NATO
OTAN

The Secretary General's Report

Climate Change & Security Impact Assessment

2022

Foreword

This year, the Euro-Atlantic area is experiencing profound instability and urgent security threats. But even as we address these pressing challenges, we cannot ignore the inexorable, global reality of climate change, and the security implications thereof. Climate change is already a 'threat multiplier'; one that will worsen as the world warms further. As an Alliance tasked with ensuring the security of its members, NATO must assess this challenge, adapt to it, and contribute to mitigating its effects while always maintaining military effectiveness.

This Impact Assessment focuses on assessing the security impacts of climate change. The conclusions are sobering. There will be more extreme weather and natural disasters putting our citizens at risk. More conflicts will erupt over access to resources. Coasts will be flooded, putting civilian populations, military facilities and economic assets under threat of being inundated. Our militaries will increasingly be required to operate in extreme heat and extreme cold, for example in the Arctic as it opens up.

These changes will require us to transform fundamentally our approach to security and defence. In doing so, we will ensure that military effectiveness in carrying out NATO's core tasks remains primary. We will need to adapt our equipment, training, facilities, operations, technologies and partnerships, in order to maintain our operational effectiveness in the changing climate. This Impact Assessment will contribute to that process.

It is a regrettable but unavoidable fact that climate change will measurably increase the risks to the security of our citizens. NATO militaries, and the Alliance as a whole, will play an active and substantial role in helping to address these risks. As part of that effort, NATO will be a world leader in assessing the security risks of climate change, including through Impact Assessments like this one.

Jens Stoltenberg
Secretary General, NATO

Executive Summary

Climate change is the overarching challenge of our time. The scope, scale and intensity of climate change effects are projected to increase, ramping up considerably after 2040, as assessed by the July 2021 Report of the Intergovernmental Panel on Climate Change (IPCC). These conditions represent a 'threat multiplier' that has significant security implications for NATO on a tactical, operational and strategic level. For that reason, NATO Heads of State and Government (HOSG) agreed that NATO should aim to become the leading international organization when it comes to understanding and adapting to the impact of climate change on security, and endorsed NATO's Climate Change and Security Action Plan (CCSAP) at their 2021 Summit in Brussels. That Action Plan sets out an ambitious agenda to increase Allied awareness, as well as to develop measures to adapt to and mitigate the impact of climate change.

This Climate Change and Security Impact Assessment (CCSIA) responds to the demand for increased Allied awareness concerning the impact of climate change on security. This report sets out the effects of various climatic hazards: (1) on NATO's strategic environment; (2) on NATO's assets and installations; (3) on NATO's missions and multi-domain operations; as well as (4) on NATO's resilience and civil preparedness. Further, this Impact Assessment briefly outlines potential and proposed adaptation measures based on NATO's analysis and Allies' best practice.

With ground water depleting, wildfire seasons are becoming longer and more severe.

NATO's Strategic Environment

Each region assessed in this Impact Assessment - Europe, North America, Middle East and North Africa / the Sahel and the High North - is projected to experience concurrent and multiple climate change hazards. Imminent physical impacts include an increased number of storms, floods, heatwaves, drought, ocean acidification and sea level rise. These would be more frequent and severe at 2.5°C compared to 2°C global warming, and even more widespread and pronounced with higher warming levels. Secondary consequences include the degradation of water supplies and reduced agricultural productivity, and disruptions to wider resources and fuel supply chains, with varied impacts across different parts of the world. In some cases, women and girls, and marginalized groups will be disproportionately affected. Competition over increasingly scarce resources is likely to exacerbate state fragility, fuel conflicts, and prompt migration, thus creating conditions which could be easily exploited by non-state armed groups. The wider impacts of climate change can also make peace and stability harder to sustain, particularly in countries with a narrow natural resource base or where competition over resources already influences conflict dynamics.

Climate change opens up new areas of strategic competition. For example, increased accessibility to shipping channels, and competition for natural resources in the High North will influence the ways in which certain countries develop their military capabilities and force structures, and hence the Alliance's overall strategic environment.

A number of Allies have already developed their own national strategies and objectives in relation to the impact of climate change on security, ranging from considerations regarding the strategic context, to energy efficiency measures, and the integration of climate change and security within the policy landscape and procedures. The Russian invasion of Ukraine has highlighted the need to seek alternative and reliable sources of energy, including to ensure the primacy of operational effectiveness; this transition should also take into account the impact of climate change on security. During the energy transition, including through the exploitation of innovative technology, it will be vital to ensure that no further dependencies are created on unreliable suppliers, including Russia and China.

At the strategic level, NATO's adaptation to the impact of climate change on security, and efforts to address greenhouse gas (GHG) emissions, must take account of several considerations, including:

- Military effectiveness in carrying out NATO's core tasks remains primary.
- The deterioration in Euro-Atlantic security as a result of Russia's actions, posture and threat-perception will lead to substantial increases in the number of Alliance platforms, as well as training, exercising and patrolling. This will increase fuel demand and consumption, thus GHG emissions.
- The decisions taken in response to Russia's invasion of Ukraine to acquire new equipment offer an opportunity to build energy efficiency into capability design, reducing fuel and logistical requirements in future.
- Transition to "clean" technologies such as solar panels, smart camps and fuel cells should take into account the importance of not creating new strategic dependencies, in particular on China, which currently dominates the control and processing of essential materials.
- Interoperability should also be a priority as Allies adopt new technologies to adapt to the impact of climate change on security, and as part of the transition to green technologies and alternative energy. In this way, exploitation of these innovative technologies should be considered at the design stage of capabilities.
- NATO's adaptation measures can have benefits also in the civilian sector. A strong demand signal from the military establishments that they are moving towards new and cleaner technologies and energy sources can stimulate industry to create the necessary materials, for example, processing for biofuels and synthetic fuels.

High water vehicle being directed down a flooded road at Iatt lake in Grant Parish, March 2016.

NATO's assets and installations

The consequences of climate change test the resilience of Allied military installations and critical infrastructure - whether fixed or deployed. Rising sea levels and storm surges threaten the structure of ports and bases situated in low-lying coastal areas, potentially limiting access for extended periods of time. Increasing aridity makes fires on ranges and training areas more likely, which disrupts access and limits military mobility. Drought, fires and thawing permafrost all have adverse impacts on the surfaces of buildings, roads and runways. Increasing desertification affects the critical water infrastructure of military bases and supplies for deployed forces.

The design, procurement and life cycle of both fixed and deployed equipment will be affected by changes in climate as environmental extremes increase the 'wear and tear' on platforms and equipment critical for NATO's missions and multi-domain operations. The mechanical failure of equipment, e.g. due to electrical overload or overheating, will require increased maintenance and repair requirements. Temperature extremes will require additional cooling capabilities, driving up military energy consumption. Assets and equipment in the air domain are vulnerable to dust storms which cause damage to turbines and engines, and hamper launch and flight trajectories.

Rain and heavy winds from Hurricane Isabel flood portions of Fleet Parking at Naval Station Norfolk, September 2003.

NATO's missions and multi-domain operations

Climate change makes military operations and missions in various regions more expensive and more technically challenging. This cuts across the traditional operating domains of maritime, land, air and space with cascading effects on the readiness and sustainability of NATO forces and capabilities, therefore on the Alliance's deterrence and defence posture as a whole.

Long spells of hot weather, and the increased drought such heatwaves entail, cause disruptions to testing and training cycles of armed forces with repercussions for training schedules.

Coastal flooding and coastal erosion will adversely affect maritime operations by creating time lags in repair, depot-level maintenance and scheduled operations for naval and coast guard vessels. Increases in ocean temperature will necessitate greater cooling requirements to keep ship propulsion systems from overheating.

Coastal and inland flooding, as well as heavy precipitation, impacts land operations, as such hazards cause disruptions to transport networks, impeding operations that require cargo, medical supplies and personnel to be moved quickly and safely. At the other end of the spectrum, excessive heat and drought conditions can put soldiers' physical health at risk, potentially leading to increased requirements for medical supplies and personnel in operational theatres.

Climate change induced variability may challenge the viability of air operations, given that aircraft performance (both fixed and rotary wing) is directly dependent on air temperature, air pressure, precipitation and wind patterns. Allies may witness loss of payload, range and loiter time during air operations. Sea level rise may impair space operations, given that launch facilities are frequently located close to the shoreline; also, variability in wind patterns in the upper and lower levels of the atmosphere may negatively influence launch trajectories for satellites and missiles.

Climate change may also affect fundamental mission and deployment profiles. Armed forces are increasingly

Florida guardsmen use a helicopter to help put out a wildfire in Bay Country, March 2022.

being called on to perform humanitarian aid and disaster relief operations and asked to operate against peer- and near-peer adversaries in new strategic theatres. Such shifts at the mission and deployment level will require adaptations in training, as well as procurement to acquire specific capacities for these new roles and new theatres of operation. In particular, the increasing demand on armed forces for humanitarian aid and disaster relief operations potentially reduces their availability for more traditional roles; as humanitarian aid and disaster relief operations requirements are very likely to increase. This will need to be factored into deterrence and defence considerations.

US Special Forces prepare for Exercise Cold Response 2022

Preparedness

Climate change challenges Allies' capacity to provide critical services to their population and military forces in vital sectors, including communications, energy, transport, and food and water. The Alliance depends on civil and commercial resources and infrastructure, including railways ports, airfields and energy grids, to support the rapid and effective movement and sustainment of its military forces. It is imperative for NATO and Allies to continue strengthening national and international resilience, taking into account the impact of climate change.

Royal Air Force Chinook called in to support Environmental Agency in repairing a damaged river bank, June 2019.

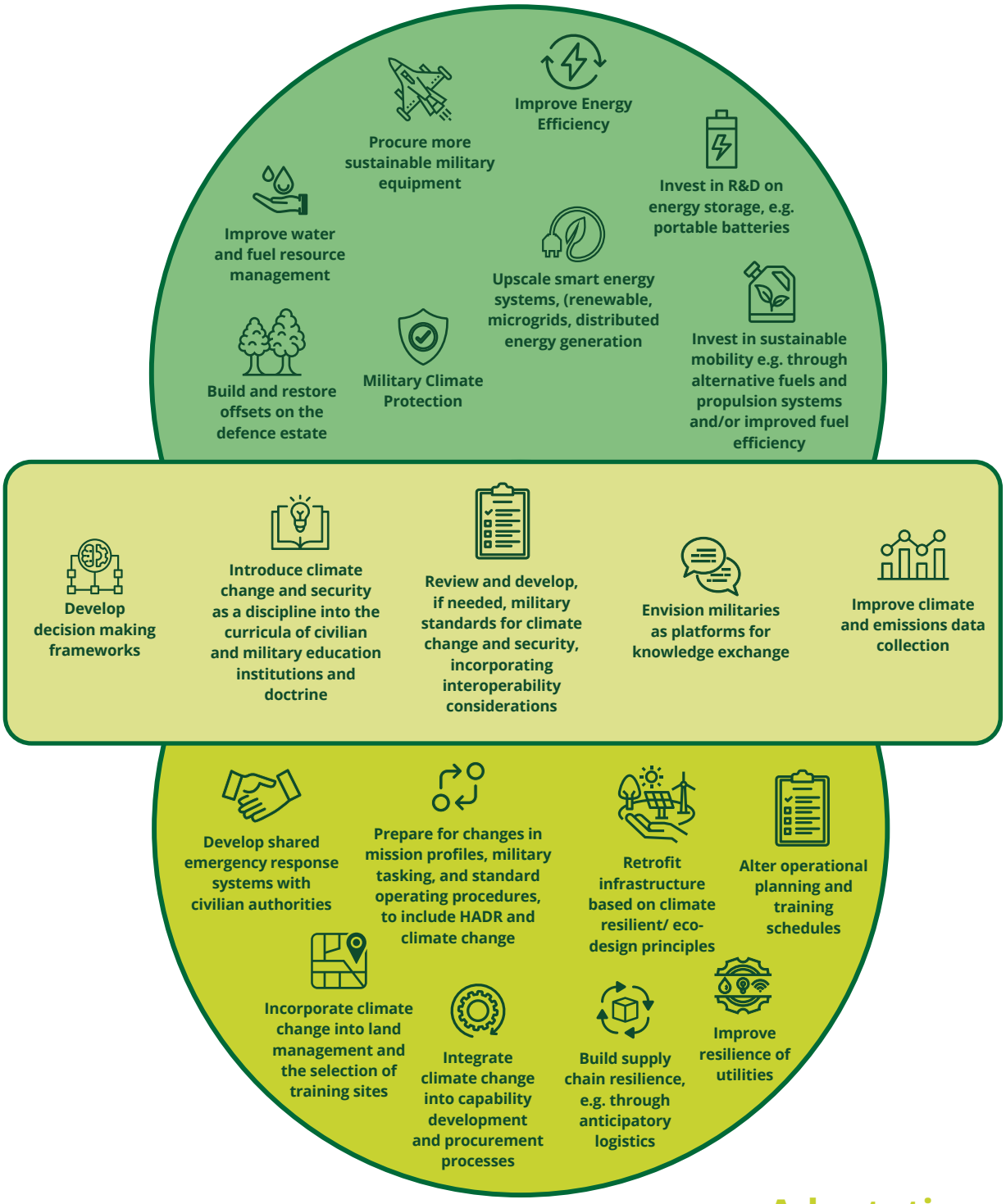
Climate Impacts

Climate change will continue to have direct impacts on military infrastructure and equipment capability as well as more indirect implications for mission profiles, military supply chains and the Alliance's security environment both in the Euro-Atlantic area and the broader neighbourhood.

Most prominent impacts of climate change on security.

Mitigation

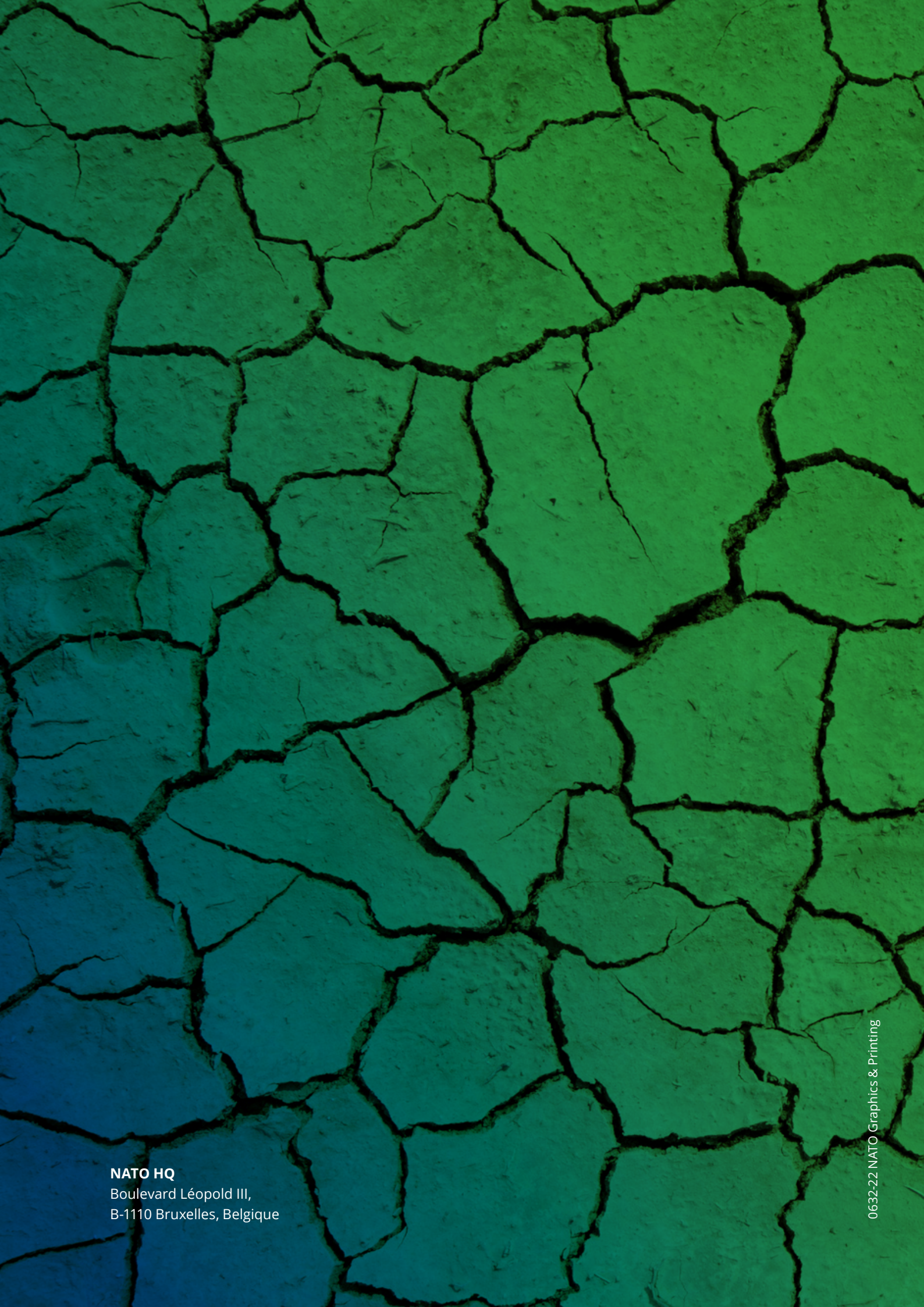
Measures to reduce and/or capture military CO2 emissions.



Adaptation

Measures to address the impact of climate change on the Alliance.

Prominent adaptation and mitigation measures including those from a survey of Allied best practice.



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