity building for nations;

3) Support regional/multinational cooperation with industry stakeholders where appropriate;

4) Determine the full extent of private-sector contributions before, during and after disasters; and

5) Assess PPP initiatives that support resilience.

Acknowledgement

The views and opinions in this work are those of the author alone and do not necessarily represent the policies or views of the United States Institute for Security Governance, the Defense Security Cooperation Agency, or the Department of Defense.

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THE CLIMATE CHANGE, CONFLICT AND MIGRATION NEXUS IN THE GLOBAL SECURITY CONTEXT

Walter David, Michelle King-Okoye[1], Irene Mugambwa[2]

Abstract: The impact of climate change on location, scale and nature of crises calls for an immediate evaluation and urgent need to improve resilience. There is a dearth of research examining the direct impact of climate change on adverse health outcomes across populations globally, in relation to flooding, droughts, wildfires, increasing temperatures. This is especially significant for minorities that are more exposed to climate change and environmental degradation, living in marginal and poverty-stricken locations and often neglected by local governments. Asylum seeking and international migration highlight the impact of climate change and in turn have the potential to put pressure both on the European Union and globally. Armed conflicts and warfare have further contributed to environmental degradation causing pollution, and food insecurity. Mitigation and adaptation strategies are important to address climate change, but implementation processes may take years. In the interim, it is crucial to implement short- and medium-term action plans, to operationalize the Humanitarian–Development–Peace nexus, promote respect for rules of war, exploit innovative technologies such as artificial intelligence. Authors are involved in a promising research and aim to test a medical intelligence platform in the context of support to humanitarian security in Northeast Nigeria.

Keywords: climate change, environmental degradation, armed conflict, displacement, migration, minorities, mitigation, and adaptation strategies.

Introduction

Global heating, coupled with environmental degradation, will lead to greater and larger disasters for which global crisis response mechanisms are unprepared. Climate change is already having profound effects on the location, scale, and nature of crises. 30.7

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million people were displaced, as a result of disasters (Figure 1), of all 40.5 new displacements recorded in 2020 (IDMC, 2021). Over the next 10-20 years we will see increasing flooding in urban areas, multiplication of droughts and widespread food insecurity, large scale cyclones, heat waves and an increased number of public health emergencies. Countries enduring conflict are disproportionately affected by climate change and variability. In fact, of the 20 countries deemed most vulnerable to climate change, 12 are mired in conflict according to 2019 data from the Notre Dame Global Adaptation Initiative (ND-GAIN Index, 2021).

Climate change has indeed impacted infrastructures as well as population, yet there is a dearth of research that has focused on minorities, who are more prone to the impact of climate change due to living conditions, poverty and lack of financial support to

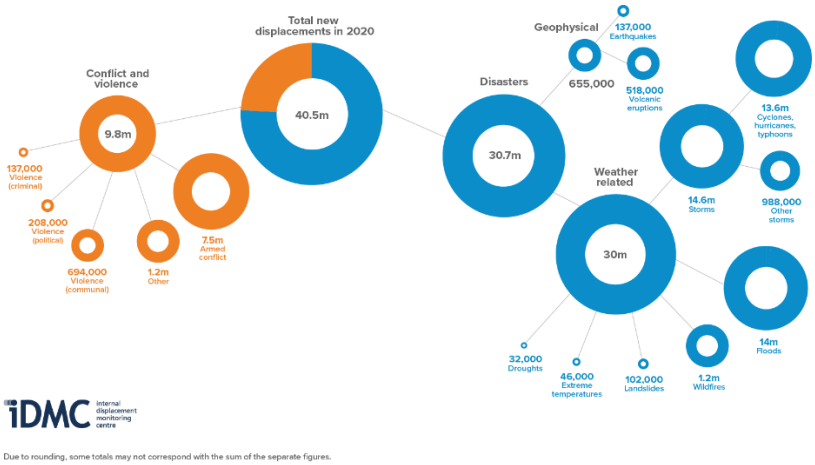

Figure 1. New displacements in 2020: conflict and disasters (IDMC, 2021).

help following the aftermath of climate adverse conditions. Although research examining the direct impact of climate change on people health are quite sparse, physical, mental and occupational adverse health outcomes have been reported. This is a call for multidisciplinary and collaborative research to examine both direct and indirect impact of climate change across populations. The paper aims to investigate the nexus between Climate change, Conflict and Migration, from a humanitarian perspective, and

- *the effect of climate on conflict and the impact of warfare on the environment,*
- *the effect of climate on displacement and migration,*
- *the impact of climate change on human populations with a focus on minorities,*
- *the importance of mitigation and adaptation strategies for climate change.*

Climate change and protracted crises

Climate change poses an increasingly immediate threat to global stability. Humanitarian actors have already reported dramatic its effects on location, scale and nature of crises. According to the FAO, this can be seen in the frequency, intensity, and complexity (FAO, 2021). Climate change driven natural disasters are occurring 3 times more often than 50 years ago; megafires, extreme weather, large desert locust swarms, and new biological threats devastate agricultural livelihoods and food systems, inflicting cascading negative economic consequences (FAO, 2021). The COVID-19 pandemic is spreading and has already contributed to these historical events never yet experienced.

According to the United Nations Office for the Coordination of Humanitarian Affairs (OCHA), the average humanitarian crisis in which there is an UN-coordinated response increased from the average length of 5.2 years in 2014 to more than 9 years, highlighting the devastating impact of climate change (OCHA World Humanitarian Data and Trends, 2018, OCHA Global Humanitarian Overview, 2021). Humanitarian organizations are already struggling with present crises and response mechanisms are unprepared to meet exponentially growing needs resulting from unmitigated climate change effects.

Social and economic impact of climate change

Climate change broader impacts on global trends pose a large dilemma (OTH, 2017), including its serious threat to economic stability. In fact, heatwaves reduce people's ability to work. Hurricanes, cyclones and typhoons devastate areas where millions live, bringing absolute poverty. Droughts (Figure 2) reduce crops' productivity, further complicating the task to feed world population, which is expected to reach 10 billion by 2050 (United Nations, World Population Prospects 2019).

According to the World Bank, climate change could push 100 million more people into poverty by 2030 (Iberdrola, 2021).

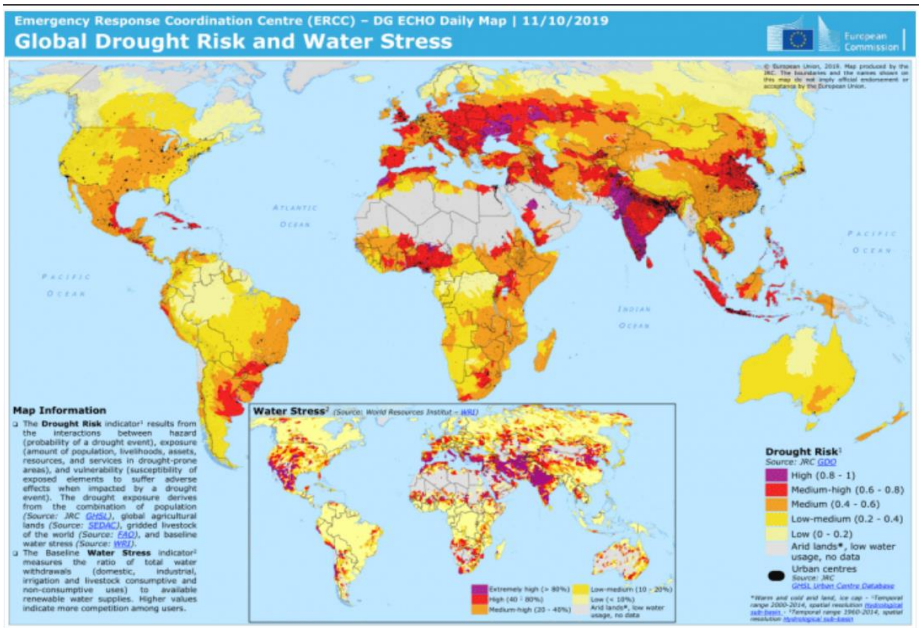

Figure 2. Global droughts risk (European Union, 2019).

Climate in relation to conflict and violence

Although there is a dearth of empirical studies that support climate change and conflict in relation to migration nexus, climatic conditions have indeed played a significant role as an explanatory factor for asylum seeking for the period 2011-2015. This was demonstrated by the impact of drought severity and the likelihood of armed conflict. The effect of climate on conflict occurrence is particularly relevant in the period 2010–2012 for Western Asia countries undergoing political transformation. Abel et al., 2019, provided a conceptual model and suggested that the impact of climate on conflict and asylum-seeking flows is limited to specific time-period and contexts (see Figure 3).

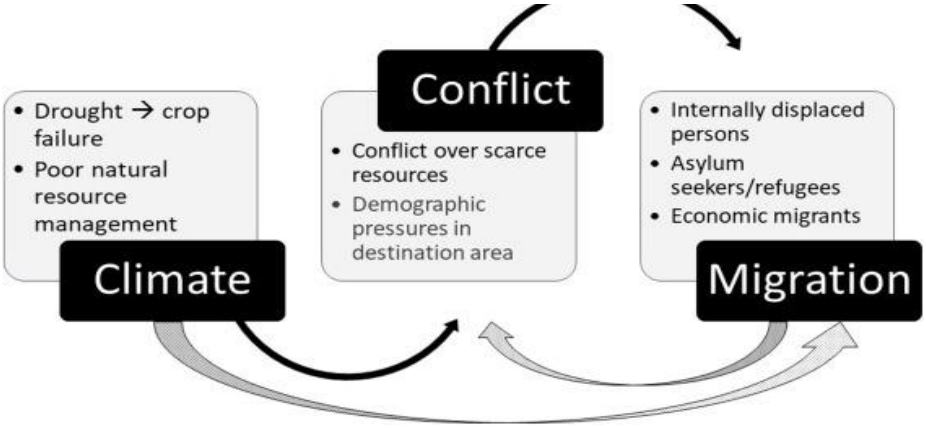

Figure 3. Climate, Conflict, Migration Conceptual Model (Abel et al., 2019).

Having a better understanding and responding to the impact of armed conflicts and the environment crisis is significant to obtaining a holistic view. Countries enduring conflict are disproportionately affected by climate change and variability. This is well demonstrated by the Notre Dame Global Adaptation Initiative. The ND-GAIN Index (2021) summarizes a country's vulnerability to climate change and other global challenges in combination with its readiness to improve resilience. The index looks at two key dimensions:

- **Vulnerability** - a country's exposure, sensitivity, and capacity to adapt to the negative effects of climate change and
- **Readiness** - a country's ability to leverage investments and convert them to adaptation actions.

Of the 20 countries deemed most vulnerable to climate change, 12 are mired in conflict**.** Yemen, Mali, Afghanistan, Democratic

Republic of the Congo and Somalia, all of which are dealing with conflict, are among the lowest ranked (ICRC, 2020).

Rather than a direct correlation between climate change and conflict, authors observe that **countries enduring conflict are less able to cope** with climate change, because armed conflict weakens their ability to adapt. Research shows countries that have "multiple existing stresses and low adaptive capacity" (EPA, 2017) could be related to wars and competition over natural resources.

Therefore, their populations are among the most vulnerable to the climate crisis and most neglected; in particular, those belonging to ethnic minorities. Indirectly, **climate change also increases the risk of conflict:**

- by exacerbating existing social, economic and environmental factors
- stir tensions in places that lack strong governance and inclusive institutions. Non-state armed groups control large open spaces while often, state officials are absent and access is limited by violence.

Impact of armed conflict on the environment

Too often, the **environment is directly attacked or damaged by warfare,** leading to contamination of water, soil and land, or release of pollutants, thus reducing the resilience of people living in the affected territory and their ability to adapt to climate change.

Moreover, the destruction of large areas of forest, or the damage to infrastructure such as oil installations or big industrial facilities that easily become targets for artillery bombing, can release large volumes of greenhouse gases.

Climate change and migration

The consequences of climate change on the environment and migration present humanity with an unprecedented challenge (IOM, 2009).

While there are not many scientific studies, already in 1990, the Intergovernmental Panel on Climate Change (IPCC, 2021) noted that the greatest single impact of climate change might be on human migration, with millions of people displaced by shoreline erosion, flooding and agricultural disruption.

Successive reports have argued that environmental degradation is poised to become a major driver of population displacement.

Extreme environmental events such as cyclones, hurricanes, tsunamis and tornadoes capture the attention of media, but it is gradual changes in the environment that are likely to have a much greater impact on the future movements of people (IOM, 2009 and IOM DTM Human mobility in the context of environmental and climate change, March 2020). Desertification and temperature rise**,** decreasing arable land and access to water combine and lead to a dramatic pressure to populations to shift toward coastal areas and Europe, thus challenging the

political stability of European Union states, due to the exploitation of the migration issues by local politicians.

Climate change related displacements are usually internal, localized, and short term but in many instances they have led to long and protracted internal displacements and even to external displacements in other countries.

Migration flows vary as a function of both the severity of the event and the ability of the household (Figure 4) to migrate (IOM, 2009 and IOM World Migration Report 2020: Chapter 9 Human Mobility and Adaptation to Environmental Change).

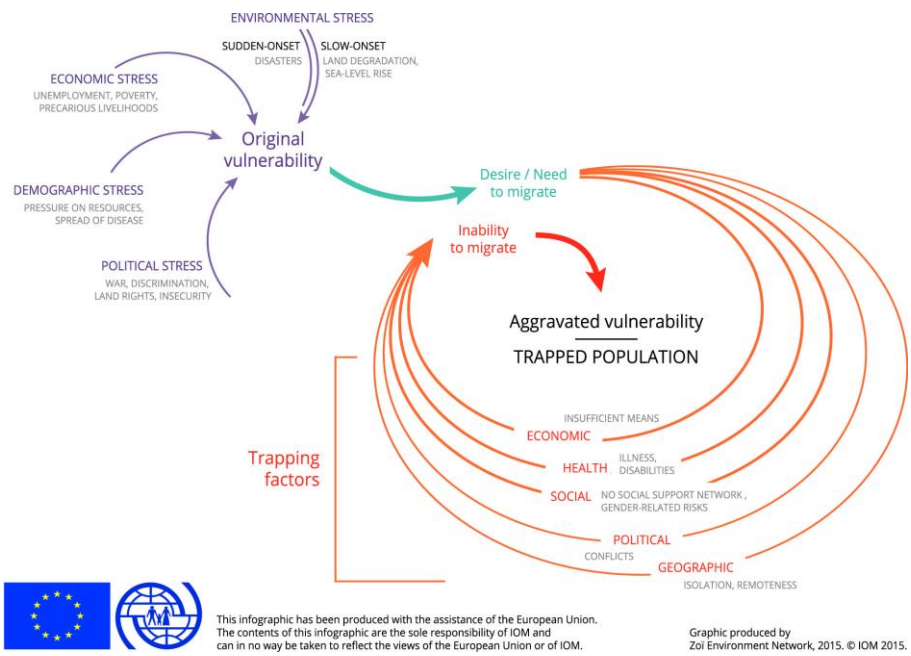

Figure 4. Vulnerability and trapped populations (Zoi Environment Network, 2015).

Although Climate change might be considered as one of the reasons of migration, in some cases it has been the root cause. Therefore, it is considered a slow onset occurrence that have over time led to major displacement across Africa and globally.

Table 1 from the IOM Migration Report 2020 indicates displaced persons in the last 20 years including those displaced by climate related occurrences.

Table 1. Key facts and figures (World Migration Report, 2020).

	2000 report	2020 report
Estimated number of international migrants	150 million	272 million
Estimated proportion of world population who are migrants	2.8%	3.5%
Estimated proportion of female international migrants	47.5%	47.9%
Estimated proportion of international migrants who are children	16.0%	13.9%
Region with the highest proportion of international migrants	Oceania	Oceania
Country with the highest proportion of international migrants	United Arab Emirates	United Arab Emirates
Number of migrant workers	-	164 million
Global international remittances (USD)	126 billion	689 billion
Number of refugees	14 million	25.9 million
Number of internally displaced persons	21 million	41.3 million
Number of stateless persons	-	3.9 million

According to the IOM Migration on Africa *"Climate change is expected to challenge food and water security in Sub-Saharan Africa, endangering lives and livelihoods. As precipitation patterns shift, yields from rain-fed agriculture are predicted to fall*

and compounded stress on water resources is foreseen to be intensified with escalated risks of flooding, drought and desertification. Africa, along with Asia, is urbanizing faster than any other region in the world. Rapid urbanization combined with overall population growth push socio-economically vulnerable populations into living in the most environmentally hazardous and densely populated areas, thus increasing the potential number of people affected and displaced by natural disasters." (Figure 5).

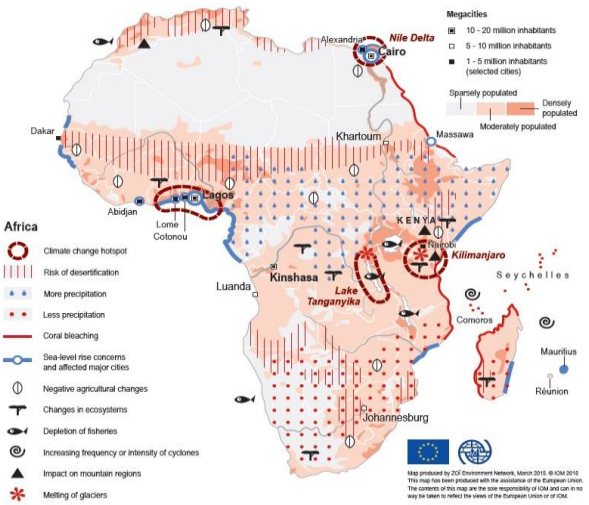

Figure 5. Climate change impact on Africa (ZOI Environmental Network, 2015).

There is no internationally agreed definition of 'environmental migration', although IOM glossary adopted the description of an 'environmental migrant' as a person or group(s) of persons who, predominantly for reasons of sudden or progressive changes in

the environment that adversely affect their lives or living conditions, are forced to leave their places of habitual residence, or choose to do so, either temporarily or permanently, and who move within or outside their country of origin or habitual residence.

Asylum seeking and migration

Asylum seeking and migration due to climate change are mostly seen among vulnerable populations that lack available resources, such as food and water. They normally reside in conflict-affected countries whereby both livestock and crops are affected (UNHCR, 2021).

Due to living in climate 'hotspots', refugees, stateless and internally displaced people are faced with more disasters than others, making them more prone to devastating health, and social and psychological damages.

This is an ongoing cycle for them making it difficult to recover, due to the domino effect. Climate change is a crisis for these populations who are forced to migrate to other parts of the country locally or cross international borders as a means of survival.

On average, climate change has resulted in almost 20 million people migrating to safer and 'richer' environments for themselves and their families (IOM, 2008). This occurs within their own countries or cross borders, whereby international protection may be needed. In Bangladesh, Mexico, Malawi,

Zimbabwe and Mozambique climate change has severely impacted living conditions forcing populations to seek asylum. These people required humanitarian support. Recovery is a long-term process for those affected, which usually take years (Table 2).

Table 2. Countries affected by Climate change impact (IOM, 2008 and UNHCR, 2021).

Country	**Climate change impact**
Central America	Hurricane Eta, 2020
Mozambique, Zimbabwe and Malawi	Tropical Cyclone Idai, 2019
Bangladesh	Monsoon storms, flooding and landslides.
New Jersey	Hurricane Sandy, 2012
Puerto Rico	Hurricane Maria, 2017.
New Orleans	Hurricane Katrina, 2005

UNHCR, the UN refugee agency, efforts were instrumental towards providing relief efforts, such as shelter, clean water and sanitation equipment to those affected by the devastating impact of climate change (UNHCR, 2021).

Hurricane Eta affected approximately three million people in Central America and southern Mexico. In 2019, Tropical Cyclone

Ida, one of the worst to hit Africa, destroyed villages in Mozambique, Zimbabwe and Malawi, killing over 1300 with some reported missing. In 2018, monsoon storms across Bangladesh killed over 1100 victims.

Lake Chad Basin Crisis

Authors have chosen North Africa as an example. Due to its geographic location facing the European Union, and due to its natural resources, North Africa is a playground for the competition among regional and world powers, which has become an increasingly immediate threat to global stability.

Libya has the largest oil reserves and Algeria has the largest proven gas reserves in Africa (159 trillion cubic feet) after Nigeria. However, multiple environmental pressures have caused great disturbances to diverse populations (NATO, 2018).

One outstanding example of this environment degradation trend is the Lake Chad (Figure 6), which shrunk from 26,000 sq km to 1,500 sq km (almost 90%) in 50 years (Salkida, 2021). About a decade ago, 200 Nigerian villages bordering the Sahara Desert disappeared due to desertification and the country continues to loses 1,350 square miles of arable land to the desert every year (https://cdn.americanprogress.org/wp-

content/uploads/issues/2012/04/pdf/climate_migration_nwafrica.pdf).

Figure 6. Environment degradation of the Lake Chad (Salkida, 2021).

The environment degradation is exacerbating the overall situation of the entire Lake Chad Basin region where some 17 million people are facing a complex crisis driven by extreme poverty, climate change and conflict between non-state armed groups (NSAG) such as Boko Haram and military forces. From 2014, the armed conflict expanded from Northeast Nigeria to North Cameroon, West Chad and Southeast Niger (MSF, 2021).

According to the Armed Conflict Location and Event Data Project (ACLED), more than 37,500 people were killed in the Lake Chad Basin region between May 2011 and 31 July 2020, while thousands have faced violence, abuse and violations.

Conflict goes on in Nigerian states of Borno, Adamawa and Yobe and in regions of Niger, Chad and Cameroon.

National governments have prioritized security issues and struggled to contain the NSAG expansion but they could not address efficiently humanitarian issues.

Due to severe disruption of food production and distribution, more than 10 million people need protection and lifesaving help to survive but aid access to people in need is much limited by violence that has displaced an estimated 2.5 million people across the region (IOM DTM Round 32/33 Reports Nigeria, and IDMC).

People move to towns for better security conditions but they have limited freedom and are dependent on humanitarian assistance to survive.

According to UNCHR reports as of 31 August 2020, 299,314 Nigerian refugees are living in Chad, Cameroon, and Niger.

In Nigeria's Borno state, some camps for displaced people still lack basics such as food, clean drinking water, shelter and sanitation (WASH) (MSF, 2021; OCHA Nigeria Situation Report 2021, OCHA Humanitarian Needs Overview 2021, OCHA Humanitarian Response Plan 2021).

Northeast Nigeria scenario

The operational context is characterised by huge humanitarian needs but decreasing funding. Nigeria is faced with complex multidimensional conflicts which comprise activity of the non-state armed groups (NSAG) in the Northeast.

The over 11-year-long ongoing armed conflict in Northeast Nigeria has affected over 13 million people with over 8.7 million in need of humanitarian assistance.

The crisis is exacerbated by COVID-19 pandemic and pre-existing vulnerabilities (OCHA, 2021). There are 1.7 million IDPs, 1.2 million are returnees, 4.8 are host communities, and one million are living in inaccessible areas.

Most of the affected populations are women and children (W 53%, children 58%, M 47%), especially those living in the 284 camps and camp-like settings and those living in the 1000+ villages/locations in the states of Borno, Yobe and Adamawa (OCHA, 2021).

In Cameroon, Chad and Niger, the NSAG presence threatens the livelihoods of both the local populations and IDPs.

Millions live in inadequate living conditions with high protection and health risks such as IDPs overcrowding in camps, fragile shelters, inadequate Water, Sanitation and Hygiene (WASH) facilities (IDMC, 2021).

Many displaced people find refuge in host communities that are already facing challenges, putting more pressure on their scarce local resources and infrastructure (MSF, 2021). For example, the trees are cut down to create camps, access routes, and the wood from the trees used for constructing of shelters and also used as fuel for cooking. Human activities in locations of displacement have further contributed to environmental degradation in both air

and water population, waste management, and soil/land stress due to dense and active human activity in congested locations.
The security situation is unpredictable, with attacks on civilians (IDPs, humanitarian workers). The International NGO Safety Organisation (INSO) recorded 896 incidents in the Lake Chad Basin region between January and April 2019, including kidnappings, attacks, roadblocks and bombings.

Recently, NSAG directly targeted health workers and health facilities (MSF, 2021) and the general humanitarian community.

Since December 2020 more than 8 humanitarian workers have been abducted and in recent past a significant number of those abducted have been killed. This compels humanitarian organizations to scale back their outreach activities at times to protect refugees and staff (MSF, 2021).

Access related issues are a major concern, including limited technological access such as functional telecommunication networks, electricity networks in addition to military related constraints and road blocks on main transport routes.
The rainy season further complicates things, some conflict affected populations are cut off due to flooding and waterlogged roads (MSF, 2021; OCHA Nigeria Situation Reports 2021).
In addition to an increase of diseases such as malaria, cholera and hepatitis E (MSF, 2021), the on-set of the COVID-19 pandemic has exacerbated the vulnerability of displaced person thus increasing affected populations protection concerns and risks. In an effort to mitigate the transmission of the pandemic in

congested camps and camp-like settings, community engagement, participation and sensitization is continuously ongoing to counter the rumours and mis-information about the pandemic (HRP, 2021).

Approaches to Climate change: mitigation and adaptation

Climate change adaptation efforts focus on the frequency, duration and intensity of weather and climate events and impact on human populations. Consideration is also given to exposure and vulnerability of populations. Mitigation and adaptation are critical towards addressing climate change (Cardona, 2012).

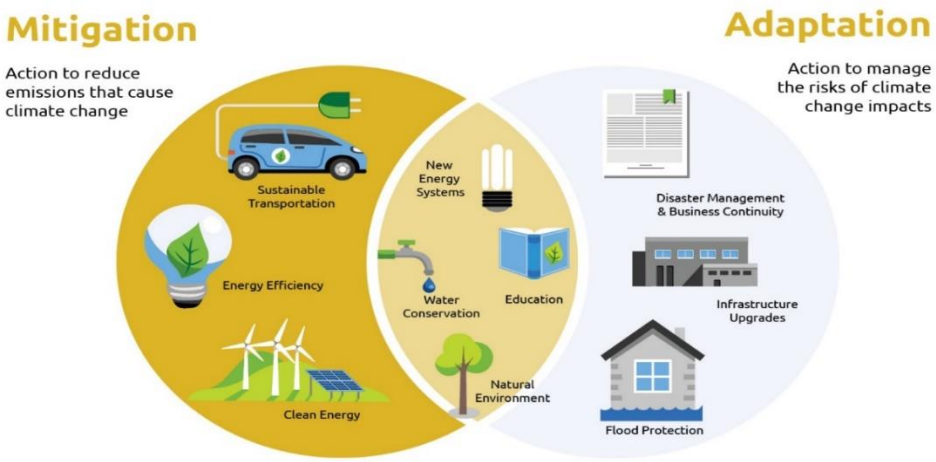

Figure 7. Mitigation and adaptation (Source: Huron County, Canada, 2021)

Mitigation refers to avoiding and reducing emissions of heat-trapping greenhouse gases into the atmosphere to prevent the planet from warming to more extreme temperatures.

Adaptation means altering behaviors, systems, and, in some case, ways of life to protect families, economies, and the environment from the impacts of climate change.

The more we reduce emissions right now, the easier it will be to adapt to the changes we can no longer avoid (NASA Global Climate Change, 2021).

Mitigation actions will take decades to affect rising temperatures, so we must adapt now to the changes (WWF, 2021).

Given the difficulty of predicting future climate effects, it is crucial to learn lessons from previous crisis. Humanitarian actors, from donors to international organizations to non-governmental organisations, should ensure that their work does not further contribute to deteriorating the environment, implementing greener response, and interlinking with adaptation and resilience.

Sometimes, adaptation to climate change can be simple (e.g. a change of crops) but often it may require major social, cultural or economic changes if the agricultural system might need to change. Conflict and violence situations limit adaptation efforts because authorities and institutions are more concerned with immediate security priorities.

Greater respect for the rules of war can reduce the harm and risks for conflict-affected communities, by prohibiting attacks on objects indispensable such as agricultural areas and drinking

water, that are protected by international humanitarian law (NASA Global Climate Change, 2021).

Humanitarian organizations must collaborate to strengthen climate action, they are already struggling to respond and will not be able to meet exponentially growing needs resulting from unmitigated climate change while the average duration of protracted crises has increased.

While people in conflict zones are among the most vulnerable to climate change, there is a gap in funding for climate action between stable and fragile countries. A greater share of climate finance must be allocated to countries affected by armed conflict to help local communities adapt to climate change.

Approach towards climate change mitigation includes reduction of greenhouse gases, changes in management practices and consumer behaviour, renewable energies and new technologies from high-tech subways to cargo drones and artificial intelligence. In the context of scarce donors' resources and increasing needs, it should be avoided any duplications between programmes in the domains of humanitarian action, international cooperation for development and peacekeeping, by operationalizing the Humanitarian–Development–Peace nexus and exploiting potential synergies.

Health impact of climate change

Both climate mitigation and adaptation are critical to ameliorate climate crises. Climate change research focuses on economic

sectors, such as infrastructure and agriculture but a humanistic approach is necessary to examine the impact on human populations, which need equal attention**.** For example, there are long-term health consequences of climate change ranging from physical. Mental and occupational impact, and on ethinc minorities, which are under researched.

A few studies highlighted the association between air quality and infectious, respiratory and cardiovascular diseases and resulting deaths.

Increasing temperatures have also been linked with heat stress, exhaustion, skin diseases, suicide and adverse maternal and fetal health-related problems, such as low birth weight, eclampsia and pre-eclampsia. Extreme weather has also been seen to be associated with some types of cancer. Occupational problems such as injuries sustained from falls were also linked with adverse temperatures (Khader et al., 2015; Gao et al., 2019).

Research has also shown the impact of climate change in relation to worsening the disease trajectory for those with underlying cardiopulmonary health conditions. People with respiratory conditions, such as asthma and chronic obstructive pulmonary disease have been identified as high-risk groups due to the increasing mould proliferation and increasing pollen caused by climate change.

These can also promote respiratory health problems. The drastic variations in temperatures, both at sea and atmospheric levels have also contributed to poor respiratory health.

Increased concentrations of greenhouse gases, particulate matter and pollen distributions have caused respiratory health problems, mostly affecting those residing in poverty-stricken areas and limited access to health and/or medical services. The steadily increasing release of carbon dioxide into the atmosphere has been identified as the main greenhouse gas contributing to increasing temperatures and heat waves. This has led to more pollen being produced as the increasing concentrations of carbon dioxide has facilitated photosynthesis and reproduction in plants, extending allergenic seasons (Ayres et al., 2009; Beinstein et al., 2013; Kovats et al., 2004; Ziska and Beggs, 2012).

Increasing temperatures have been found to be associated with diabetes and heart diseases, mainly among marginalised communities (Zilbermint, 2020).

Heat exhaustion and heat strokes from living in ‘heat islands’ reported by the United States Environmental Protection (EPA, 2020) have been found to affect young children and older adults increasing the risk of death.

A 2015 study also showed a link between infant mortality rates and heat waves for the period 1999 to 2011 in the Journal of Paediatric and Perinatal Epidemiology (Basu et al., 2015). Long-

term respiratory health problems were also found among those exposed to PM2.5, a measure of particulate matter, or particle pollution inhalation (EPA, 2021).

Climate change impact on indigenous populations and minorities

Although the literature is scarce, immigrant communities, minorities and indigenous populations have been more severely affected, deepening the existing inequalities. Minorities reside in climate 'hotspots', exposed to hurricanes, flooding and droughts. Some examples are the New Orleans floods arising from Hurricane Katrina in 2005, in which African Americans were severely affected, and the Indian flooding in 2007, which affected Dalits.

Ethnic minorities are disproportionately affected by climate change and are often neglected with regard to government involvement and support (Baird, 2008).

African Americans, Hispanic Americans, Asian Americans, Pacific Islanders and Native Americans, are less likely to receive protection and are more likely to live in heavily polluted areas, contributing to increasing mortality rates. This has been described as 'environmental racism', which refers to 'an unequal access to a clean environment and basic environmental resources based on race'.

Evidence showed that ethnic minorities are more likely to live near industrial facilities. In the USA, 60-70% of African

Americans in Baltimore live close to an oil industry. An NAACP (2017) report revealed African Americans were more likely to live within a half-mile of a natural gas facility.

These factors have further compounded the impact of climate change, making them more vulnerable to increasing temperatures due to lack of infrastructure, being more likely to occupy low-income employment and poor living conditions.

Coupled with longstanding discrimination, these factors make it more difficult for ethnic minorities to recover from the aftermath of natural disasters (Fernandez Rysavy and Floyd, 2017-2020).

Marginalised communities and those from lower socioeconomic backgrounds are more prone to the increasing heat due to being resident in urban, hotter living conditions and often lacking air conditioning.

Such urban areas were referred to as urban heat islands in a 2013 study. Black ethnic groups were 52% more likely to reside in these urban heat islands. A lack of green spaces and available parks within urban areas predisposes residents to the impact of heat waves (EPA, 2020).

A 2020 study showed a direct relationship between exposure to air pollution and mortality rates from COVID-19. Another similar 2020 report highlighted that those resident near Superfund sites are disproportionately populated by ethnic minority communities and low-income communities. Superfund

sites are contaminated by toxic chemicals and are more prone to flooding as sea levels rise (Mastroianni, 2021).

Awareness and impact on marginalised communities

A recent study conducted among British citizens found a lack of awareness of the huge impact of climate change on Black, Asian, Arabs and minority ethnic communities. The study showed that 26% of UK citizens perceive that all ethnic groups are equally vulnerable and one third believe that Whites are mostly affected (Bairstow, 2020).

A Global Warming's Six Americas Quiz survey conducted in 2019 by the Yale Program on Climate Change Communication and the George Mason University Center for Climate Change Communication among various ethnicities across the USA highlighted concern regarding climate change. This was mainly seen amongst three largest racial/ethnic groups in the U.S.: non-Hispanic/Latino Whites, non-Hispanic/Latino African Americans, and Hispanics/Latinos.

The categories utilised for this survey included, 'Alarmed', 'Concerned', 'Cautious', 'Doubtful' 'Disengaged' and 'Dismissive'.

'Alarmed' participants were most concerned about global warming and have demonstrated support of the policies and actions for climate change.

The ‘Concerned’ ones are not as concerned about global warming as the ‘Alarmed’ ones as they perceive this as less urgent. Those less engaged with climate change occupy the ‘Cautious’, ‘Disengaged’ and ‘Doubtful’ categories, whilst those that view climate change as non-threatening and are not engaged in any actions.

The survey shows that African Americans (57%) and Hispanics/Latinos (69%) are more likely Concerned and Alarmed respectively than Whites (49%), who occupy the ‘Doubtful’ (27%) and Dismissive categories, in comparison to African Americans (12%) and Hispanics/Latinos (11%) (Climate Change Communication, 2020).

African Americans (36%) and Hispanics/Latinos (37%) are more willing to be part of campaigns to reduce global warming; expressed as ‘definitely’ or ‘probably’ than Whites (22%). 57% of Hispanic/Latinos and 53% of African Americans that completed the survey selected ‘very important’ to their vote in the 2020 Presidential Election, in comparison to 35% Whites that participated in the survey (Climate Change Communication, 2020).

These studies highlight the growing ignorance of climate change and impact across races and ethnicities and how important it is to increase awareness of this global issue.

Indigenous communities and tribes across the globe are also more prone to the impacts of climate change.

Firstly, they mostly reside in isolated or rural communities that are considered as climate 'hotspots', along the coast and in deserted areas.

Secondly, they may lack medical insurance.

And thirdly, due to cultural practices connected to envronment and natural resources, their income, food and way of life can be drastically impacted. Rising sea levels pose significant threats for the Kirbatis.

Likewise, indigenous communities in the Brazilian Amazon and Sengwer people in Kenya have been severely impacted by climate change (Howden, 2008).

In 2017 in Kenya, droughts severely affected herds pastoralists leading to animal and crops deaths and food insecurity among 2.7 million people. Due to the reduction of their sales of livestock, the drought further contributed to a fall in the economy (Morland, 2017).

Lack of attention for marginalised communities

There is a lack of attention of the impact of climate change on low-income and ethnic minority communities.

Despite the security implications of disasters triggering wars and mass migration, as highlighted by the European Union, the lack of attention continues to grow. This also includes access to aid following the aftermath of disasters.

The Intergovernmental Panel on Climate Change (IPCC, 2021) has highlighted that socially marginalised communities are less likely to be represented on both national and international levels, leaving the voices of sufferers of climate change unheard.

Conclusions

In conclusion, authors propose action points such as:

- Respect for the rules of war (in particular, prohibiting attacks on agricultural areas and drinking water).
- Humanitarian organizations must collaborate and incorporate climate change recommended adaptations and mitigation measures to strengthen climate action.
- People in conflict zones are among the most vulnerable but there is a gap in funding for climate action between stable and fragile countries. A greater share of climate finance must be allocated to countries affected by armed conflict to help local communities adapt to climate change.
- Major efforts, including systemic and structural changes, political support**,** competent governance, investment, technical know-how, new mindsets are needed to limit climate change.
- Avoid duplications by operationalizing the *Humanitarian–Development–Peace (HDP) nexus* (exploiting synergies among humanitarian action, international cooperation for development and peacekeeping).

Work in progress

Authors are involved in a work in progress, building on the priority topic session on humanitarian security, artificial intelligence and medical intelligence lead by Ronin Institute at the UN OCHA organised HNPW conference, April 2021.

Authors, with the support of the private sector and accademia, aim to look specifically at testing an artificial intelligence (AI) supported medical intelligence platform (MIP) provided by industry on the Northest Nigeria scenario.

Because people in conflict zones are among the most vulnerable, we need to also perform terror risk assessment to safeguard people, including ethnic minorities, and minimize risks to aid workers.

The aim of this research is to safeguard people including IDPs and refugees and, at the same time, minimize risks to humanitarian workers.

The AI medical intelligence tool should have the capability to explore and analyse in real or near real-time, by selecting on a GIS tool, a geographic area of interest and providing specific keywords, open sources information available on online resources such as, for example, scientific literature repositories, national and local press, blogs, websites, social media tools and apps, and focus on:

- present and future medical threats,
- terror and violence risk,

- feedback from social media for emotions and sentiment analysis.

Such updated intelligence could be effective in improving the situational awareness, feed common operational pictures and simulations and finally enable better decision-making in the context of protracted crises.

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MILITARY IMPLICATIONS OF CLIMATE CHANGE

Dariusz Dobron[1]

Abstract: The serious implications of climate change for peace and security significantly growing. Although non-climatic factors still dominate armed conflicts, climate change also acts as a factor exacerbating such trends and tensions. The effects of climate change, combined with additional factors (such as, rapidly growing population and low levels of socio-economic development) can lead to an escalation of tensions and increase the likelihood of war. The worldwide increase in extreme weather events and natural disasters is leading to an increasing commitment by the armed forces to combat their consequences.

Keywords: Jordan, Covid-19, pandemic, NCSCM, matrix, crisis.

Climate as a risk factor for armed conflict

The temperature of the oceans has risen, the masses of snow and ice have decreased, sea levels have risen and the concentration of greenhouse gases in the atmosphere has increased. From the pre-industrial era to the present, anthropogenic warming will continue and will result in long-term changes in the climate system[2].

Experts leave no doubt as to the impact of climate change not only on ecosystems, but also on societies and national economies. Especially the societies of the so-called The Global

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[2] IPCC, Climate *Change 2013*, https://www.ipcc.ch/site/assets/uploads/2018/03/ar5-wg1-spm-3polish.pdf,

South and those with limited adaptation abilities will be most affected by the effects of climate change[3].

With recognition of the serious security implications this will have, researchers and policymakers are increasingly expressing concern that the effects of climate change may also increase the risk of armed conflict.

According to a 2019 study done by Stanford University researchers the effects of climate change, combined with additional factors (such as, for example, a rapidly growing population and low levels of socio-economic development) can lead to an escalation of tensions and increase the likelihood of war breaking out, both within and between countries.

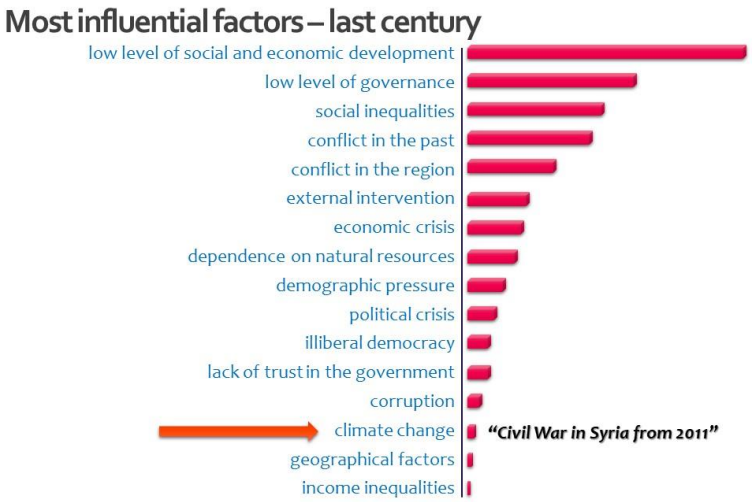
With climate change and the increase in global temperature, the risk of armed conflict increases. Nevertheless, most researchers agree that other, non-climatic factors, such as the low level of socio-economic development or institutional opportunities, still have a much greater impact on conflicts.

In other words, climate change should be seen as ***a threat multiplier*** and increasing the risk of armed conflicts by exacerbating existing social, economic and environmental problems, placing a heavy burden on states' responsiveness and institutional capacity.

[3] Polish Humanitarian Action, *Climate changes — Impasse and perspectives*, https://www.pah.org.pl/app/uploads/2017/09/2017_Zmiany_klimatyczne_impas_i_perspektywy.pdf

An increase in temperature on Earth could cause[4]:

- glaciers melting, permafrost thawing, and limiting the extent and duration of sea ice;
- global level of oceans can rise from 0,3 up to 2,5m;
- increasing incidence of extreme weather phenomena: hurricanes, heavy rainfall, floods, droughts, storms, as well as tsunamis;
- a decrease in agricultural production in the tropics and its potential increase in temperate zones;
- changes in the species composition of certain ecosystems, such as forests and coral reefs;
- potential increase in the areas where such diseases as salmonella, malaria, cholera and other
- tropical diseases are common.



(Source: own study based on K. J. Mach et al., "Climate as a risk factor for armed conflict", Nature 571 (2019), 195.)

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[4] Security Environment out to 2035 -NUP 2x35: The Polish Perspective, D&TC of PAF, 2020

Climate change is best viewed as a threat multiplier that will exacerbate existing trends, tensions and situations of fragility. The main problem is that climate change threatens to put an undue burden on countries and regions that are already fragile and conflict easily. It is important to realize that these threats are not purely humanitarian; are also among them political and security threats that have a direct impact on European interests. Moreover, in line with the concept of human security, it is obvious that there are many issues related to the impact of climate change on international security are interrelated, and therefore require comprehensive political solutions. For example, the Millennium Achievement development goals would be seriously jeopardized as climate change, if not mitigated, could wipe out years of development efforts altogether[5].

Due to the EU's leading role in development, global climate policy and the wide range of tools and instruments at its disposal, the EU's capacity situation the response to the impact of climate change on international security is unique. Moreover, this the security challenge allows Europe to seize the opportunities it presents a comprehensive approach to conflict prevention, crisis management and reconstruction post-conflict, as well as opportunities arising from the fact that she is the main spokesman effective multilateralism.

[5] Climate Change and International Security, Document of the High Representative and the European Commission to the European Council, S113/08 14 March 2008 r.

Types of potential conflicts related to climate change

For all societies in the world, climate change will be one of the key challenges in the coming decades. Although the changing weather conditions will have negative consequences for all living organisms inhabiting the planet, international efforts to combat climate change is proving ineffective. As a result, it is everywhere the world's rise in extreme weather events and natural disasters is leading down to potential unrest, conflict and even war.

The following potential types of conflicts related to the effects of climate change can be distinguished:

Conflicts related to limited natural resources:

The catalyst for the conflict may be the shortage of certain raw materials, assuming the nature of an ecological deficit - e.g. reducing the area of arable lands, water scarcity, decreasing food resources (including e.g. fishing). Climate change will fuel conflicts over scarce resources, especially where access to these resources is politically determined. The consequences will be particularly acute in areas under strong demographic pressure.

According to United Nation (UN) around 40% of all conflicts on the world were connected to natural resources, particularly saying and more precisely to secure existing or even gain new once. Moreover, it is estimated that more than 75% of conflicts (especially internal civil wars) which took place in Africa were

financed funds obtained from illegal trade of natural resources to meet local political ambitions.

Conflicts related to territorial loos or border-disputes:

Major land changes are projected to occur in this century. Retraction of the coastline and the flooding of large areas could lead to the loss of territory, including entire countries such as small island states. More disputes over land and sea borders and other territorial laws can be expected. There may be a need to amend applicable international law, in particular the law of the sea, regarding the settlement of territorial and border disputes. However, the recent conflicts in this area had absolutely nothing to do with climate change. It can be safely assumed that the annexation of Crimea, in fact, apart from political reasons, also had an economic basis. One of the main reasons was gaining / regaining access to the energy and mining sectors and greater access to the Black Sea. The same applies to the recent conflict between Armenia and Azerbaijan, applying to the territory of Nagorno-Karabakh, which has been questioned for years for years. But what can happen if due to climate change (rising sea and ocean levels) some territories disappear from the map, such as Madagascar, the Samoa Islands, the Maldives and others. In order to survive, the inhabitants of these islands will move to the mainland, which can cause tension and aggression.

Conflicts related to global migration

By 2050, the number of climate migrants is projected to increase to over 140 million. Population migrations can increase the risk

of political instability and conflict, both in transit territories and in destination countries. In 2009-2019, an average of 22 million people per year left their places of residence as a result of droughts, fires, extreme weather conditions and other climatic factors. Sub-Saharan Africa is the most vulnerable region, where by 2050 as many as 86 million inhabitants will be forced to relocate.

The remaining regions particularly vulnerable to climate migrations are South Asia and Latin America. Many people moving from 2015 under the so-called the migration crisis comes from countries where the effects of climate change are particularly felt. The climate catastrophe is increasing the intensity of existing migrations and will trigger new migration crises.

Recently, a very vivid example of the use of economic migration for political purposes is the operation of the Belarusian authorities on the border with the European Union, and especially with its eastern flank, namely Latvia, Lithuania and Poland.

Since September 2021 alone, around 30,000 illegal immigrants have tried to cross the border between Belarus and Poland. Such activities necessitate the involvement of large numbers of law enforcement services (including approximately 12,000 soldiers) and financial resources to secure the border, including the construction of an intelligent border wall.

Conflicts caused by increased instability and radicalization in fragile or failed states due to climate change

Climate change can significantly increase instability in failed states, putting too much strain on governments' already limited ability to meet the challenges they face. It is indicated that the inability of the rulers to meet the needs of society could cause frustration, leading to tensions between ethnic or religious groups and to radicalization of political attitudes.

As early as 1968, the wars waged by Somalia with its neighbors successively led to poverty in society, which ultimately led to the intervention of the United Nations, which ultimately suffered a defeat. The civil war in Somalia continues to this day.

The worst humidity conditions are in the south of Madagascar. Precipitation is lowest there. This has a big impact on agriculture. The vegetation is in terrible condition, and the crops are virtually non-existent. The authorities fear a progressive famine. The disaster of drought and hunger in Madagascar is certainly influenced by progressive climate change. “Time” writes that the current situation on the island can be described as "the first-ever famine caused solely by climate change." - It's not war, it's not conflicts, it's climate change”.

When Abiy Ahmed Ali became Prime Minister in Ethiopia in 2018, the importance of the Tigra People's Liberation Front began to drop dramatically, leading to a referendum in the Tigray region. The Ethiopian authorities recognized the Tigra People's Liberation Front as a terrorist organization and invaded the

Tigray region. The situation in neighboring countries is also worsening. Before the conflict broke out, more than 700,000 refugees fled from Sudan to Ethiopia, and most of them sought refuge in Tigray. The commencement of hostilities turned the situation around, and it was many Ethiopians who had to flee and shelter in South Sudan. According to the United Nations, it is a difficult region and very poor. Drought often hit these areas, so the people of Tigraj often needed help. Now, the situation is dramatic - many people have left their homes, lost their property, have no access to water or communication.

Conflicts over natural resources

Many of the world's hydrocarbon reserves are located in regions particularly vulnerable to the effects of the climate disaster, and oil and gas producing countries face severe economic and demographic challenges due to climate change. Consequently, one of the largest potential resource conflicts arises from increased competition for access to and control of energy resources.

China treats the entire body of the South China Sea as its property, including the allegedly located sources of energy resources under its bottom. However, Malaysia, Taiwan, Vietnam, the Philippines and Brunei also claim parts of these territories.

Conflicts as a result of pressure on international structures

If the international community fails to counter the threats described above, the system of multilateral cooperation may be

under threat. The impact of climate change can fuel resentment, especially between those most responsible for climate change and those most affected by it.

Polish Armed Forces v. Climate change

For all societies in the world, including Poland, climate change will be in the coming decades one of the key challenges. As a result, it is everywhere the world's rise in extreme weather events and natural disasters is leading to the increasing involvement of the armed forces to combat their effects. Poland has already struggled with natural disasters the scale of which has exceeded civilian structures' responsiveness. As a result, the Polish Armed Forces many times took part in removing their effects.

It is enough to recall the so-called the flood of the millennium in 1997, when the Polish Armed Forces were involved on a large scale. At that time, 14 thousand people took part in the campaign. soldiers (out of 50,000 who were on standby), 100% of helicopters available for civilian operations, 83% of floating self-propelled transporters (PTS), and over 3,000 cars and special vehicles.

The most important document that contains the basic interests and goals of the Polish state in the field of national security is called “National Security Strategy of The Republic of Poland”. This security strategy presents a comprehensive approach to the issue of threats and covers not only purely military threats.

The development and implementation of the present National Security Strategy of the Republic of Poland stems from the need to render the state capable of counteracting threats and living up to the challenges resulting from the evolving security situation faced by Poland. It also aims at using the opportunities for improving the security of the state and its citizens, ensuring its further development and boosting the Republic of Poland`s position in the international arena.

It is therefore no wonder that an entire chapter of this strategy has been devoted to social, economic and environmental development. In the field of environmental protection, the ecological safety of the state is of particular importance, which should be achieved through:

- creating conditions for effective enforcement of environment-related legislation;
- establishing a coherent policy for the protection, restoring and management of water resources taking into account food security of the state;
- intensifying efforts to combat smog, develop electro mobility and the use of alternative fuels, support the development of energy industry based on the use of zero-emission energy sources and improve waste management;
- adjusting national policies and actions to the climate objectives agreed on in the fora of international organizations related to energy transition and achieving climate neutrality, in a way that takes into account the

specificity of the country and maximizes their positive impact on the standard of living of the citizens, the economic development of the country and the competitiveness of the economy, taking advantage of the opportunities arising from the implementation of new energy production technologies.

- aiming to preserve all functions of the natural environment, including forests as one of the key elements of the country's ecological safety.

Recently, the role and tasks of the Polish armed forces have undergone some changes and reevaluation in relation to those previously traditional. The COVID-19 pandemic and the recent events on the Polish-Belarusian border have led the armed forces to increasingly perform police tasks, such as:

- protection and patrolling of the border with Belarus (418 km), currently 13,000 soldiers are involved;
- construction and maintenance of a temporary barbed wire barrier at the border;
- construction and maintenance of refugee camps;
- medical and logistic support for border police

Climate change, and especially the increase in earth temperature, causes the melting of glaciers, and thus an increase in the water level in the seas and oceans. An increase in the water level by 1 m may significantly threaten the existing seaports and military coastal installations. This also applies to other installations important for the military, such as airports,

bridges, dams, expressways and motorways, which will require additional involvement of the armed forces to protect and maintain them.

Recently, the Polish Armed Forces have been heavily involved in crisis response and humanitarian operations. Until now, they were mainly carried out outside Poland as missions under the patronage of the United Nations (Lebanon, South Sudan, The Democratic Republic of the Congo). Now it is highly probable that the armed forces will be involved in humanitarian operations in Poland, where they can ensure:

- transport;
- electricity supply;
- evacuation;
- water purification;
- reconstruction of roads and bridges;
- removing of effects of disaster.

For this purpose, Military Reconstruction Units were established, which were created on the basis of engineering rescue battalions. In total, Poland has 10 such units that are ready for operation within 48 hours.

From 2018, a new type of troops was included in the National Crisis Management System - Territorial Defense Forces. They were used for the first time in 2019, when they conducted anti-flood activities and aimed to removing the effects of hurricane winds. Bearing in mind that the Territorial Defense Forces are

voluntary troops, it is very important in the context of unpredictability and violence extreme weather events that Territorial Defense Forces soldiers responded to the call within just four hours.

Taking into account all the above-mentioned aspects related to state security, especially climate change, will have an impact on the future role and tasks of the armed forces. It is very likely that these changes can (will) change:

- the primary goal of the armed forces;
- financing of the armed forces;
- changes in the composition / structure of the armed forces;
- striving to "greening" the armed forces;
- as a consequence, a reduction in the size of the armed forces.

CLIMATE CHANGE AND SECURITY: EMERGING CHALLENGES AND THE ROLE OF NATO

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Abstract: Climate change (CC) and security form a nexus with widespread implications across the political, military, social, economic and environmental spheres. Relatedly, CC has been widely recognised as a threat multiplier and as such - steadily made it up the international security agenda. It is perhaps high time to decidedly move beyond the conversation on whether the Earth's climate is disrupted and human activity is a particular driver for that disruption, and rather focus attention and efforts in the direction of fruitful cooperation and adequate action. Drawing from deliberations on the role of the military in tackling direct and indirect (knock-on) effects of a disrupted environment, the present research explores NATO's evolving stance as regards CC mitigation, preparedness, response and adaption. In doing so, the analyses employs the understanding that the Alliance is not and most probably will not be in the lead of CC efforts but that its capabilities are uniquely placed to support those efforts. The piece eloquently unpacks CC from a human security perspective, outlines consequences of particularly relevance to NATO, and discusses risks and vulnerabilities from a resilience and civil preparedness vantage point. The paper further focuses on NATO's role in light of wider efforts at tackling CC and with a view to the Alliance's mandate and core tasks. While elaborating on the organisation's current work on CC, the argument pivots on comprehensive and people-centred solutions within a framework of wide civil-military cooperation at various levels. Thus, the paper charts a future course of strengthened integration of climate, human security, gender and resilience considerations into all aspects of NATO's core tasks, and of fostered cooperation with stakeholders at multiple levels.

Key words: climate change, NATO, resilience, human security, gender, civil preparedness.

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Introduction

In recent years, there has been a rise in the number of reports and findings on climate change and security, reflecting increasing awareness and urgency to act to reduce climate-related risks. Although traditionally the role of states to ensure the security of their population, contemporary threats are transcending national borders, thus requiring transnational solutions. This new landscape places international and regional organisations in the limelight and emphasises their role not only in crisis management and disaster response, but also in coordinating the actions of various stakeholders to increase awareness, resilience and effectiveness.

NATO's CC-related efforts have thus far focused primarily on reducing own energy consumption [3] through technological solutions, but the recently released *Climate Change and Security Action Plan,* promises a change in strategy that addresses climate change more comprehensively.

The purpose of this research is to explore climate change and the role of NATO in mitigating its implications from a strategic and planning perspective. The research will analyse existing, publicly available NATO publications and scholarly literature to shine light on the Alliance's stance as regards climate change and thereby position its (evolving) role within larger climate change mitigation

[3] (Adekoya 2020)

efforts. The study will address linkages with protection of civilians, resilience, and gender perspectives and how these enable a comprehensive understanding of climate-related risks to security. A comparative analysis with key climate change actors such as the United Nations (UN) and the European Union (EU), will serve to inform conclusions and recommendations as per existing gaps and possible ways for improving planning and decision-making.

Embarking on this analysis requires reconciling with the limitations posed by the contemporaneity of the subject-matter resulting in a constantly evolving policy framework. Therefore, this paper does not claim to be exhaustive of the subject at hand but seeks to address important aspects surrounding climate change and security and to encourage further research on the nexus between NATO, climate change, resilience and civil preparedness.

Understanding Climate Change

The multiple, cascading effects of climate change across every sphere of life place it among the top contemporary global security threats.[4] The World Disasters Report published in 2020, notes that the 'proportion of all disasters attributable to climate and extreme weather events has […] increased significantly […] from 76% of all disasters during the 2000s to 83% in the 2010s'.[5] In

[4] (Parry 2021)
[5] (International Federation of Red Cross and Red Crescent Societies 2020, 4)

the previous decade 'extreme weather and climate-related disasters had killed over 410,000 people, and that a further 1.7 billion had been affected' and/or displaced. [6] With current forecasts predicting a continued increase in temperatures and sea levels, the implications for human populations are vast and daunting [7] and depending on overall preparedness and resilience. This coupled with increasing resource competition, violence and economic and political turmoil will result in displacement of vast swathes of the global population, increasing communal tensions and conflict around the world.[8]

Ultimately, those most at risk will be the already most vulnerable in a given community or society. Climate change related hazards would more easily turn into disasters for populaces lacking adequate capacities and resources to prevent, respond to and recover from emergencies. Inequalities will deepen and further threaten social cohesion and unity.

The United Nations General Assembly (UNGA) highlights the importance of 'people-centred, comprehensive, context-specific and prevention-oriented responses that strengthen the protection and empowerment of all people'[9]. The human security paradigm, developed by the *United Nations Development Programme* (UNDP) in 1994 aims to support countries to identify the widespread and cross-cutting nature of security threats (**Error!**

[6] Ibid.
[7] (Intergovernmental Panel on Climate Change (IPCC) 2014)
[8] (Podesta 2019)
[9] (United Nations Trust Fund for Human Security 2021)

Reference source not found.).[10] NATO has also embraced this concept in recent years with the aim of protecting civilians in conflict zones.[11] The approach highlights the intersectional nature of the threats posed by climate change as seen on the table below.

Type of insecurity	Examples of potential root causes of insecurity linked to climate change
Economic insecurity	Damage to infrastructure, lost productivity, mass migration and increased security threats.[12]
Food insecurity	Disrupted agro-ecosystems and consequently agricultural production and post-harvest, leading to food scarcity and increased malnutrition.[13]
Health insecurity	Heatwaves, which are now increasing in frequency and severity.[14]
Environmental insecurity	Precipitating natural disasters, environmental degradation and resource depletion.[15]
Personal insecurity	Resource scarcity and environmental stresses giving rise to illegal coping mechanisms to survive.[16] This places populations at greater risk of physical injury and/or violence.
Community insecurity	Increased tensions, violence, and crime between ethnic, religious, and other social groups.[17] Example: Herder-farmer conflicts in Sahel and Lake Chad region.[18]
Political insecurity	Increasing social stress and economic turmoil triggering political instability.[19]

[10] (United Nations Development Programme (UNDP) 1994)
[11] (NATO 2030 Reflection Group 2020, 43)
[12] (Wade and Jennings 2015)
[13] (Food and Agriculture Organisation of the United Nations (FAO) 2015, vii)
[14] (Centre for Research on the Epidemiology of Disasters (CRED) 2020)
[15] (Intergovernmental Panel on Climate Change (IPCC) 2014)
[16] (Ahmed, et al. 2019)
[17] (International Committee of the Red Cross (ICRC) 2020)
[18] (International Committee of the Red Cross (ICRC) 2021)
[19] (Worland 2020)

Climatic changes have geopolitical implications, which create instability by exacerbating pre-existing threats, tensions, and inequalities, and by creating new ones.[20] The herder-farmer conflict in western Africa and the Sahel region serves as a stark illustration of how precipitated soil degradation and desertification have pushed traditional herdsmen and members of the Fulani tribe to change their migrating patterns in search of arable land, pitting them against other local groups. The tension caused by this increasing scarcity of resources has led to conflict, which has also taken an 'ethno-religious' dimension.[21] Terrorist groups, such as JNIM and Al-Qaeda, have exploited this situation to recruit more members and further their agendas, bolstering instability across the region.[22] This example highlights the need for whole-of-government and whole-of-society cooperative responses to climate change consequences.

Climate change is a transnational issue, which requires coordinated responses among a diverse range of stakeholders at all levels: from the local, through the national, to the regional and international. The interconnected insecurities provoked by its consequences are complex, requiring a multitude of resources, expertise and capabilities to mitigate risks and protect populations.

[20] (European External Action Service (EEAS) 2020, 4)
[21] (Al-Jazeera 2018)
[22] (Demuynck and Coleman 2020)

However, despite the transnational impact of climate change, the effect is not equal on all countries. Countries are disproportionality affected and “the more impacted are the most vulnerable […], including in arid and semi-arid areas, landlocked countries and Small Island developing states’.[23] The burden of climate change, therefore, is to be shared equitably to prevent the loss of lives and livelihoods in impact-exposed areas, as secondary order effects will inevitably reverberate across the globe. International organisations, governments, NGOs, the private sector and local communities all have a role to play in elaborating tailored solutions to climate change preparedness, response, mitigation and adaption.

It is indubitable that some actors have a stronger role to play in tackling climate change: national authorities and international organisations like the UN and EU are indeed more likely to be first responders in climate change-related emergencies.

NATO and the EU currently have 21 member countries in common, highlighting their interconnectivity and the importance of this relationship.[24] As the *NATO 2030: United for a New Era* report accentuates the two organisations need to work closely together to ensure information sharing, complementarity, implementation and coordination, while avoiding duplication of efforts.[25]

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[23] (Food and Agriculture Organisation of the United Nations (FAO) 2015, ix)
[24] (NATO 2021)
[25] (NATO 2030 Reflection Group 2020, 55-56)

The European External Action Service's *Climate Change and Defence Roadmap*[26] delineates three areas of action for the Union: 1) the operational dimension; 2) capability development; and 3) strengthening multilateralism and partnerships.[27] It further stresses the need to take action to improve energy efficiency and create greener technology, recognising climate change as a security threat 'multiplier'.[28] Concrete actions for the short to mid-term with an emphasis on the 'human factor', behaviours and awareness are also highlighted alongside the need to mainstream climate change and environmental considerations into all operations planning, military infrastructure renovation, training and education, implementation and reporting activities.[29] The report notes the need to explore closer cooperation on climate and defence with NATO and other partners including civilian organisations.[30] This call for increased cooperation on boosting resilience is echoed in the *NATO 2030: United for a New Era* report, though the climate-security nexus is not explicitly mentioned.[31]

[26] (European External Action Service (EEAS) 2020)
[27] (European External Action Service (EEAS) 2020, 2-3)
[28] (European External Action Service (EEAS) 2020, 6)
[29] (European External Action Service (EEAS) 2020, 6-7; 9)
[30] (European External Action Service (EEAS) 2020, 10)
[31] (NATO 2030 Reflection Group 2020, 56-57)

Implications for NATO: a view from a human security perspective

NATO is affected both directly and indirectly by climate change. Critically, its decision-making and planning processes are being pushed to adapt to ensure that forces are resilient and ready to deliver on the Alliance's mandate.

The direct physical impacts of climate change are already manifesting themselves on NATO's military installations and infrastructure. A prime example of this is the increased frequency and severity of flooding caused by sea level rises at the world's largest naval base in Norfolk, Virginia (USA), which houses NATO commands[32]. Tactics, equipment, vehicles, uniforms and weaponry are being upgraded and/or replaced out of a necessity to become greener and more resilient. The wellbeing of military personnel, as well as the integrity of operations and equipment, are increasingly at risk due to extreme weather. During a NATO exercise in Poland in 2019, for example, temperatures reportedly exceeded 40ºC inside German *Ozelot* armoured weapons carriers, impeding soldiers from staying inside them for more than a few hours.[33] Events like this, coupled with a predicted further rise in temperatures, will have an impact on NATO's ability to conduct operations. Moreover, the opening up of new, previously inhospitable domains, through desertification and

[32] (Stoltenberg, Remarks by NATO Secretary General Jens Stoltenberg at the Leaders Summit on Climate 2021)
[33] (Sabine and Robin 2021)

thawing permafrost presents a particular challenge in terms of preparedness and readiness. The melting of ice caps in the Arctic region, for example, is increasing geopolitical tensions and competition, which could potentially lead to future security concerns and/or conflict.[34]

The consequences of climate change are cross-cutting and result in many knock-on effects, which NATO must be ready to tackle. The increasing number of natural disasters are necessitating increased humanitarian assistance. With growing pressure on governments and aid organisations to handle the impacts of climate change, NATO assistance in emergency situations is likely to be sought after more frequently[35]. Against a context of mass displacements, increasing tensions, and deepening conflicts due to effects of climate change, the need for increased civil preparedness and resilience becomes prominent.

Climate change represents a non-traditional threat to security in many ways. One of the most significant is that it generates and deepens vulnerabilities and hazards affecting all 7 types of human security. As Brickner notes, 'it is no longer enough just to have strong defences in place', there should be strategies to adapt, mitigate, counter and recover in the face of evolving threats.[36] Under Article 3, NATO members have committed

[34] (Lanteigne 2019)
[35] For information on NATO's support in emergency situations, visit the Euro-Atlantic Disaster Response Coordination Centre (EADRCC) at: https://www.nato.int/cps/en/natohq/topics_117757.htm
[36] (Brickner 2020)

themselves to improving the civil preparedness and the resilience of their populations.[37] While this Article originally intended to ensure preparedness against armed attack, it has expanded to encompass a wider spectrum of threats, including climate change-related threats.

It should be highlighted that NATO's role in humanitarian assistance and resilience-building is one of 'last resort', with national governments and humanitarian organisations (and NGOs) leading those efforts. Nevertheless, and in a context of a growing need for transnational responses to climate change, NATO should ensure that its response to climate change is comprehensive and inclusive.

Research has shown that women and children are disproportionately affected by climate change, due to 'pre-existing inequalities, gender-related roles and expectations, and unequal access to resources'.[38] However, and as evidenced in a recent report on *Climate Change in Women, Peace and Security National Action Plans*[39], states are falling short of addressing this link in favour of tailored planning and decision-making. Only 17 out of 80 states directly mention climate change and only 3 have specific goals and activities.[40] This highlights that the connection

[37] (NATO 2021)
[38] (United Nations Environment Programme (UNEP); United Nations Entity for Gender Equality and the Empowerment of Women (UN Women); Department of Political and Peacebuilding Affairs (DPPA); United Nations Development Programme (UNDP) 2020, 1)
[39] (Smith 2020)
[40] (Smith 2020, 10)

between climate change and gender is not systematically studied, hence incorporated in relevant policies, programmes and projects at the national level, including by NATO member and partner countries.

Involving women and other groups into climate change adaptation and resilience planning will ensure more comprehensive responses, in line with the disaster risk reduction principles of human security.[41] However, and as NATO Special Representative for Women, Peace and Security, Clare Hutchinson points out in her 2020 op-ed, threats to women's immediate security like sexualised violence or climate change could compromise their ability to 'participate effectively in peace and security governance'.[42] [43] She also emphasises that there is further potential to better integrate gender considerations into all areas of NATO's work.[44] This resonates with the fact that the *NATO 2030: United for a New Era* report notes that the organisation could still do more 'to incorporate human security in its development of future strategic documents and clarify how it relates to NATO's core mission and major goals for purposes of prioritisation, operationalisation, and resources'.[45] However, the report's sub-section on human security and WPS makes no connection to the previous sub-section on 'Climate and Green

[41] (UN Human Security Unit 2016, 15-16)
[42] (Council on Foreign Relations 2021)
[43] (Hutchinson 2020)
[44] (Hutchinson 2020)
[45] (NATO 2030 Reflection Group 2020, 43)

Defence', though they are placed next to each other in the chapter.[46] This is significant when compared to the UN, which explicitly emphases the inextricable link between gender, climate and security.[47]

NATO's stance on climate change: a chronological overview

NATO has become increasingly conscious of its environmental impact and relatedly, has embarked on redefining its role in tackling climate change. At the Chicago Summit in 2012, Allied governments and Heads of State agreed to work towards 'significantly improving the energy efficiency of [their] military forces'.[48] Two years later, the *Green Defence Framework* was published with the aim to provide a basis for cooperation and information sharing between Alliance Members on green solutions for defence.[49] Subsequently, from January 2013 to May 2015, the '*Smart Energy Team'* (SENT), comprised of experts in the field, explored means through which NATO could become more energy efficient and provided their recommendations in a final report.[50] The latter notes the need to reduce energy consumption and to innovate technology for improved

[46] (NATO 2030 Reflection Group 2020)
[47] (United Nations Environment Programme (UNEP); United Nations Entity for Gender Equality and the Empowerment of Women (UN Women); Department of Political and Peacebuilding Affairs (DPPA); United Nations Development Programme (UNDP) 2020, 7)
[48] (NATO Multimedia Library 2011)
[49] (NATO 2014)
[50] (NATO Smart Energy Team (SENT) 2015)

operability, reduced energy costs and increased security in the theatre (taking into consideration commonly vulnerable supply lines to the front).[51] Both the NATO *Green Defence Framework* and *Smart Energy Initiative* focused on increased energy efficiency mostly through greener technology and research and development (R&D) sharing between Alliance members.

The appointment of Jens Stoltenberg, the ex-UN Special Envoy for Climate Change, as NATO Secretary General in 2014, signalled a new age for NATO, with an increased focus on climate change as a threat to global security. Since his appointment, strategic thought on climate change at NATO has evolved as evidenced in NATO's *Strategic Foresight Analysis* (SFA, 2017) and *Framework for Future Alliance Operations* (FFAO, 2018) reports. In the former document, climate change is referred to as a transnational challenge, which requires the creation of a large 'ecosystem' made up of a wide variety of partners 'including Nations, International Organizations, Non-Governmental Organizations, the private sector and academia, to share information, provide early warning and shared awareness and make maximum use of existing expertise'.[52] This echoes Heise's statement that 'the Allies are individually responsible for adapting to climate change, but the Alliance must also act collectively'.[53]

[51] (NATO Smart Energy Team (SENT) 2015, 24)
[52] (Strategic Analysis Branch- NATO Allied Command Transformation 2017)
[53] (Heise 2021)

NATO's SFA further aims to 'provide wide-ranging shared understanding of the future security environment […] expected to unfold over the long-term horizon' and of the security implications of these threats. The document dedicates a whole chapter to the Environment (Chapter 6), which covers Environmental and Climate Change (6.1) and Natural Disasters (6.2), highlighting their relevance to security. The report notes the cross-cutting and intersectional effects of climate change and its direct and indirect implications on people, livelihoods and governments. Climate change is described as a 'transnational challenge', which is deepening the 'uncertainty, disorder and complexity' of the security landscape, as well as a threat to governance with political, economic and social dimensions of the threat.

Notably, climate change is mostly understood throughout the report as an external threat, with a higher burden on underdeveloped and developing countries and the risk of a power vacuum in them should climate stressed, ungoverned areas be exploited. There is however, some mention of the need to increase overall resilience, particularly of critical infrastructure and equipment, of NATO allied and partner Nations, indicating awareness of climate change implications for the Alliance as a whole. The document recommends that NATO improve its capabilities in 'weather and climate prediction and early warning' to make it more 'long-range, more accurate and available'.[54] Further, it acknowledges the opportunity for improved

[54] (Strategic Analysis Branch- NATO Allied Command Transformation 2017, 67)

technology, resilience and greater energy independence in climate-stressed settings. It should be noted that the focus of climate change related action in this report was placed almost entirely on structures, technology and equipment rather than on people. While this is an important aspect of climate change action, the *Policy on Power Generation for Deployed Force Infrastructure (DFI),* published in 2014, also stresses the importance of changing behaviours surrounding energy and its consumption, rather than just evolving technologies.[55]

The FFAO (2018) aims to inform Alliance Members of opportunities for improved deterrence and defence capabilities.[56] It emphasises that 'forces must have the ability to protect themselves from extreme environmental conditions, address health and safety issues, and minimise their environmental impact'.[57] The document focuses on adaptability, resilience and interoperability, exploring energy efficiency mainly as a means to increase these three areas and optimise self-reliance. The majority of mentions of climate change in the document also note the need for technological advances and logistical improvements both to 'reduce cost and environmental impact' and boost resilience.[58] This document is therefore centred on NATO's own impact to climate change, and the need to adapt to climate-stressed environments. In both the SFA and the FFAO, analysts

[55] (NATO 2014, 5)
[56] (NATO Allied Command Transformation 2018)
[57] (NATO Allied Command Transformation 2018, 35)
[58] (NATO Allied Command Transformation 2018, 27)

highlight that while such adaptation to climate change is needed to prevent a dangerous threat, it is also an opportunity to improve NATO operations and planning.

An increased organisational emphasis on climate change as a threat is provided in the *NATO 2030: United for a New Era* report, notably in its chapter entitled *'Climate Change and Green Defence'*.[59] This report is the result of extensive consultation by an independent group with key figures from within and outside of NATO. It offers one of the most recent written insights into what could potentially become the organisation's core strategy and goals for the next decade and how that could be translated into specific actions.[60] Its recommendations intend to strengthen Allied unity and cohesion, to increase political coordination and consultation and to foster NATO's political role and ability to address current and future threats and challenges from all strategic directions.[61] In this report, the focus of immediate actions is placed on reducing emissions, noting the fact that climate change handling is 'primarily a national competency'.[62] It also however notes that NATO has 'a role to play in increasing situational awareness, early warning and information sharing'.[63] This report highlights an evolution in the understanding of NATO's role, expanding on the implications of the SFA to create

[59] (NATO 2030 Reflection Group 2020, 41)
[60] (NATO 2030 Reflection Group 2020)
[61] (NATO 2030 Reflection Group 2020, 3)
[62] (NATO 2030 Reflection Group 2020, 14)
[63] (NATO 2030 Reflection Group 2020, 14)

a more concrete objective and line of action, which focuses on behaviours, as well as technology.

2021 is of particular significance as regards NATO's understanding and role in tackling climate change as it marks the adoption of a specific agenda on climate change and security (*NATO Climate Change and Security Action Plan)*[64] by NATO Foreign Ministers[65], and the publication of a major civil society-driven report on '*Sustainable Peace & Security in a Changing Climate' (April 2021)*[66].

The Climate Action Plan elaborates on the strategy presented by Secretary General Stoltenberg in April 2021[67], which suggests a three-pronged approach in response to climate change and security: 1. improving *awareness* of the threat at NATO through increased monitoring, tracking and data sharing; 2. *adaptation* of operations planning and exercises, the evolution of equipment for climate change readiness and the protection of critical infrastructure, and 3. *reduction* of NATO's environmental impact and its militaries' emissions, while increasing operational effectiveness. The *Climate Action Plan* contributes a fourth point emphasising *outreach,* which aims to strengthen collaboration

[64] Hereafter referred to as the *Climate Action Plan*.
[65] (Heise 2021)
[66] This report, developed by experts of the North-Atlantic Civil Society Working-Group on Environment and Security (NCWES), provides recommendations for implementation initiatives (North-Atlantic Civil Society Working-Group on Environment and Security (NCWES) 2021).
[67] (Stoltenberg, Remarks by NATO Secretary General Jens Stoltenberg at the Leaders Summit on Climate 2021)

with partner countries, international and regional organisations, as well as civil society, the academia and the industry. This demonstrates that there is a will to increase information sharing on climate change and security within and outside of NATO, taking advantage of experts from a significantly broader network. The implementation of the *Climate Action Plan* will be key to helping put recommendations into practice.[68]

This increased focus on climate change as a security threat in itself or a threat multiplier, especially in already fragile environments is further reflected in the NATO Secretary General's speeches on the topic, which have increased in frequency in recent months.[69] [70] This highlights that climate change is now understood to be both a cause of and an exacerbating factor in crises and conflicts. The increased frequency of speeches on the topic and the language[71] used signal an evolution in understanding on climate change at NATO,

[68] (Heise 2021)
[69] (Stoltenberg, NATO and the security implications of climate change- Virtual speech by NATO Secretary General Jens Stoltenberg 2020)
[70] (Strategic Analysis Branch- NATO Allied Command Transformation 2017)
[71] This evolution in language is particularly important, as it defines the threat. For instance, The Guardian Newspaper recently changed its vocabulary from 'climate change' to climate 'crisis' or 'emergency'. Similar language has also been utilised by the UN Secretary General, António Guterres, in his speeches at the 2019 Climate Action Summit. Throughout NATO literature and discourse, threats caused by heightened environmental fluctuations, extreme weather and changing regional or global weather patterns are labelled uniformly as 'climate change', with occasional use of 'global warming'. However, there has been a gradual change in the way the Alliance is describing climate change to give a sense of a threat that is more imminent, perilous, and closer to home is being observed.

when compared to the SFA and FFAO. This is particularly evident in the sense of urgency conveyed.

Senior leaders are now increasingly recognising the anthropogenic or human activity-induced nature of climate change. Due to the fact that military forces are often exempt from providing data on their contribution to greenhouse gas contributions, it is difficult to accurately measure NATO's impact on the environment.[72] However, the International Military Council on Climate and Security (IMCCS) notes that defence remains the single biggest consumer of hydrocarbons, including fuel and gas, in the world.[73] In response, NATO Secretary General Jens Stoltenberg is now highlighting the need to reduce military emissions and fuel consumption.[74] If carried out in a timely and effective manner, this action could certainly help reduce the repercussions of climate change.

As NATO attempts to reduce emissions from its activities, it is worth noting that the Alliance could also offer some solutions, particularly concerning early warning, modelling & simulation and weather surveillance, which to improve forewarning of impending environmental disasters. Furthermore, NATO also has experience in the aftermath of natural disasters, having already provided disaster relief through the EADRCC mechanism. By helping to reinforce policing structures through the NATO

[72] (BBC 2021)
[73] Ibid.
[74] (Stoltenberg, Remarks by NATO Secretary General Jens Stoltenberg at the Leaders Summit on Climate 2021)

Stability Policing concept, NATO can also help to protect environmental spaces, which are often subject to criminal activity in areas where there is a weaker rule of law.[75] This helps to maintain biodiversity and environmental integrity, which is key to preventing natural disasters, coastal erosion and extreme weather events. [76] Similarly, environmental policing and protecting forests, peatlands and other habitats that are major stores of carbon can also help to reduce greenhouse gases in the atmosphere.[77] Although environmental protection is mostly a national responsibility, NATO can promulgate its pre-established coordination, training and information sharing experience to share best practices and lesson-learnt with regards to environmental protection and emissions reduction. As a regional organisation with transnational experience, NATO is well placed to help support Alliance members and partners in becoming more environmentally conscious.

The Future of NATO in a Climate Disrupted Environment

In 1969, NATO officially recognised environmental challenges as a threat to the Alliance.[78] Its related actions since have fallen into

[75] (Bergonzini 2021)
[76] (European Commission 2021)
[77] Ibid.
[78] (NATO 2021)

two categories: environmental protection and environmental security.[79]

Environmental protection efforts are currently being strengthened through the work of two NATO groups: the *Environmental Protection Working Group* (EPWG) and the *Specialist Team on Energy Efficiency and Environmental Protection* (STEEEP). [80] These groups are establishing guidelines and standards for NATO-led forces. Their work is being supported by bodies such as the NATO *Science and Technology Organization* (STO) and the *Science for Peace and Security (SPS) Programme*, which are contributing to R&D.[81] Cooperation with international organisations, industry, governmental organisations and academia is a crucial aspect of environmental protection efforts. The *SPS programme* has been supporting cooperation in activities to tackle environmental security issues in Alliance and partner countries.[82] Through initiatives, such as the *Environment and Security or ENVSEC Initiative*, NATO has also provided financial and technical assistance to support environmental action.[83] By drawing on the knowledge of a significantly broader network of subject-matter experts, NATO will have an excellent opportunity to increase

[79] Ibid.
[80] (NATO 2021)
[81] Ibid.
[82] Ibid.
[83] (Environment and Security Initiative (ENVSEC) 2021)

information sharing on climate change and security within and outside of NATO, mutually strengthening resilience.

In terms of environmental security, the EADRCC and the Civil Emergency Planning Committee (CEPC)[84] have been playing an active role in supporting Allies and Partners in their emergency response to climate change-related disasters. Working groups like the *Military Committee Working Group on Meteorology and Oceanography* have been supporting NATO members and partner countries to build their civil and military capacities to assess and prepare for these kinds of threats.[85] Additionally, in 2016, seven baseline requirements for civil preparedness were outlined at the Warsaw Summit, creating a basis for assessing the resilience of populations.[86]

Lessons-learnt and best practices sharing, risk communication and trust building between civilians and the military is vital to strengthening resilience and preparedness against climate change. Education and training have therefore been a fundamental building block of climate security. Within NATO, these efforts are largely conducted by specialised Centres of

[84] Information on the role of the NATO CEPC is available here: https://www.nato.int/cps/en/natolive/topics_50093.htm
[85] (NATO 2019)
[86] (Roepke and Thankey 2019)

Excellence (COEs)[87] [88]. The Crisis Management and Disaster Response (CMDR) COE, for example, has been actively expanding its interest and expertise on climate change and how it affects and is affected by military activities. In 2017, the Centre organised and conducted an *Advanced Research Workshop* (ARW) (under the NATO SPS Programme), which, among other things, resulted in a publication addressing regional considerations on the implications of climate change and disasters on military activities.[89] Furthermore, in response to an identified education and training gap, in close collaboration with the European Security and Defence College (ESDC), the CMDR COE developed a *Climate Change and Security Course*. The course brings together participants from a wide range of fields to explore the emerging risks/threats of climate change and discusses planning for mitigation and adaptation as means for reducing the effects of climate change.[90] In June 2021, the

[87] "NATO Centres of Excellence are nationally or multi-nationally funded institutions accredited by NATO. They train and educate leaders and specialists from NATO member and partner countries, assist in doctrine development, identify lessons learned, improve interoperability and capabilities, and test and validate concepts through experimentation. They offer recognized expertise and experience that is of benefit to the Alliance and support the transformation of NATO, while avoiding the duplication of assets, resources and capabilities already present within the NATO command structure." Source: https://www.act.nato.int/centres-of-excellence

[88] In November 2020, the NATO 2030: United for a New Era report provided recommendations on Climate Change specifically. One of these was to create another COE dedicated entirely to Climate Security, recognising climate change's increasing impact not just to humanitarian assistance and disaster response, but also on every other aspect of NATO's work. There is still potential for this action to be implemented in the future.

[89] (NATO CMDR COE 2017)

[90] (NATO CMDR COE 2021)

Centre conducted its *9th Annual Interagency Interaction in Crisis Management and Disaster Response Conference*. [91] The Conference addressed climate change from a variety of perspectives, highlighting its intersectional and multidisciplinary character, as well as potential solutions to be found in space weather environmental modelling. During the event, the CMDR COE also conducted its first *Climate and Security Workshop*, which saw experts from different organisations, both governmental and non-governmental, discuss climate-related risks to security and the need for improved planning and decision-making for crisis and disaster management. The results from the Conference and the Workshop will soon be published (upcoming CMDR COE 2021 Proceedings) and made available on the Centre's official website.[92]

NATO COEs could be instrumental in translating the *Climate Action Plan* into environmental and climate change-related education and training, which explore the characteristics of the new security environment from multiple perspectives. It is important to highlight that the changes within NATO should not be merely technological, but importantly - behavioural. Climate change should be mainstreamed into operations planning and exercises. Reduced environmental damage and energy/fossil fuel usage are only one aspect of this, which could also have other positive externalities like financial savings and increased

[91] (NATO CMDR COE 2021)
[92] https://www.cmdrcoe.org

operational mobility/adaptability. Climate change mainstreaming should also be applied more widely in NATO reports, speeches, planning, facility design and investment decisions. In the face of climate change denial and diminishment, language and posture are ever important to ensure and inspire action.

As NATO explores climate change-related solutions and adaptation plans, it is vital that the Alliance ensures its integrity and sustainability. Key to the latter would be the collection and analysis of climate change-related data on risks and threats, which to ultimately inform actions both internally and externally.

This data collection will need to explore climate and environmental security from multiple perspectives, particularly that of human security. Comprehensive, disaggregated data on socio-differentials including age, gender, ethnicity, socio-economic background, amongst others, and the vulnerabilities they face will serve to better inform NATO's decision-making processes and activities in support of civil preparedness and resilience. It is worth noting on this front that the recent Climate Action Plan does note the need to further 'leverage its science and technology programmes and communities to support research on the impact of climate change on security, including gender perspectives in the context of NATO's Women, Peace and Security policy'.[93] This shows promising signs that the organisation is strengthening the integration of human security

[93] (NATO, 2021)

principles, alongside climate security considerations, into its planning and decision-making.

Conclusion

In the past, NATO has focused much of its attention on technological solutions. The latest *Climate Change and Security Action Plan* suggests a very positive change of course, which places much needed emphasis on human-based behavioural solutions to climate change and on the importance of transnational and intersectional coordination, cooperation and education. These recommendations will now need to be translated swiftly into concrete action to ensure the safety and security of NATO and the populations it serves. The *Annual Climate Change and Security Impact Assessment* and first *Climate Change and Security Progress Report* (to be delivered at the 2022 Summit) should encourage positive changes premised on a strong commitment to improved climate security.

An important prerequisite of any sustainable and comprehensive climate change-related action will be increased data collection and research on the subject. Risk/vulnerability assessments based on disaggregated data (across multiple differentials), emissions and environmental degradation data will serve to better inform decision-making and planning and to improve accountability, resulting in more sustainable practices and higher levels of resilience.

Although not a primary actor, NATO can support Allies and Partners in strengthening climate change mitigation and adaptation, particularly emphasising civil preparedness and resilience. This can be achieved through education and training, information sharing, including sharing of best practices and lessons-learnt. Furthermore, NATO can help strengthen and improve coordination with relevant counterparts, including through its COEs, and foster collaboration via specialised programmes and initiatives.

Having recognised the devastating consequences of climate change, NATO should be setting an example in its response. Secretary General Jens Stoltenberg has made it clear that he intends for NATO to 'set the gold standard on climate change and security', to reduce the emissions output and environmental impact of its forces, and to support Alliance members and partners countries in achieving the same.[94]

[94] (Stoltenberg, Jens Stoltenberg: NATO's climate challenge 2021)

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IS THERE A ROLE FOR NATO STABILITY POLICING IN ENVIRONMENTAL PROTECTION?

Stefano Bergonzini[1]

Abstract: Current and future conflicts and crises may be caused by threats to and from the environment or affect the latter and require holistic approaches, which cannot disregard the contribution by law enforcement. Stability Policing can be a flexible and adaptable instrument to address capability and capacity gaps of HNs, particularly the IPF, but also the Judiciary and Corrections, as well as other institutions of governance including in the remit of EP. Absence of or inadequacies in law enforcement may therefore be filled by SP reinforcement and/or temporary replacement activities and tasks. These seek to identify, prevent and punish EP violations, transgressions and crimes by irregular actors, including by HN forces and foster a widespread culture of respect for limited natural resources and heritage.

Key words: environment, UN, Stability Policing, NATO, logistics, climate change.

What is Environmental Protection (EP)?

The Concise Oxford English Dictionary [2] defines "the environment" as "the natural world, especially as affected by

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[2] The NATO Terminology Directive PO(2015)0193-AS1 of 16 April 2015 identifies the Concise Oxford English Dictionary (COED) as the official basis for English NATO Terminology.

human activity", identifying the fundamental relation linking deeds by humankind with their effects on nature.

Human beings as individuals or members of a group may endanger and attack the environment, but they may also play a positive role resulting in the prevention, mitigation and the proactive contrasting of threats, violations, as well as damages and destruction. Two fundamental aspects can therefore be considered in EP, namely the compliance, when abiding to rules and norms, and its contrary (i.e. the non-compliance), when violations, transgressions and crimes are committed. The latter perspective encompasses law enforcement and therefore it is also a NATO Stability Policing's concern, both when reinforcing and/or temporary replacing indigenous police forces (IPF).

Environmental Protection Global Players

The United Nation Environmental Programme (UNEP)[3] is the most significant global initiative encompassing the United Nations Environment Assembly and Governing Council, the world's highest- level decision-making body on the environment scene[4]. Seven broad thematic areas include climate change, disasters and conflicts, ecosystem management, environmental governance, chemicals and waste, resource efficiency, and environment under review; all topics abide to an overarching

[3] https://www.unep.org/

[4] https://www.unep.org/environmentassembly/about-united-nations-environment-assembly?_ga=2.84826969.199290943.1614184477-1095729201.1614184477

sustainability[5]. UNEP also hosts the secretariats of many critical multilateral environmental agreements and research bodies, bringing together nations and the environmental community to tackle some of the greatest challenges of our time[6]. Other active International Organizations (IOs) include the European Union (EU), INTERPOL and NATO.

The EU has a significant body of EP initiatives, including Article 3 of the Treaty on the European Union[7] and Articles 11 and 191-193 of the Treaty on the Functioning of the European Union[8]. Within the EU, key environment topics are related to actions.[9]

EU environment topics and actions

- **Air** to improve air quality and reduce air pollution.
- **Chemicals** to ensure chemicals are safe, for health and the environment.
- **Circular economy** transition to a circular economy with a focus on green growth.
- **Industry** to make industry more sustainable and reduce industrial emissions.
- **Marine and coastal environment** to protect Europe's coasts, seas and oceans.

[5] https://www.unep.org/about-un-environment/why-does-un-environment-matter
[6] https://www.unep.org/about-un-environment/why-does-un-environment-matter
[7] Article 3 'high level of protection and improvement of the quality of the environment'
[8] Articles 11 "Environmental protection", "policies, activities", "sustainable development" "objectives:" preserving, protecting and improving the quality of the environment", "combating climate change."
[9] https://ec.europa.eu/environment/topics_en

- **Nature and biodiversity** on environmental conservation and protection.
- **Noise** to reduce environmental noise pollution.
- **Plastics** on plastic production and pollution to contribute to a circular economy.
- **Soil and land** for the sustainable use of soil and land.
- **Sustainable development** commitment in Europe and worldwide. Urban environment to promote the sustainability of European cities.
- **Waste and recycling** on waste management, treatment and recycling.
- **Water** on water issues, to protect water.

The EU has a range of laws to improve environmental standards for Europeans and protect their quality of life and it ensures that national governments correctly implement these environmental laws.[10]

Another global player in EP is the International Criminal Police Organization (INTERPOL), which dedicates one of its remits exclusively to combating environmental crimes.[11] Its website proclaims that borders do not restrict environmental crimes, which indeed range from ivory trafficking and overfishing of protected species, to illegal logging and the dumping of

[10] Directive 2005/35/EC on ship-source pollution and on the introduction of penalties for infringements and EU law against environmental crime: EU law against environmental crime: SUMMARY OF: Directive 2008/99/EC – protecting the environment by means of criminal law.
[11] https://www.interpol.int/Crimes/Environmental-crime

hazardous waste. Smuggling wildlife often follows routes used to trafficking weapons, cultural property, drugs and people, while environmental crime often occurs hand in hand with other offences. Unlike other illegally traded goods, natural resources are finite and cannot be replenished in a lab, hence there is a sense of urgency to combat environmental crime.[12]

Environmental Protection within NATO

The protection of the environment is primarily a responsibility of Nations, often enshrined in their constitution[13], due to their function as overarching entity endowed with rights and duties combining politics, population and territory. NATO, as a political and military organization was established[14] to defend its signatories and recognizes that climate change has a demonstrable impact on Allied security and shapes the security conditions under which NATO and its adversaries operate. In 2014, NATO adopted the Green Defence framework, which aspires to reduce the environmental footprint of its military operations and improve NATO's resilience by investing in green technologies that reduce fuel consumption, energy dependencies, mission footprints and long, vulnerable supply

[12] https://www.interpol.int/Crimes/Environmental-crime/Our-response-to-environmental-crime

[13] Art. 9 of the Constitution of the Italian Republic states "The Republic promotes the development of culture and of scientific and technical research. It safeguards natural landscape and the historical and artistic heritage of the Nation."

[14] The North Atlantic Treaty was signed on the 04th of April 1949

lines.[15] In this regard, NATO defines environment as "The surroundings in which an organization operates, including air, water, land, natural resources, flora, fauna, humans, and their interrelations."[16] Neither the Washington Treaty[17] establishing the Alliance, nor the NATO Status of Forces Agreement (SOFA)[18] or the Paris Protocol[19] mention EP. But the Wales Summit Declaration mentions "Key environmental and resource constraints, including health risks, climate change, water scarcity, and increasing energy needs will further shape the future security environment in areas of concern to NATO and have the potential to significantly affect NATO planning and operations."[20] Moreover, NATO acknowledges the need to step up many environmental challenges and climate change. In particular, the Alliance is working to reduce the environmental effects of military activities and to respond to security challenges emanating from the environment.[21]

NATO's current activities related to the natural environment include protecting the environment from damaging effects of military operations but also promoting environmentally friendly management practices in training areas and during operations as

[15] NATO United for a New Era, 25 November 2020
[16] NATO Agreed term
[17] https://www.nato.int/cps/en/natolive/official_texts_17120.htm
[18] Agreement between the Parties to the North Atlantic Treaty regarding the Status of their Forces, signed 19.06.1951, London
[19] Protocol on the Status of International Military Headquarters set up pursuant to the North Atlantic Treaty, Paris 28 August 1952
[20] https://www.nato.int/cps/en/natohq/official_texts_112964.htm
[21] https://www.nato.int/cps/en/natohq/topics_91048.htm

well as adapting military assets to a hostile physical environment. It encompasses preparing for and responding to natural and man- made disasters, addressing the impact of climate change, educating military officers on all aspects of environmental challenges as well as supporting partner countries in building local capabilities, enhancing energy efficiency and fossil fuel independence and finally building environmentally friendly infrastructures.

All these activities fall under two broad categories, namely Environmental protection, consisting in protecting the physical and natural environment from the harmful and detrimental impact of military activities on one side, and Environmental security, which addresses security challenges emanating from the physical and natural environment, on the other.[22]

Furthermore, the Military Committee established NATO's military EP principles and policies in support of all NATO-led military activities.[23] In particular, it defined the responsibilities of NATO Commanders, Commanders of units from all participating NATO Nations and non-NATO Troop Contributing Nations, for EP during the preparation for and execution of military activities.[24] In operations, the conundrum between operational imperatives and

[22] Adapted from https://www.nato.int/cps/en/natohq/topics_91048.htm
[23] MC 469/1, NATO Military Principles and Policies for Environmental Protection (EP), 14 October 2011
[24] MC 469/1, paragraph 4

EP principles will result in the primacy of the former[25], while in exercises EP policies normally prevail.

EP standards may vary during missions and require an Environmental Management System. [26] The minimum EP standard is to hand back areas used by NATO in no worse environmental condition than they were received.[27] Further Allied EP publications cover EP best practices and standards for military camps in NATO operations [28], EP during NATO-led military activities[29], NATO environmental file during NATO-led activities [30], environmental sampling protocols [31] and best environmental protection practices for sustainability of military training areas [32]. These land-oriented NATO standards are mirrored by Allied Maritime Environmental Protection Publication (AMEPP from 1 to 9).

NATO commanders and their staff should rely upon their LEGAD and environmental specialists to know the applicable environment protection laws and standards, to understand environmental issues, and recommend appropriate solutions. In order to implement EP properly, it should be incorporated in the commander's policy and guidance, planning and the actual

[25] NATO Environmental Policy Implemented: on Land, at Sea and in the Air by Lieutenant Colonel Ben Valk, NATO Legal Gazette, Issue 40, p.46
[26] See AJEPP-3 Environmental Management System in NATO Operations
[27] See AJEPP-3
[28] AJEPP-2
[29] AJEPP-4
[30] AJEPP-6
[31] AJEPP-6.1
[32] AJEPP-7

conduct of an exercise of NA5CRO[33]. Disregarding EP may lead to unnecessary environmental damage that might impact civilian populations, create bad publicity (i.e. jeopardize the Alliance's battle of narrative) and lead to loss of public support of the mission.[34] NATO Secretary General Stoltenberg on the 17th of September of 2020 participated in a NATO seminar on security and the environment jointly organized by the delegations of Italy and the United Kingdom linking climate change and the security environment, NATO planning and operations. NATO Allies agree on the need to adapt to future threats and challenges over the next decade and beyond, issues that are part of the Secretary General's NATO 2030 reflection process. Climate change is already addressed by the Alliance in its 2010 strategic concept, which highlights it as one of the factors that will "shape the future security environment in areas of concern to NATO and have the potential to significantly affect NATO planning and operations".[35] Moreover, during his address at the Human Security conference held on 25 February 2020, he stated that NATO will continually update its standards to better recognise the full range of threats and risks to populations, words that might equally be directed to dangers derived from or impacting on the environment as these directly influence populations.[36]

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[33] Non Article 5 crisis response operations, also include peace support operations
[34] NATO Environmental Policy Implemented: on Land, at Sea and in the Air by Lieutenant Colonel Ben Valk, NATO Legal Gazette, Issue 40, Conclusion p.54
[35] https://www.nato.int/cps/en/natohq/news_178028.htm?selectedLocale=en
[36] https://www.nato.int/cps/en/natohq/opinions_181806.htm

What is NATO Stability Policing?

Stability Policing (SP) is a concept developed within NATO[37], but applied also by other International Organizations[38], responding to the policing-related needs of a Host Nation's population, if no other HN or external actor (IPF, IO etc.) is present or can intervene timely and/or effectively[39]. Overcoming a combat-only approach to crisis response, SP expands the reach of the military instrument into the policing remit[40].

> ***Stability Policing definition***
>
> *"Police related activities intended to reinforce or temporarily replace the indigenous police in order to contribute to the restoration and/or upholding of the public order and security, rule of law, and the protection of human rights."*

Thereby it contributes in a comprehensive approach to win the war while aiming at building peace.

The "Allied Joint Doctrine for Stability Policing"[41] defines SP as "Police related activities intended to reinforce or temporarily

[37] Derived from the Multinational Specialized Unit (MSU) designed and led by the Italian Carabinieri and deployed to Bosnia in August 1998 within the NATO Stabilization Force (SFOR)

[38] EU, AU, UN, use different taxonomy and dedicated ways and means.

[39] This capability/capacity vacuum is often referred to as "security" or "policing gap".

[40] MC 362/1 and MC 362/2 infer that civilian law enforcement may not be a NATO function, but NATO may support or conduct it, if so directed by the North Atlantic Council (NAC), see also AJP-3.22, the "Allied Joint Publication for Stability Policing"

[41] AJP-3.22 was promulgated in July 2016.

replace the indigenous police in order to contribute to the restoration and/or upholding of the public order and security, rule of law, and the protection of human rights" and envisions two missions. The reinforcement[42] of the IPF, consists in intervening on their capabilities [43] and capacity [44] to raise overall performance. When the IPF are missing or unwilling to carry out their duties, their temporary replacement by SP could be the only deployable solution until other actors from the International Community (IC) intervene and/or take over as a follow-on force. A substitution[45] mission is likely to co-exist with a Police Capacity Building (PCB) one, to allow a disengagement of forces external to the HN. Executive SP missions require a North Atlantic Council (NAC) decision[46] endowing SP assets with an executive policing mandate.[47] In such a case, SP elements enforce international and applicable HN law to create effects on the adversary, conducting the so-called "legal targeting". This may include the investigation or detention/arrest of irregular actors[48] such as war,

[42] SP activities: monitoring, mentoring, advising, reforming, training and partnering with (MMARTP); ATP-103 "Replacement and Reinforcement of Host Nation Police Forces" being drafted, seeks to adopt the MGOTEAM framework: monitoring generating, organizing, training, enabling, advising, mentoring.
[43] "Capability, the ability to create an effect through employment of an integrated set of aspects categorized as doctrine, organization, training, materiel, leadership development, personnel, facilities, and interoperability" NATO Agreed term.
[44] Capacity, for this paper intended as a capability expressed in quantitative terms.
[45] Substitution i.e. replacement.
[46] That may follow a UNSCR or an invitation by the HN
[47] See UNSCR 1244 Kosovo and UNSCR 1272 East Timor
[48] The use or threat of force by irregular forces, groups or individuals, frequently ideologically or criminally motivated, to effect or prevent change as a challenge to governance and authority. NATO Agreed term

organized and transnational criminals, terrorists and insurgents. It could consist in limiting their mobility and restricting their freedom of action, seizing their assets and financial means[49] as well as dismantling their networks and structures.

SP can be performed in all three NATO core tasks (collective defence, crisis management and cooperative security), within all operations themes (from peacetime military engagement to warfighting) and before, during as well as after (armed) conflicts and manmade or natural disasters. It is normally encompassed within NATO stability operations and consists of the performance of stability, enabling, defensive and offensive activities in the remit of policing.

Since irregular actors operate on land, sea and in the air, in cyberspace as well as in the information environment, SP does likewise, but it is generally "land -heavy".

A key, if not formalised, SP principle proclaims, "Everybody can contribute to SP, but not everyone can do everything".[50] This allows the Alliance to select the best suiting participants and to draw from a multitude of force providers from Allied Nations. SP actors include Gendarmerie-type forces, which are the first choice[51], the Military Police and other military forces; under a comprehensive approach, also non-military actors including police forces with civilian status, IOs, NGOs, and contractors[52].

[49] See MCM-0053-2019 "Capstone Concept – Joint Military Operations in Urban Environment" for further details.

[50] "All" may refer to forces, services, assets, Subject Matter Experts (SME) etc.

[51] AJP-3.21 "Allied Joint Doctrine for Military Police" para 2.6.3

[52] AJP-3.22 "on the basis of the mandate and the environment being permissive"

Any trained and equipped unit or asset can conduct basic SP activities and tasks, while higher-level standards must be applied when considerable policing expertise and experience are required, e.g. for investigating international crimes and terrorism or advising the senior HN leadership.

Policing is very different from soldiering, but urban challenges may progressively blur police and military responsibilities; in fact, military operations in densely populated areas will require military personnel to have policing-like skills[53].

NATO Stability Policing contribution to Environmental Protection

The SP contribution to EP may consist in both the IPF reinforcement and/or temporary replacement in the specific remit. SP aspects concerning EP may contribute to an overall re-establishment of the Rule of Law (ROL)[54], support a frail Justice Sector (Police, Judiciary and Corrections) and improve the HN governance by following a number of Lines of Operation[55].

All executive law enforcement endeavors can and should be mirrored by suitable and HN-tailored capability/capacity building

[53] See MCM-0053-2019 "Capstone Concept – Joint Military Operations in Urban Environment" for further details.

[54] The rule of law refers to "a principle of governance in which all persons, institutions and entities, public and private, including the State itself, are accountable to laws that are publicly promulgated, equally enforced and independently adjudicated, and which are consistent with international human rights norms and standards" UN Security Council, S/2004/616, para 6.

[55] LoO "A path linking decisive conditions to achieve an objective" NATO Agreed Term

initiatives within the HN. Experience showed that planning, preparing, resourcing and executing PCB should as much as practicable respond and abide to HN requirements and culture. Co-designing is likely to yield positive results by wedding the HN local knowledge and understanding with outside expertise and innovative solutions.

There is a host of evidence [56] linking crimes against the environment to organized criminal groups. Also other irregular actors in fragile states may take advantage from the HN government's reduced law enforcement action, capabilities and capacity, not only to expand their illegal activities, but also to spoil any stabilization, peace or development process. As such all these actors become adversaries for Stability Policing, which, when deployed, seeks to support stability before, during and after crises or conflicts, to foster peace and contribute to creating the conditions for social, cultural and economic improvements. This may take two avenues of approach, in accordance with the SP missions, namely replacing and reinforcing the IPF.

In performing executive law enforcement in the field of EP, SP tasks may fall within five activities.

Within these broad remits, specific tasks are accomplished in support of EP. In fact, SP assets, may patrol seeking to gather

[56] https://www.europol.europa.eu/crime-areas-and-trends/crime-areas/environmental-crime,https://www.interpol.int/Crimes/Environmental-crime/Pollution-crime,https://fbiretired.com/skillset/fbi-environmental-crime/, http://www.laterradeifuochi.it/eng/index.asp

information about sites generating, stocking and treating waste, with a particular attention to hazardous or toxic materials. Surveillance of these locations might help developing an understanding of the modus operandi of criminal individuals, organized groups and networks. The analysis of such law enforcement information generates law enforcement intelligence that can be used by the whole Allied force to acquire a better situational awareness and to improve its common operating picture. If significant criminal activity is suspected, an intelligence-led policing approach can determine where and how to act best. Placing a cordon might in fact ensure the critical site security for a water purification plant or protect people from coming in contact with pollutants, toxic substances or radiations; it might also allow to conduct a search to seize evidence. If the presence of contaminants or poisons is documented, a crime scene investigation is conducted to determine the level of hazard for the surrounding populace. Immediate dangers might determine an evacuation, an escort to a safer area and in general operate a control of movement of populations, refugees, and IDPs to keep them safe. SP assets furthermore collect and ensure the custody of evidence, while forensic activities at the spot or at a deployed laboratory can reveal further information about the culprits. Biometrics can help uncloaking them from anonymity and lead to their detention/arrest also in support of war-crime tribunals and international courts. Trafficking waste, including toxic and radioactive, within countries but also across one or more national and even continental borders, can be validly

contrasted by SP only through effective criminal investigations. Following and tracking the goods allows to identify the source, transit and destination areas or countries, but also means, ways and operating methods. Analysing the resulting illicit monetary flows generates information about white-collar actors, corruption, money-laundering and other related financial crimes. It furthermore allows to seize this sources of illegal revenue, depriving criminal organizations of these resources, which in turn is conducive to their dismantling. Should criminals pose a severe threat, high risk arrests can be executed by robust, specialised SP assets? If irregular actors such as terrorists or insurgents utilise improvised explosive devices in combination with biological, chemical or radiological agents, SP can support weapons intelligence teams with their technical expertise and authority as law enforcement operators. Conducting interviews, questioning, interrogation and recording voluntary statements, SP can collect and document grievances and testimonies. During traffic policing and implementing SP checkpoints, SP operators can control people and goods also to ascertain if and how dangerous materials, waste and pollutants are moved and by whom. By controlling public establishments, SP assets verify their safety and abidance to environmental parameters or may detect and tackle administrative violations.

In a non- executive mission. SP performs 7 activities.

In practice, monitoring might imply SP assets inspecting an IPF compound to verify their abiding to established emission levels

(noise in a shooting range), observe the actions of IPF personnel within a training unit to acquire an understanding of their waste management or conducting a survey among EP inspectors to measure their professional background. In an interview, questions about EP policies may establish the current status of HN organizations, while audits may help identifying financial and budgeting perspectives also in relation to EP. Analysis and writing a report result in elaborating and transmitting data for further action. In generating forces, budgeting aspects should include the reduction of waste, recruiting could include EP specialists and experts and the selection of candidates might enhance environmentally sound individuals over EP-indifferent ones. The vetting process should include background checks for violations and crimes against the environment. In organizing, SP personnel might include EP subject matters in the analysis of training requirements and training needs, while designing and developing formation offers should include a general awareness about EP for all personnel and specific products for EP specialist and EP investigators. In the implementation and evaluation of trainings, EP-specific matters and courses need to be included in theory and practice, at individual and collective level, including in exercises. Enabling the IPF and HN might include developing EP policies, doctrines as well as tactics, techniques and procedures, provide specific services such as internship programmes or personnel exchange, build, rebuild and maintain facilities and infrastructure abiding to EP norms and principles, but also EP-specific ones, such as including recycling areas.

Managing equipment and material delivery and maintenance should foster minimizing the production of waste and maximise the collection, reprocessing and reuse of resources. Sharing information about EP threats supports creating awareness, helps preventing wrong actions by HN personnel, but also protects them and the environment from hazards and dangers. Advising encompasses informing about EP best practices, but also recommending proper courses of actions and liaising to ensure a correct flow of information. Mentoring could mean coaching a police station commander to become more EP sensitive, but also guide his superior in presenting the topic correctly to his subordinates enforcing corrective measures for transgressions but also rewarding useful initiatives and actions. Developing an investigator's skill in updating his professional knowledge in air or water sampling but also influencing his attitudes and views may foster self-improvement and enhance professional abilities. In certain cases, supporting IPF operators or governance personnel through funding, transportation or secure communication can mean the difference between their success or failure.

NATO Stability Policing Environmental Protection Teams

Specialized SP EP teams (SPEPT) can be deployed as part of a NATO Stability Policing Unit (SPU), to prevent and investigate the whole range of EP-related violations, transgression and crimes, including war crimes and crimes against humanity. With

an extensive background acquired in years of focused EP law enforcement in their own countries and abroad their expertise and qualifications encompass international and national legal instruments and a “culture” of environmental protection. SPEPT members often possess further degrees in environmental and other sciences such as geology, topography, ecology, chemistry, zoology and social or atmospheric science.

Trained and equipped to identify, understand, locate (GIS verification) and guarding Natural Heritage sites[57] or sites of EP significance, they may acquire EP and crime-related information to feed the intelligence cycle about environmental hazards. These specialists can contribute to the prevention, deterrence and investigation of EP-related crimes, terrorist and insurgent attacks, and identify and seize illicit revenue from trafficking waste or toxic materials. They may concurrently participate in EP-related capacity building of IPF and, if mandated, other actors within the HN. Creating an EP awareness is key and may involve political actors at all levels, members of the HN governance but should also be conducted holistically in civilian and military education and training facilities.

Showing children and teaching pupils correct behaviours and involving them in practical activities, including games may have extremely rewarding results. In different bilateral engagements, personnel of the Comando Carabinieri per la Tutela

[57] 1972 UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage.

dell'Ambiente (Carabinieri Command for the Protection of the Environment)[58] conducted EP enforcement and capacity building endeavours. Some major successes were registered in Djibouti, where a police capacity building activity trained 12 gendarmes as EP specialists in a newly established unit. At the same time, lessons to local school children resulted in the Minister of Educations' interest and appreciation, leading to the introduction of a nation- wide monthly "day of the environment". The Palestinian Authorities also required a similar training action. These activities were widely publicized by social, local and national media[59], contributing to the further dissemination of the EP message.

Conclusions and Key Takeaways

Current and future conflicts and crises may be caused by threats to and from the environment or affect the latter and require holistic approaches, which cannot disregard the contribution by law enforcement. Stability Policing can be a flexible and adaptable instrument to address capability and capacity gaps of HNs, particularly the IPF, but also the Judiciary and Corrections, as well as other institutions of governance including in the remit of EP.

[58] The Carabinieri Nucleo Operativo Ecologico (NOE) founded in Italy on 01.12.1968 is the first police unit in the world specialized in EP, in 1988 the Spanish Guardia Civil established the Servicio de Proteccion de la Naturaleza (SEPRONA).
[59] E.g. La Nation, Djibouti, 11.12.2018, page 3 and Il Corriere della Sera, 23.12.2018, page 11.

Absence of or inadequacies in law enforcement may therefore be filled by SP reinforcement and/or temporary replacement activities and tasks. These seek to identify, prevent and punish EP violations, transgressions and crimes by irregular actors, including by HN forces and foster a widespread culture of respect for limited natural resources and heritage.

The deployment of SP EP specialists may provide the crucial expertise and experience necessary to defy threats and create HN capabilities and capacity improving resilience and contributing to sustainable and peaceful development.

The CMDR COE thanks all authors and contributors who helped to accomplish the present issue. Sincerest appreciation for their time and willingness to share information and opinions.

The CMDR COE also thanks all organisations and individuals who engaged in the Centre's events held during the year of 2021.