The Hague Centre
for Strategic Studies

Serious Gaming: Grounding and Directing Climate Action

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August 2022

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Key Takeaways

There is no doubt that climate change is severely affecting the entire planet. Anthropogenic carbon emissions catalyze the pace of melting ice caps, soaring temperatures, and decreasing rainfall patterns, creating concerning scenarios for the future. Areas vulnerable to such conditions might suffer from larger-scale impacts on their security, for instance, disrupting vital systems, exacerbating existing tensions, destabilizing politics, creating migrations, and ultimately wars. Risks are plenty, and climate action is imperative.

This snapshot by HCSS Assistant Analyst Ricardo Pereira Teixeira addresses serious gaming as a critical tool for undertaking climate initiatives and reports on the output from the NATO Crisis Management and Disaster Response (CMDR) Centre of Excellence course on Climate Security in Sofia, Bulgaria.

By employing HCSS' tabletop strategic game, twenty participants discussed, compared, and selected the best practices to prevent and respond to a severe and long-term drought scenario affecting the ecosystem and populations living off the Tigris-Euphrates River Basin. Building from the conclusions reached at the event, this snapshot holds that serious gaming constitutes a crucial first step in gearing efforts toward climate action and harmonizing internal organizational processes. By engaging in such a capability analysis within a determined (fictitious) scenario, ic allows critical actors to engage in relevant discussion, open communication lines, and ground policy goals with an organization's available resources.

As a result, participants achieve an enhanced situational awareness, supporting better preparedness, developing resilient capacities, and, most importantly, translating policy goals into substantial climate mitigation/adaptation outcomes.

«Participants achieve an **enhanced situational awareness**, supporting better preparedness, developing resilient capacities. »

1. Introduction

At the Sofia based NATO Crisis Management and Disaster Response (CMDR) Centre of Excellence course on Climate Security three serious games on Climate Security Risk were conducted. This article reports on the results.

From the past decade onwards, the Arctic Sea ice extent significantly declined at a rate of 13% each year,[1] sea levels rose an average of 3.6 mm per year,[2] and wildfires are becoming more frequent and severe.[3] Climate-induced challenges are more widespread, frequent, and disruptive. An increasing number of local and global actors acknowledge the far-reaching impacts and challenges climate change leverage on people's wellbeing and the integrity of the systems that they rely on. The signature of the Paris Agreement in 2015, for example, marked a worldwide effort toward addressing security beyond national borders to collectively mitigate and adapt to the climate-induced challenges of this increasingly interdependent, yet vulnerable world.[4]

Due to the severity of climate-induced risks, informed and timely decision-making is an essential asset to preparing and responding to climate crises and foster cooperation among communities, governments, and corporations.[5] Drawing from the serious game experience and conclusions reached at the NATO Crisis Management and Disaster Response (CMDR) Centre of Excellence course on Climate Security in Sofia, Bulgaria, this snapshot argues that serious games constitute a crucial tool to reach coordinated decision-making strategies among different stakeholders.

<<Due to the severity of climate-induced risks, informed and timely decision-making is an essential asset to preparing and responding to climate crises.>>

This snapshot is organized into four parts. The first part introduces the concept of gamified analysis and its components. The second section elaborates on the scenario of a long-term drought in the Tigris-Euphrates River system. The third part recalls the discussions and extracts the most relevant patterns in addressing climate mitigation and adaptation policy making. Finally, the fourth section briefly offers concluding remarks.

1 NASA, 'Arctic Sea Ice Extent', Global Climate Change: Vital Signs of the Planet, 13 July 2022, https://climate.nasa.gov/vital-signs/arctic-sea-ice/.
2 Rebecca Lindsey, 'Climate Change: Global Sea Level', Climate.gov, 19 April 2022, https://www.climate.gov/news-features/understanding-climate/climate-change-global-sea-level.
3 United Nations Environment Programme, 'Spreading like Wildfire: The Rising Threat of Extraordinary Landscape Fires', A UNEP Rapid Response Assessment (Nairobi, 2022), https://www.unep.org/resources/report/spreading-wildfire-rising-threat-extraordinary-landscape-fires.
4 Emyr Jones Parry, 'The Greatest Threat to Global Security: Climate Change Is Not Merely an Environmental Problem', United Nations Chronicle, n.d., https://www.un.org/en/chronicle/article/greatest-threat-global-security-climate-change-not-merely-environmental-problem#:~:text=It%20has%20become%20increasingly%20clear,for%20food%2C%20water%20and%20energy.
5 New Zealand National Institute of Water and Atmospheric Research, 'Serious Games as a Tool to Engage People', NIWA: Taihoro Nukurangi, 2022, https://niwa.co.nz/natural-hazards/our-services/serious-games-as-a-tool-to-engage-people#:~:text=Serious%20games%20support%20climate%20change,for%20future%20generations%20and%20ourselves.

2. Serious gaming: grounding and directing climate action

HCSS delivered an expert session at the NATO CMDR course on Climate Security in Bulgaria, in April 2022. Crisis management experts from the NATO Allies, the Istanbul Cooperation Initiative (ICI), and Partners across the Globe (PatG) partook in a scenario-based capability analysis. HCSS's gamified analysis tabletop and digital platforms enabled the participants to map their resources and structure their discussions. The experts addressed the role of climate change as a threat multiplier, its impacts on international security and public health, and the necessity of integrated policies to tackle such challenges.

2.1. Serious games

2.1.1. The main concept

Serious games do not serve recreational purposes. On the contrary, its 'seriousness' component refers to "connecting a serious purpose to knowledge" [6] facilitated by in-person or digital interactions. Serious games have become a prominent analytical tool to engage important stakeholders, open communication lines, and ground policy goals with available resources, leading enhanced awareness and supporting better preparedness enabling resilient capacities.[7] Simulating potential real-life issues offers ample opportunities to create solid situational awareness and train participants on better policy developments, boost the quality of crisis preparedness, communication, and responses.[8] Thus, decision-makers can bridge policy design and implementation stages when exploring issues surrounding climate risk attribution, desertification, land-use models, rising sea levels, urban development, water security, and other climate-related simulations of negotiations.

When addressing climate-induced challenges, The Hague Centre for Strategic Studies (HCSS) continuously stresses that developing a better understanding of climate change's geopolitical and security implications constitutes a vital first step for organizations to harmonize their internal processes, empowering them to reach realistic and feasible climate action.

2.1.2. How does HCSS' game work?

HCSS' serious gaming product is a serious tabletop – or online – game that fosters interactive and non-competitive discussions, contextualized within a given circumstantial scenario. The game allows participants to inventory their current resources and ground their ambitions towards realistic future-oriented strategic goals.

This product aims to raise awareness about an organization's current operational and strategic capacity and reflect on how its team members communicate internally. As a result, the team can identify which capabilities are lacking or should be prioritized when evaluated against a determined scenario.

6 Damien Djaouti and Pierre Jessel, 'Classifying Serious Games: The G/P/S Model', in Handbook of Research on Improving Learning and Motivation through Educational Games: Multidisciplinary Approaches, ed. Patrick Felicia (Hershey, PA: IGI Global, 2011), 119.
7 Tina-Simone Neset et al., 'Serious Gaming for Climate Adaptation—Assessing the Potential and Challenges of a Digital Serious Game for Urban Climate Adaptation', Sustainability 12, no. 5 (27 February 2020): 1, https://doi.org/10.3390/su12051789.
8 Diana Reckien and Klaus Eisenack, 'Climate Change Gaming on Board and Screen: A Review', Simulation & Gaming 44, no. 2–3 (April 2013): 255, https://doi.org/10.1177/1046878113480867.

>> the team can identify which capabilities are lacking or should be prioritized when evaluated against a determined scenario<<

2.1.3. **Capabilities**

The concept of capabilities and the analytical framework stand crucial to the game's functioning and structure of its discussions. A capability can be broadly defined as 'the ability to do [something] with an [intended effect].' This capacity stems from several combinations of different processes, systems, knowledge, skills, actors, and externalities. Consequently, the participants can orchestrate a specific intention and achieve substantial effects.[9]

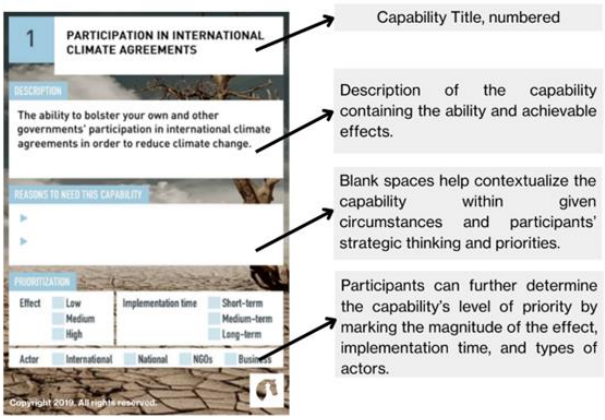

Figure 1 HCSS' Climate Security Game Capability Card and its components

As seen in Figure 1, the capabilities are visualized in numbered cardboard cards describing the action and potential effects to facilitate the analysis. Prior to the debate, the team must ground their capabilities on its desired effects, implementation times, and which actor to engage, considering the scenario in which the capabilities are implemented. The participants can draft or design their strategy by writing the mentioned information down into the card. With such information available, the team can justify the capability's relevance in a determined scenario and place it in an analytical grid.

The analytical framework is a tool to structure capability-oriented thinking and discuss potentially emerging differences in perspectives regarding capability implementation. Within the analytical framework, capability cards can be displayed along the x and y axes according to their specific strategic and operational categories, which in several instances overlap.

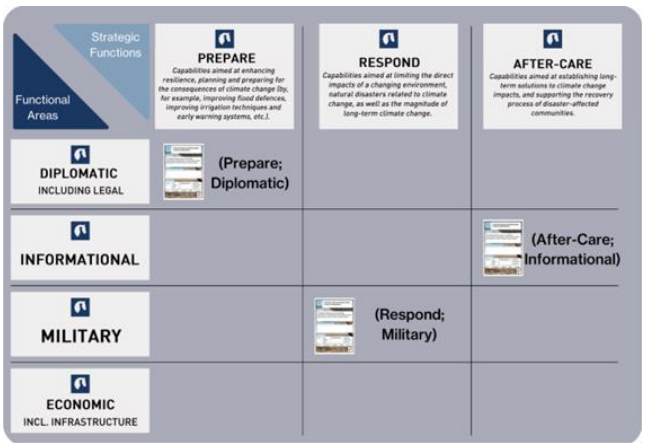

Figure 2 The Analytical Framework, Tabletop Version

From a life cycle perspective, the columns comprise the strategic functions that need capabilities that can result in intended effects. In this case the strategic functions are preparedness, response, and after-care. Capabilities under the 'prepare' function aim to enhance resilience, planning, and prevention of potential consequences of climate change. Other capabilities intend to limit the direct impact of climate crises as these unfold shall be placed under the 'respond' function. Finally, the 'after-care' function focuses on those capabilities that support disaster-affected communities' recovery or reconstruction.

The rows are based on the DIME model, overseeing the functional areas to implement desired capabilities, comprising Diplomatic (including Legal), Informational, Military, and Economic (including infrastructure) instruments of national capacity.[10] The intersections of the Strategic functions and

9 Strategy&, 'What Is a Capability?', Strategy&: Part of the PwC network, 2014, https://www.strategyand.pwc.com/gx/en/about/media/videos/2015-and-older/what-is-a-capability.html.

10 Tim Sweijs et al., 'A Framework for Cross-Domain Strategies against Hybrid Threats' (The Hague: The Hague Centre for Strategic Studies, 2021), 7, https://hcss.nl/wp-content/uploads/2021/01/Framework-for-Cross-Domain-Strategies-against-Hybrid-Threats.pdf.

Functional Areas create 12 operational areas to contextualize current or desired capabilities and buttress strategic analysis decision-making.

2.1.4. Playing Against Scenario(s)

A primary objective of the serious gaming session on Climate Security is to provide participants with the opportunity to learn various competencies – a blend of information, abilities, and attitudes necessary to prepare or manage climate change's adverse effects accurately.[11] Therefore, contextualization constitutes an essential, overarching, and facilitating game feature. HCSS strategic capability games provides factually justified yet hypothetical scenarios and accounting for foreseeable futures. Scenarios provide detailed cues for the participants to evaluate their capabilities more concretely. It also encourages structured discussions on whether the effects or implementation of their capabilities shall occur in the short or long term, for example.

When playing capabilities against multiple scenarios, means playing the serious capability game 'strategically', addressing multiple capabilities useful for as much as possible scenarios. This way it evaluates one's capabilities against several circumstances and constitutes an oversight of required capabilities to further enhance or build up that could be used in as much as possible circumstances. From a policy perspective, tackling climate challenges and catastrophic events involves careful planning and limited-resource allocation to simultaneously and rapidly unfolding circumstances, overseeing complex interconnected systems and the people depending on them.

Playing against one scenario only would have a more limited sight created, meaning it is operational planning only. Focusing on a single scenario offers the opportunity to participate in highly contextualized discussions and to build solid situational awareness. Between 5-7 April 2022, HCSS' strategic capability games contributed to delivering the NATO CMDR Capacity Building course, where experts and representatives from NATO allies shared their experiences and discussed the best practices of responding to disasters.[12] The participants operationally addressed during the game which capabilities constitute best practices at preparing, responding, and engaging in after care in the operational scenario of a long-term drought in the Tigris-Euphrates River Basin.

2.1.5. The scenario: long-term drought In the Tigris-Euphrates

The Tigris-Euphrates River Basin has been a significant water source in Western Asia for thousands of years. As illustrated in Figure 3, these rivers flow almost 2,000 km downstream from the mountains of Eastern Turkey to the Iraqi-Kuwaiti border in the Persian Gulf, constituting the backbone of the ecological and biological diversity, economic activities, and cultural practices of modern-day Turkey, Syria, and Iraq.

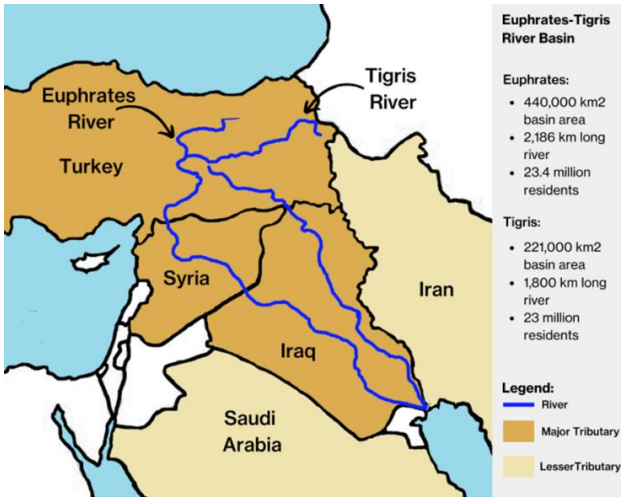

Figure 3 The Geography of the Main Tributaries of the Tigris-Euphrates River Basin

Faltering transboundary water governance frameworks and the latest greenhouse gas (GHG) trends are two severe challenges threatening the water supply and the livelihoods of millions of residents in the region.[13] Since the 1960s, for example, the major tributary countries to the Euphrates-Tigris River basin have systematically invested in water development projects, namely, dams or irrigation systems, which triggered water

11 Daniela Ahrens, 'Serious Games - A New Perspective on Workbased Learning', Procedia - Social and Behavioral Sciences 204 (2015): 278, https://doi.org/doi: 10.1016/j.sbspro.2015.08.152.
12 Capacity Building International, 'Become NATO Certified in Just a Few Weeks', Capacity Building International, 2022, https://www.capacitybuildingint.com/CMDR-course.
13 G. Zittis et al., 'Climate Change and Weather Extremes in the Eastern Mediterranean and Middle East', Reviews of Geophysics 60, no. 3 (September 2022): 1, https://doi.org/10.1029/2021RG000762.

disputes between the riparian countries.[14] Turkey's South-Eastern Anatolia Project (GAP) offers a clear example where Turkey's water ambitions of building 22 dams and 19 hydropower plants leverage severe criticism from the lower riparian countries due to fears of severely cutting water supply.[15] After a failed attempt in the 1908s, Turkey, Syria, and Iraq partake since 2005 in the Euphrates-Tigris Initiative for Cooperation (ETIC), aiming to achieve technical, social, and economic developments in the region through trilateral capacity-building programs, river hydrology, and conflict management.[16]

Despite the countries' efforts to consolidate best standard practices for managing the rivers, changing meteorological features correlated with Green House Gas (GHG) concentrations in the atmosphere directly affect rainfall patterns. Climate change in the Eastern Mediterranean and Fertile Crescent regions translates into extreme temperatures and a decrease in rainfall, and consequently a reduction in the flow of the rivers,[17] especially during summer months.[18]

Studies on variability of precipitation and hydrographic flows show that the period between 2007-2018 constituted a "severe and prolonged drought,"[19] posing significant challenges to the region's agricultural industry.[20] Building on these alarming figures, HCSS constructed a scenario to conduct a strategic analysis aiming to tackle a foreseeable and more severe, longer-lasting, drought scenario.

The HCSS' game (fictitious) climate security scenario consists of the Euphrates-Tigris River basin with no rainfall for two consecutive seasons. Moreover, predictions forecast another dry year. Such meteorological conditions will cause a 75% decrease in water availability, negatively impacting domestic food production by -65%. Due to the failing agricultural industry, other ripple effects include widespread malnourishment, soaring unemployment rates, and internally displaced people (IDPs). Scarcity, unemployment, and forced internal displacements to heighten tensions over access to food and water, leading to widespread protests and violent conflicts between communities, with a high risk of spilling across borders.

2.2. Insights from the NATO CRDM Course In Sofia, Bulgaria

2.2.1. The dynamic of the game

Between April 6-9, 2022, experts in crisis management and disaster response partook in HCSS' serious capability gaming, focusing on mitigating and adapting to climate change. Before the analysis, scarcity was introduced to simulate the real-life constraints of balancing limited available resources against a series of strategic goals. In several rounds and in four clusters of capabilities, the players discussed and selected half of the capabilities available for the game.[21] In other words, from a total of 46 capabilities, the participants played with half of them, simultaneously simplifying the round of discussions. From an analytical point, having smaller groups discussing and prioritizing the

14 Aysegül Kibaroglu, 'State-of-the-Art Review of Transboundary Water Governance in the Euphrates–Tigris River Basin', International Journal of Water Resources Development 35, no. 1 (2019): 9, https://doi.org/10.1080/07900627.2017.1408458.
15 Kibaroglu, 9.
16 Kibaroglu, 19.
17 Eleftherios Giovanis and Oznur Ozdamar, 'The Transboundary Effects of Climate Change and Global Adaptation: The Case of the Euphrates-Tigris Water Basin in Turkey and Iraq', ERF Working Papers Series (Giza: Economic Research Forum, December 2021), 3, https://erf.org.eg/app/uploads/2021/12/1640259860_743_119870 6_1517.pdf.
18 Zittis et al., 'Climate Change and Weather Extremes in the Eastern Mediterranean and Middle East', 9.
19 Karem Abdelmohsen et al., 'Buffering the Impacts of Extreme Climate Variability in the Highly Engineered Tigris Euphrates River System', Scientific Reports 12, no. 1 (December 2022): 4178, https://doi.org/10.1038/s41598-022-07891-0.
20 Adamo Nasrat, Nadhir Al-Ansari, and Varoujan K Sissakian, 'Global Climate Change Impacts on Tigris-Euphrates Rivers Basins', Jounral of Earth Sciences and Geotechnical Engineering 10, no. 1 (2020): 64.
21 The capability list used in HCSS' climate security capability games can be found on Appendix C.

capabilities statistically ensured that there was input on each capability card as the different groups prioritized capabilities distinct from one another.

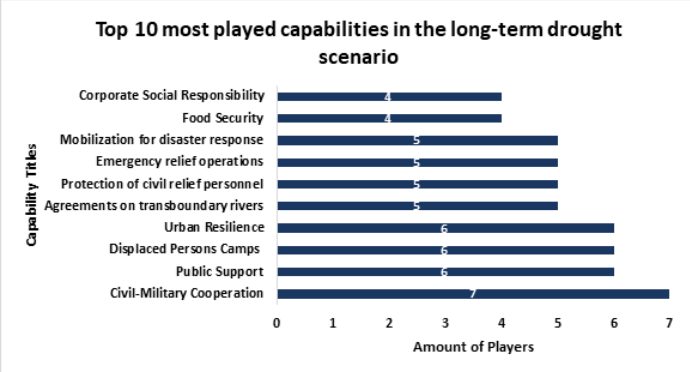

Figure 4 Number of participants playing their selected capabilities

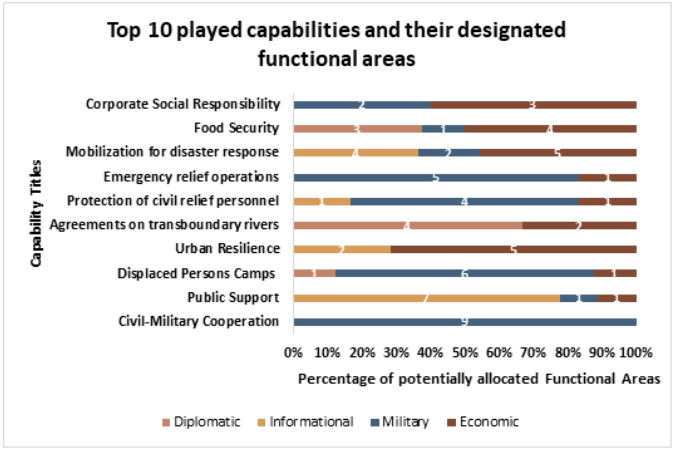

Figure 5 The 10 most recurrent capabilities and their designated strategic functions.

2.2.2. **Descriptive Statistics**

A total of 20 participants partook in a series of discussions to prioritize the most critical capabilities to agree on the best practices toward climate mitigation and adaptation, contextualizing their conclusions within the long-term drought scenario in the Tigris-Euphrates River Basin. Figure 4 shows the number of participants choosing their preferred capabilities to implement, amounting to the 10 capabilities which most experts selecting them.

Figures 5 and 6 further illustrate the strategic functions and functional areas assigned to each capability. Understanding the capabilities' applicability scope constitutes a crucial element of the discussions on how to best allocate resources implementing them across functional areas and strategic functions. When discussing which capabilities constitute a priority to mitigate the impacts of a long-term drought in the Tigris-Euphrates River Basin, the experts rendered several capabilities as strategic priorities in several simultaneous stages of crisis management. In doing so, takeaways can be summarized.

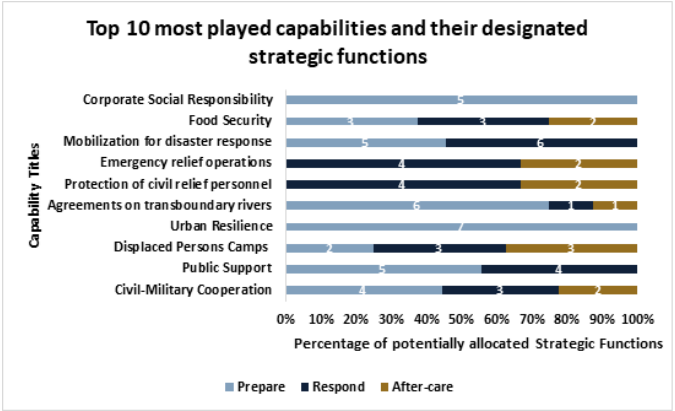

Figure 6 The 10 most recurrent capabilities and designated functional areas

2.3. Strategic Capability Analysis: Key Takeaways

2.3.1. Takeaway 1: about the discussions and the game

Figures 5 and 6 show that the participants implemented capabilities along multiple strategic functions and functional areas. Stressing the importance of developing plastic and adaptable capabilities through time and circumstances constituted an anchoring concept during the discussions. In this vein, when structuring the discussion along the 'prepare,' 'respond,' and 'after care' stages of crisis management and disaster response, such stages can be paralleled to what happens before, during, and after an unwanted event. However, such stages are not static. Figures 7-9 illustrate capabilities stretching across strategic functions, as these can mutually reinforce one another, addressing the crisis scenario in a more holistic way.

For example, experts prioritized the capabilities 'Food Security' or 'Agreements on Transboundary Rivers' as essential in the three 'prepare,' 'respond,' and 'after care' strategic functions. In structuring the discussion, HCSS designed broad capabilities so that participants can account for splitting and reorganizing internal resources, allocating them to several – and simultaneous – functional areas and different local, regional, domestic, and international actors.

Such analytical flexibility entails that the experts carry out their discussions while evaluating and reviewing the implemented capabilities across strategic functions and functional areas simultaneously, striving for constant improvement and learning from past decisions or current unravelling of events.

2.3.2. Takeaway 2: Preparing for the scenario

The capabilities implemented within the strategic function 'Prepare' aim at creating a whole-of-government(society) approach to prevent the risks foreseen in the scenario from materializing. Its Diplomatic component, for example, is crucial when addressing transboundary challenges. For example, Turkey, Syria, and Iraq are the primary riparian states that form The Tigris-Euphrates River Basin, meaning that developments affecting the water flow from any of the countries can have severe repercussions on the other lower riparians. A lack of good water governance frameworks can heighten political tensions as water becomes scarcer due to the area's changing climatic conditions.[22] Other water management frameworks, namely, the countries sharing the Mekong River in Southeast Asia, or the Amazon River in South America, constitute great examples of diplomacy playing a fundamental role in sharing information, coordinating efforts, and using the river resources more sustainably. Based on this evidence, the experts stressed the urgency of consolidating the current diplomatic and cooperative efforts in the Tigris-Euphrates river Basin.

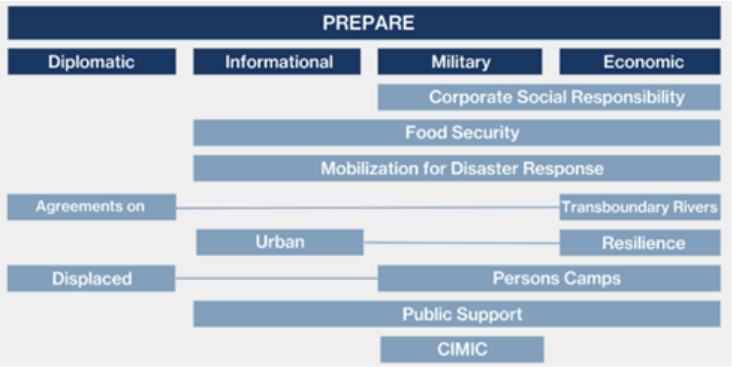

Figure 7 Implemented capabilities by functional area, allocated to the strategic function 'Prepare'.

2.3.3. Takeaway 3: Who does what, when, and how?

Figures 7 and 8 display several capabilities gravitating toward the Military and Economic functional areas of the DIME Model. By implementing Civic-Military Cooperation (CIMIC), the experts' reasoning

[22] S Ho, 'River Politics: China's Policies in the Mekong and the Brahmaputra in Comparative Perspective', Journal of Contemporary China 23, no. 85 (2014): 1–20.

suggests a strong military leadership in the crisis management stages. The military often is a crucial player in domestic crisis preparedness, response, and after care, because a country's armed forces are readily able to mobilize people, allocate scarce resources, and make decisions despite having insufficient information or time for implementation.[23] In this sense, having a strongly-led military response to a crisis, the experts also concluded that guaranteeing safeguards, for example, protecting civil relief personnel and upkeeping displaced person camps, are, according to one participant, "imperative in every effort towards mitigating" an adverse event.

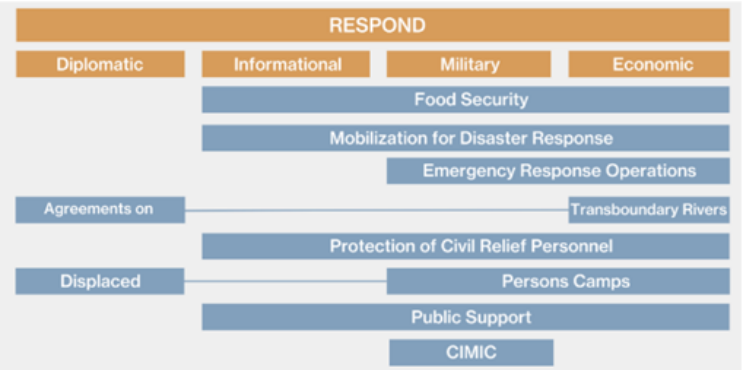

Figure 8 Implemented capabilities by functional area, allocated to the strategic function 'Respond'.

Nevertheless, while the military is a primary actor in designing contingency plans to prevent crises, the experts further emphasized the importance of maintaining close cooperation and communication with civil society entities and the private sector. Therefore, the experts rendered Public Support and Corporate Social Responsibility (CSR) as crucial pre-requisites to achieve an adequate CIMIC.

The capability of Public Support entails keeping the population informed and involved in creating and implementing the measures to prevent adverse events, creating a sense of ownership and responsibility towards society at the individual and collective levels. In doing so, the experts regarded CSR as a relevant variable in achieving public support by including the private sector in the analysis, widening the array for positive impacts in society by "doing good the right thing to do,"[24] but also doing it better.

2.3.4. The cyclicality of crisis management, from after care to new preparedness

The experts agreed that the most vital takeaway from the after-care crisis response stage is maintaining and redirecting response policies and evaluating the performance to update previous preparedness frameworks. After care measures are dynamic, reformative, and adaptable, essential features to restore normalcy after a crisis.

For example, as shown in Figure 9, the participants placed capabilities like food Security, Emergency Response Operations, or Displaced Persons Camps as after care measures. Such capabilities are crucial to conducting effective response campaigns to mitigate the impact of the crisis, focusing mainly on safeguarding a population-centric concept of security. Taking food security as an example, the experts maintained this capability implemented throughout the three strategic functions to counter a crisis. In other words, preparing entails designing a feasible and enforceable protocol, implementing it as a response, and returning to normalcy entails remaining to guarantee "that all people at all times have both physical and economic access to the basic food that they need."[25]

Once normalcy is achieved, after care measures offer the basis for a revised and updated preparedness framework. Such an opportunity to evaluate the set key performance indicators - established in the 'Prepare' state - ensure that policymakers will implement their capability repertoires to avoid repeating similar crises and anticipate other types of risks. For instance, agreements on transboundary rivers are a capability that perdures during preparation, response, and aftercare. The experts stressed the importance of updating and implementing old diplomatic frameworks into more functional ones.

[23] Jori Pascal Kalkman, 'Military Crisis Responses to COVID-19', Journal of Contingencies and Crisis Management 29, no. 1 (March 2021): 101, https://doi.org/10.1111/1468-5973.12328.

[24] Adam Lindgreen and Valérie Swaen, 'Corporate Social Responsibility', International Journal of Management Reviews 12, no. 1 (March 2010): 1, https://doi.org/10.1111/j.1468-2370.2009.00277.x.

[25] Food and Agriculture Organization and European Commission, 'An Introduction to the Basic Concepts of Food Security', FAO Food Security Programme (Food and Agriculture Organization, 2008), https://www.fao.org/3/al936e/al936e00.pdf.

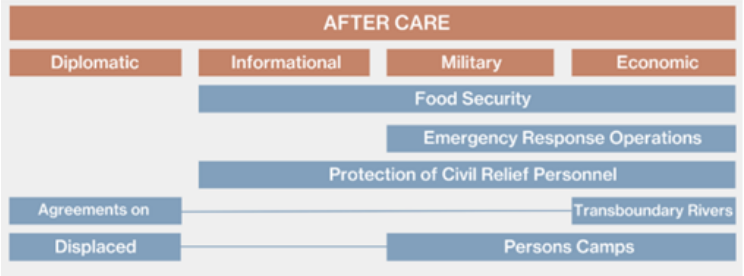

Figure 9 Implemented capabilities by functional area, allocated to the strategic function 'After Care'.

3. Conclusions

This article reported on the serious gaming experiences on Climate Security Risk at the Sofia-based NATO Crisis Management and Disaster Response (CMDR) Centre of Excellence course on Climate Security in Sofia. Twenty participants engaged in strategic capability analysis concerning the requirements to maintain prevention, mitigating, and after-care of societies in the HCSS-designed long-term drought in the Tigris-Euphrates River Basin scenario.

In conclusion, serious gaming is a tool that fosters discussion and in-depth cooperative analyses. By engaging in a strategic game and playing against one or multiple scenarios, a public, private, or non-profit organization can map their current resources, compare and contrast such resources with their desired best practices, identify challenges in prioritization, teamwork, and implementation of measures, and leads to a more accurate and integrated decision-making dynamics within an organization. Climate-induced challenges are increasingly becoming more frequent and disruptive, and using serious gaming facilitates interactions between participants, recreating the complexities of a real-life policymaking discussion on climate-induced challenges. In this way, critical actors provide critical input, communicate openly, and ground their policy goals due to enhanced situational awareness.

Appendix

Appendix A. Climate Security Games held by HCSS

Date	Partner Institutions	Place
2017	Dutch Ministry of Foreign Affairs; Dutch Ministry of Defense	The Netherlands
November 2018	House of Representatives of the Netherlands (Tweede Kamer der Staten-Generaal)	The Netherlands
February 2019	Planetary Security Conference	The Netherlands
April 2019	NATO Crisis Management and Disaster Response Centre of Excellence	Bulgaria
June 2021	NATO Crisis Management and Disaster Response Centre of Excellence	Online/Remote
October 2021	Warsaw Security Forum	Poland
November 2021	Event held parallel of COP26	Online/Remote
February 2022	Dutch Ministry of Economic Affairs and Climate	The Netherlands
April 2022	NATO Crisis Management and Disaster Response Centre of Excellence	Bulgaria

Appendix B. HCSS Climate Security Strategic Capability Game, Capability List

No.	Title	Capability
DIPLOMATIC (Including LEGAL)		
1	Participation in international climate agreements	The ability to bolster your own and other governments' participation in international climate agreements in order to reduce climate change.
2	Agreements on transboundary rivers	The ability to successfully negotiate international agreements on allocation and use of major transboundary rivers in order to reduce the risk of transboundary water conflicts.
3	Joint management institutes over transboundary waters	The ability to set up joint management institutes over shared transboundary waters in order to reduce the occurrence of cross-boundary water shortages.
4	Disaster diplomacy	The ability to engage in disaster diplomacy in order to coordinate emergency relief among international actors.
5	Punishment for environmental crimes	The ability to hold actors accountable for environmental disasters in order to prevent their recurrence.
6	International dialogue mechanisms	The ability to develop international dialogue mechanisms for stakeholders with a vested interest in a particular geographical area affected by climate change in order to avoid civil conflict.
7	Cooperation for emissions reduction	The ability to improve legal and institutional systems for emissions reduction (e.g. in the forestry sector) in order to reduce climate change.
8	Flexible climate governance	The ability to design flexible climate governance laws in order to make them more effective in the face of changing local contexts and climate change forecasts.
9	Governance of sea lanes and resources	The ability to establish laws governing newly-opened sea lanes and resources in the Arctic (due to global warming) in order to avoid conflicts or tensions.
10	Inclusive policies	The ability to include vulnerable and marginalized groups in climate change adaptation policies in order to develop more inclusive policies.
11	Coordination of emergency incidents and disasters	The ability to establish mechanisms by which emergency management stakeholder agencies and resources are coordinated in order to ensure that all incident response requirements are met.
INFORMATIONAL		
12	Local-level adaptation	The ability to translate international climate change scenarios into local-level assessments in order to gain better insight into local climate change impacts.
13	Bottom-up adaptation	The ability to provide and teach information on climate change in native languages and to train local experts in order to enhance bottom-up understanding and adaptation.
14	Distribution of information	The ability to distribute information on the post-disaster situation in order to better manage and coordinate evacuation operations and relief aid.
15	Local healthcare expertise	The ability to improve local healthcare expertise in order to offer better health services (after events).

16	Education and training for alternative livelihoods	The ability to educate and train local populations in order to provide them with new livelihood opportunities, if needed, due to climate change impacts.
17	Local expertise	The ability to train local experts to continue working on rebuilding and strengthening societies after emergency relief workers have left in order to increase their self-reliance.
18	Public support	The ability to increase public support for climate change adaptation measures in order to facilitate successful adaptation policies.
19	Local information campaigns	The ability to translate traditional climate science into tailored information campaigns for (local) policy-makers in order to increase their knowledge and awareness of issues at stake.
20	Public communication	The ability to utilize public communication in order to disseminate warning signals and post-disaster information.
21	Learning from experience	The ability to learn from natural disaster experiences and make local impact assessments in order to improve international resilience programs and to better tailor aftercare operations.
22	Innovative solutions	The ability build/develop expertise and innovative solutions in order to rebuild societies in the aftermath of natural disasters or climate change-induced societal problems.
23	Emergency response information	The ability to provide emergency response information in the direct aftermath of natural disasters in order to facilitate relief operations.
24	Emergency response technologies	The ability to equip emergency managers and response personnel with appropriate technology tools (e.g. drones, satellite imagery through GIS, real-time disaster modeling) to better tackle the immediate challenges faced during a natural disaster and to better prepare for future natural disasters.
MILITARY		
25	Military CO2-emissions reductions	The ability to cut down CO2 emissions of the military through energy saving and adoption of new sources of energy in order to reduce their carbon footprint in affected areas.
26	Protection of civil relief personnel	The ability to protect civil relief personnel after disasters (in conflict or conflict-prone areas) in order to facilitate a safe work environment.
27	Civil-military cooperation	The ability to execute civil-military cooperation when assisting in rebuilding societies after extreme weather and climate events and/or incorporating climate adaptation measures in peacebuilding missions in order to improve disaster resilience in developing countries.
28	Sustainable military camps	The ability to design and plan military camps in a sustainable way in order for them to serve communities and other purposes after military units have left.
29	Safety of personnel	The ability to ensure the safety of personnel in risk areas in case of extreme weather events, disease outbreaks, or natural disasters in order to prevent human suffering.
30	Emergency command and control (C2)	The ability to exert command and control over an emergency response and recovery operation in order to ensure an effective and consistent response.
31	Relocation of internally displaced persons (IDPs)	The ability to successfully relocate internally displaced persons (on a long-term basis) in order to avoid tension.

32	Emergency relief operations	The ability to set up emergency relief operations after extreme weather events or natural disasters (such as logistics, food provision, emergency reparations and evacuations, medical support, securing displaced persons' camps) in order to reduce their negative impact on local communities.
33	Displaced persons camps	The ability to establish displaced persons camps with sufficient resources (shelter, clean water, food) in order to prevent human suffering and the risk of conflict in the direct aftermath of natural disasters.
ECONOMIC		
34	Critical infrastructure improvement	The ability to improve critical infrastructures in risk areas to decrease their vulnerability to extreme weather events.
35	Infrastructure reparations	The ability to restore and replace (critical) infrastructure after natural disasters in order to facilitate communications and emergency relief operations, as well as to speed up the disaster recovery process.
36	Renewable energy	The ability to develop renewable energy projects in order to adapt to climate change and reduce emissions.
37	Subsidies for livelihood diversification	The ability to set up livelihood diversification and low-impact agriculture projects in order to adapt to changed environmental circumstances.
38	Climate change mitigation programs	The ability to set up climate change mitigation programs in developing countries in order to enhance resilience of fragile societies to climate change.
39	Carbon pricing	The ability to implement carbon pricing mechanisms (such as emissions trading and carbon taxes) in order to shift the burden for damage back to polluters.
40	Mobilization for disaster response	The ability to mobilize human and financial capital in order to ensure a rapid and adequate response to disasters.
41	Innovation	The ability to drive innovation in the field of climate change adaptation in order to speed up the adaptation process.
42	Corporate Social Responsibility (CSR)	The ability to engage in CSR activities in order to promote funding of sustainable development programs and environmentally friendly business strategies.
43	Food security	The ability to provide emergency food aid, improve storage technologies, and monitor food prices in order to avoid food shortages (and possible food riots) in the event of natural disasters.
44	Urban resilience	The ability to adapt infrastructure (including airports) and urban development planning to the risks of climate change in order to avoid social and political disruption, as well as to handle people and relief goods after disruptive events occur.
45	Psychological support	The ability to provide psychological support to disaster victims in order to reduce human suffering after disasters and to prevent trauma.
46	Behavioral change	The ability to motivate people and businesses to reduce their climate change-enhancing behavior in order to reduce climate change.