

Shifting Bases, Shifting Perils

A Scoping Study on Security Implications of Climate Change in the OSCE Region and Beyond

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Commissioned by the Office of the Co-ordinator of OSCE Economic and Environmental Activities with financial support from Spain

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The contents of the report are the sole of responsibility of the authors and do not reflect the position of the Office of the Co-ordinator of OSCE Economic and Environmental activities

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List of Abbreviations

AA	German Federal Foreign Office	IPCC	Intergovernmental Panel on Climate Change
AEPS	Arctic Environmental Protection Strategy	MAC	Military Advisory Council
BMU	German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety	MARPOL	International Convention for the Prevention of Pollution from Ships
BMZ	German Federal Ministry for Economic Cooperation and Development	MoD	Ministry of Defence
CCIS	Climate Change and International Security	NATO	North Atlantic Treaty Organisation
CH ₄	Methane	NIC	National Intelligence Council
CLCS	Commission on the Limits of the Continental Shelf	OCEEA	Office of the OSCE Co-ordinator of Economic and Environmental Activities
CNA	Centre for Naval Analysis	OSCE	Organisation for Security and Co-operation in Europe
COP	Conference of the Parties	PCB	Polychlorinated Biphenyls
CSP	Country Strategy Paper	SEC	Council Secretariat
EC	European Commission	REC	Regional Environmental Centre for Europe
ECOSOC	Economic and Social Council	SIDS	Small Island Development States
EEA	European Environment Agency	SLR	Sea-level Rise
EEZ	Exclusive Economic Zone	UK	United Kingdom of Great Britain and Northern Ireland
ENP	European Neighbourhood Policy	UN	United Nations
ENVSEC	Environment and Security Initiative	UNCLOS	United Nations Convention on the Law of the Sea
ESS	European Security Strategy	UNDP	United Nations Development Program
EU	European Union	UNEP	United Nations Environment Program
FCO	Foreign and Commonwealth Office	UNFCCC	United Nations Framework Convention on Climate Change
FOI	Swedish Defence Research Agency	UNGA	United Nations General Assembly
FSC	Forum for Security Cooperation	UNHCR	United Nations High-Commission on Refugees
FYROM	Former Yugoslavian Republic of Macedonia	UNHRC	United Nations Human Rights Council
GAERC	General Affairs and External Relations Council	UNPD	United Nations Population Division
GDP	Gross Domestic Product	UNSC	United Nations Security Council
G77	The Group of 77	UNSG	United Nations Secretary-General
HDR	Human Development Report	WB	World Bank
IMO	International Maritime Organization	WBGU	German Advisory Council on Global Change
IOM	International Organisation for Migration		

Executive Summary

The **2003 Strategy Document (Maastricht Strategy)** of the Organisation for Security and Co-operation in Europe (OSCE) calls upon the Office of the OSCE Co-ordinator of Economic and Environmental Activities (OCEEA) to contribute to OSCE activities related to early warning and conflict prevention. This shall be done by monitoring economic and environmental challenges and threats to security and stability and collaborating with relevant international organisations.

The **2007 Madrid Ministerial Declaration on Environment and Security** acknowledges that climate change is a long-term challenge. In addition, the Declaration outlines that the OSCE, as a regional security organisation under Chapter VIII of the UN Charter, has a complementary role within its mandate and its specific region to address these challenges outside of the United Nations (UN) level climate negotiations.

At the **2009 chairmanship conference in Bucharest**, the OCEEA announced a new extra-budgetary project focusing on the security implications of climate change. Its goal is to produce scenarios on the impacts of climate change on security and identify how the OSCE could contribute to mitigating potential challenges. The OCEEA and the European Environment Agency (EEA) will jointly implement the project. This report – commissioned by the OCEEA in the context of this project – is a scoping study on potential security implications of climate change. It has four main aims:

- **Reviewing** the state of the debate in current research on climate change and security. In addition, assessing the role of scenarios in policy planning and identifying the characteristics of scenarios related to climate change and security.
- **Identifying** potential security implications of climate change in several regions within or adjacent to the OSCE – in particular the Arctic, the Southern Mediterranean, South East and Eastern Europe, the South Caucasus and Central Asia.
- **Assessing** the activities conducted by countries and international organisations – particularly the UN and OSCE member states – with regard to climate change and security.
- **Outlining** initial recommendations to the OSCE on addressing the potential security implications of climate change.

The scoping study was implemented by Adelphi Research, in cooperation with the Royal Institute for International Affairs (Chatham House) and CIMERA. It reviews key literature, and includes desk-based research and input from regional experts.

CLIMATE CHANGE AND SECURITY – INTERLINKAGES, CONCEPTS AND SCENARIOS

A significant body of literature on potential interlinkages between climate change and security has developed over the past years. This includes scientific studies as well as reports by political bodies. At a global level, the report of UN Secretary-General Ban Ki-moon on the potential security implications of climate change identified several channels through which climate change impacts may translate into insecurity.

Climate change will alter the socio-economic foundations of society. It will **transform constants into variables**: Coastlines will be reshaped due to sea-level rise (SLR), thus altering maritime territory and borders. Infrastructure that has been designed for specific environmental conditions may suffer as

these conditions change, such as pipelines threatened by thawing permafrost. A particularly complex challenge is the **water-food-energy nexus**: Water is essential not only for drinking water, but also for food production and electricity generation, such as in the case of hydropower or when it is used as a coolant for power plants. Both agriculture and energy production are key economic sectors. Growing populations and increasing demands in food, energy and other resources converge with climate change impacts. These changes affecting water resources will thus also impact food and energy security issues, and by extension economies and employment.

The term **threat multiplier** emerged as one of the key concepts within the climate change and security debate. It states that climate change may contribute to insecurities and the likelihood of armed conflict depending on given circumstances and the interaction with other factors. Most importantly climate change can act as a catalyst deteriorating livelihoods, shifting population patterns and causing unequal distribution of resources. In this way, climate change exacerbates existing tensions, creates new ones and may under certain circumstances lead to armed conflict.

The concrete impacts of climate change, however, are still uncertain and making predictions remains difficult. While the above-mentioned impacts may materialise, their likelihood or their severity cannot be identified with certainty. **Scenarios are key instruments for addressing this uncertainty** by outlining a set of potential futures. They support early identification and preparation for trends by highlighting pathways in which climate change may threaten security.

REGIONAL SECURITY IMPLICATIONS OF CLIMATE CHANGE

As a starting point for developing scenarios on climate change's challenges and subsequent policy recommendations, an assessment of the potential security implications of climate change is necessary. For the core regions of the OCEEA/EEA project, which have been assessed in this scoping study, the potential security implications can be summarised as follows:

- **The Arctic:** The melting of the Arctic will open up new shipping routes and will make natural resources accessible. Territorial claims need to be resolved to avoid potential political tensions and maritime border disputes. In addition, the climate-induced environmental changes are degrading livelihoods and threatening ecosystems. This will impact the local indigenous communities in particular. The key challenge for the region results from the novel situation of a melting Arctic, for which current international law may need to be adapted.
- **The Southern Mediterranean:** Climate change will likely lead to a severe reduction in available food and water resources, while demands will likely continue to rise due to population growth and economic development. This could lead to economic stagnation, social dissatisfaction and grievances, and weakened authorities. States may increasingly show uncooperative behaviour over the use of transboundary water resources. Ultimately, these changes may fuel extremism, but also erode tolerance and impact civil liberties as well as political rights if the situation deteriorates. As the region is already suffering from tense social, political and economic situations, climate change may become a significant burden overstressing the adaptation capacities of institutions.
- **South East and Eastern Europe:** Increased climate variability and global warming will likely imperil food and energy security in these regions. This may negatively impact the economic and political situation and increase social tensions within the countries, for example between

ethnically diverse population groups or towards migrants. However, the close proximity to the European Union (EU) and the candidate or potential candidate status of several countries will make them less vulnerable than for instance the Southern Mediterranean countries.

- **South Caucasus and Central Asia:** Climate change will negatively impact water resources, thus impacting intra- and inter-state relations. This includes also the Aral Sea, which may further diminish due to higher evaporation resulting from regional warming. Food and electricity production, as well as economic development, will suffer, which could impact relations between social groups within countries. The likely changing levels of the Caspian Sea will raise questions related to maritime territory. Both regions are situated at geopolitical fulcrums connecting Europe, Asia and the Middle East, thus tensions within both regions may also impact neighbouring regions, and vice versa.

From the perspective of comprehensive security, the direct potential implications outlined above are mainly in the economic and environmental dimension of the OSCE. The politico-military dimension will be touched upon directly in the case of the Arctic and the Caspian Sea due to changing borders and territory. Managing these direct impacts will be of key importance to prevent the development of tensions within and between states. If not properly addressed, frustration and disaffection may lead to grievance and extremism, which could also challenge the human dimension of security.

AN EMERGING GLOBAL RESPONSE

The potential significant impacts of climate change are hardly disputed. Many OSCE participating states have already raised the issue at multiple international organisations. The United Nations debated the potential impacts of climate changes from their perspective at the UN General Assembly (UNGA), the UN Security Council (UNSC) and the UN Human Rights Council (UNHRC). In June 2009, the UNGA adopted resolution A/63/281 calling upon all UN bodies to address the threats of climate change within their respective mandates. In addition, it requested the UN Secretary-General to produce a report on the potential security implications of climate change and to include the perspectives of the UN member states. Together, the resolution and the report provide a framework of action for the UN. In addition to the UN report, the EU, the North Atlantic Treaty Organisation (NATO), as well as several OSCE participating states have started to assess the security impacts of climate change from their perspective and to integrate the potential security implications of climate change into their policies.

In the emerging global response to potential security implications of climate change, the OSCE has an added value compared to other international organisations: With its regional focus, the OSCE might be more suited to develop tailored responses than the UN with its global perspective. Being the largest regional security organisation in the world, it is also more inclusive and encompassing than other bodies such as NATO. Thus, the OSCE may serve as an inclusive platform for dialogue and cooperation, allowing tensions to defuse before they arise. Its field presence is thereby a key asset for information gathering, dissemination and preparing for climate change.

CONCLUSIONS AND RECOMMENDATIONS

In the aftermath of the climate negotiations in Copenhagen, 76 countries – 41 from the OSCE – pledged to reduce their emissions. Despite these encouraging initial pledges, global emissions are

likely to rise for the foreseeable future, while the impacts of past emissions will continue to unfold for the next decades irrespective of mitigation actions. The Arctic is currently among the most visible symbols of how climate change is radically altering the geopolitical landscape. These trends will continue and impact the lives of millions around the globe.

Identifying early signs is vital for timely action. With conflict prevention and stability as core functions of the OSCE, it will be a key task for the organisation to identify the challenges of climate change and prevent them from turning into security risks. If managed adequately, climate change may serve as a catalyst for cooperation among countries. With its comprehensive approach to security, including the Maastricht Strategy as well as the Madrid Declaration, the ground has been laid to address the security implications of climate change within the OSCE. Building on this and against the background of the key findings, the following actions are recommended:

- **Collecting the perspectives** and priorities of OSCE participating countries to start a debate on a common understanding of the threats of climate change.
- **Organising joint sessions** between OSCE bodies responsible for different dimensions to increase understanding of the cross-cutting nature of climate change.
- **Partnering with international organisations**, such as the Arctic Council and the Union for the Mediterranean, when appropriate.
- **Approaching non-OSCE stakeholders** that are adjacent to the OSCE and will also be impacted by climate change, such as China in the case of Central Asia.
- **Actively seeking cooperation and coordination** with other relevant national and international agencies on the security implications of climate change.
- **Disseminating information** on the impacts of climate change, employing the OSCE field presences, the Aarhus centres, and other relevant mechanisms for this purpose.
- **Improving networking and communication** across borders and regions to appreciate the trans-regional impacts on climate change.
- **Conducting regional consultations and assessments** to identify concrete sub-regional and sub-national impacts of climate change as well as identifying potential policy responses.
- **Building capacity** within the OSCE by developing staff training courses and a potential manual promoting the integration climate change's challenges into daily activities.
- **Improving research and analysis** on climate change by developing a dedicated climate centre, which could be integrated into existing bodies such as the OSCE academy in Bishkek. In addition, an expert group or related mechanism should be considered to support the analytical capacities of the OSCE.

The Bucharest chairmanship conference in 2009 was important in raising awareness for the role of the OSCE and bringing a broad range of stakeholders together. As the next years will be crucial in preparing for the impacts of climate change and potential security implications, the OSCE should consider holding periodic events on climate change and security. The events should serve as forums to exchange views within the OSCE and highlight specific regional aspects. The Bucharest chairmanship conference in 2009 could serve as a blueprint in this regard.

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1 Introduction

1.1 Times of Change

Climate change is transforming constants into variables. Coastlines, which have hardly changed for centuries, will become reshaped in a few decades. Fertile soils nourishing people for generations will turn into badlands. Seemingly endless springs will run dry. With climate change the past is no longer a reliable guide for the future. Until now, the vast majority of human designed systems – physical, legal and political – have assumed a constant changing environment which is no longer valid under the effects of climate change. Climate variability and climate change is altering basic conditions such as precipitation patterns, glacial melt rate, temperature, soil moisture and more.

Meanwhile, **climate change trends converge with other global trends**, such as population growth, depletion of groundwater resources, soil exhaustion, urbanisation, and change of consumption patterns (see Carus et al. 2007). The combination of these trends is creating a set of interlocking challenges (B. Lee 2009), which may exceed the capacities of societies unless there is a radical socio-economic shift (Welzer 2008; Leggewie/Welzer 2009). The aspect of interlocking can be exemplified for the case of biofuel production, which may provide a more carbon-friendly type of fuel, but simultaneously takes up agricultural land needed for food production.

Even though climate change is one among many challenges, it is likely to exacerbate current resource depletion trends. Rising temperatures, for example, will reduce water availability in many areas of the world. In the Middle East climate change will compound already existing water scarcity resulting from unsustainable use and escalating demands (Brown/Crawford 2009). Therefore, climate change has often been considered as a serious threat multiplier, putting further stress to existing challenges, possibly beyond the coping capacities of states and societies.

As climate change alters basic principles and conditions, **it erodes institutions and systems that have evolved on the basis of certain known conditions** or variability within known boundaries, such as infrastructure, legislation or certain ways of sustaining livelihoods.

Infrastructure is grafted onto an existing physical environment (see Paskal 2009). When transportation networks, cities, irrigation systems, and the like are designed, site assessments are done to ensure the new infrastructures will be secure. Normally those assessments are based on an analysis of the history of in the region. In many areas, existing infrastructures are not answering the needs generated by changing geophysical realities, and new constructions are not taking the changes into account.

Not only will existing physical infrastructure be compromised by the new conditions, in some cases legal infrastructure will also need to evolve to manage and govern border changes resulting from sea level change. According to the UN Convention on the Law of the Sea (UNCLOS), for example, maritime borders are often dependent on coastlines. However that assumes that the coastline itself is not changing with rising sea levels and retreat. By assuming the physical environment is a constant, UNCLOS lacks the **built-in flexibility that can make resolving such complex issues more difficult**. It may also lead to an abandonment of the Convention in some areas in favour of more bilateral agreements, potentially undermining the principle of international law. An emerging challenge in this regard will be the **opening of the Arctic** and resolving the competing claims of littoral states

The new concept that the **environment can significantly change territory** had previously been hardly considered by international laws. No legal framework has been developed for the case in which entire nations, particular low-lying small island states, need to be evacuated as their territories slowly disappear due to rising seas. Would they cease to exist as a legal nation? Would they lose their seat at the United Nations? Would the waters become international waters? If countries take in populations of island states, will they need to provide for exclusive economic zone (EEZ) and allow the administering of fisheries (Paskal 2007)?

There are many other pieces of legislation, both national and international, that exhibit the same lacuna. **Water sharing agreements based on absolute volumes, such as the Wadi Araba Accords within the framework of the Israel-Jordan Peace Treaty (Brown/Crawford 2009), will make it difficult for downstream nations to get their fair share in a situation where the river levels drop substantially.** The same principles apply in hydropower sharing agreements that assume a certain amount of generation based on a constant water flow.

In the case of **Central Asia, for example, both the physical infrastructure and legal infrastructure were designed not only for different environmental conditions, but for different political ones as well:** The water and power infrastructures were planned assuming the region was part of the Soviet Union. While the question of water and power sharing is already a sensitive issue (see chapter 3), climate-induced variability adds another layer of complexity to an already challenging situation.

Box 1: Climate Change Challenges All

Very often, climate change is considered a major challenge particularly for developing countries. Indeed, insufficient adaptive capacities and fragile or post-conflict situations make them particularly vulnerable to climate change effects (see Carus et al. 2007). However, this does not mean that developed countries will not be impacted by climate change. Indeed, the challenge of environmental change affects all nations, no matter how industrialized they are. In fact, in some ways, industrialized nations are particularly poorly prepared as their infrastructure is often complex, vulnerable and interlinked, leading to problems in one area cascading throughout the system, as seen with the Northeast Blackout which left tens of millions in the US and Canada without power in 2003. Environmental change can also effect economic development and create large-scale internal refugee challenges in even the most stable nations, as seen in the U.S. in 2005 in the aftermath of Hurricane Katrina. Katrina was estimated to cost \$100 billion, and Katrina refugees were inadequately integrated into host cities contributing to, for example, a 20 percent spike in murder rates in Houston (Paskal 2010). Thus, without proper planning and preparation, climate-related events may have severe impacts, Irrespective of an economy's strength

Economies and agriculture are currently adapted to relatively stable environmental conditions with the assumption of predictable climate variability. As an example, the Nile delta is not only the main residential area in Egypt, but also hosts the country's industrial and agricultural centres. **Agriculture in Egypt depended over millennia on the water and fertile alluvium provided by the Nile River.** However, with decreasing run-off and sediments carried in the Nile River, these basic conditions will disappear. Sea-level rise additionally threatens large portions of arable land, setting food production and the livelihoods of million people at risk. Environmental change may therefore bring along drastic changes within the social realm as it alters ways of living, triggers migration and changes the distribution of resources and opportunities within populations.

Taking into account that physical, legal and economic infrastructures are built assuming a constant environment through time, it is not surprising that, as the environment is changing, **instability appears at various levels** – be it legal, infrastructural, economic or social. The ripple effect spans across various fields that have a link to the physical world, from the rising costs of wheat to the rising costs of insurance.

Environmental change and its impacts will also change the parameter for global, regional and national security, however defined. Traditional security experts would recognise challenges posed by confusion over borders and compromised energy security solutions. From a tactical perspective, increasing extreme weather events can affect supply routes, troop movement, procurement choices and engagement options (see CNA 2007; Paskal 2010). From a strategic perspective, repeated domestic environmental shocks and challenges may affect a nation's ability to project power.

Additionally, environmental change contributes to concerns over water and food security, which can be exacerbated by the response of nations using various methods to try and secure supply in other countries (B. Lee 2009). This can lead to, for example, China and the Middle Eastern nations buying up farmland in Africa (Görge 2009) – and setting up bases along shipping routes to ensure that those supply lines are secure. Pakistan, as another example, offered land for foreign agro-investments including the provision of security forces to guard these lands (see Kumet 2009). Consequently, environmental change can also mean that those who may benefit from a warming climate will become more **geostrategic providers of food and water, affecting their relationships with neighbours.**

Climate change will thus have asymmetric impacts across the world, within countries and between different population groups. Additionally, men and women are likely to be unequally affected by the consequences of climate change, thus **increasing gender inequality.** As women are often involved in or responsible for activities such as collecting fuel wood and water, their workloads are likely to rise with increasing scarcity of resources. In addition, women's central role in caring for the family will become increasingly important as climate change impacts households through the spread of water-borne diseases for example (see UNDP 2009b). As a side effect, limited empowerment may result as education opportunities are threatened by increased hardships and workloads.

Managing these transformations and their impacts while keeping track of the different trajectories and response mechanisms will be a key challenge for decades to come. The impacts of these transformations will be unequally distributed and felt within and across countries. Additionally, a high level of uncertainty remains about the concrete impacts, thus making plausible scenarios, approaches and assumptions necessary. Consequently, **many governments and international organisations started to conduct regional assessments to identify which security implications can be expected from climate change and identify priority areas for action:** In the past decade, there is increasing global recognition of the implications of climate change for issues related to traditional and non-traditional conceptions of security. Academics and policy thinkers alike, together with scientists and government officials, have been devoting ever more intensive efforts to the study of this topic. On the official track, the diplomatic efforts of many states culminated in UN General Assembly (UNGA) resolution A/63/281 of June 2009, which called upon all organs of the United Nations to address the security implications within their respective mandate (UNGA 2009).

1.2 The Role of OSCE in addressing Security Implications of Climate Change

Preventing conflict within the economic and environmental dimensions of security is a key pillar of the Organisation for Security and Co-operation in Europe (OSCE).

OSCE activities in the economic and environmental dimension are based on the 2003 Strategy Document (Maastricht Strategy, OSCE 2003) which calls for the Office of the OSCE Co-ordinator of

OSCE Economic and Environmental Activities (OCEEA) to contribute to OSCE early-warning and conflict-prevention activities by monitoring economic and environmental challenges and threats to security and stability in the OSCE region, in collaboration with relevant international organizations. The Maastricht strategy also encourages the OSCE participating States to ratify and implement existing international environmental legal instruments.

The 2007 Madrid Ministerial Declaration on Environment and Security (OSCE 2007) recognizes that “climate change is a long-term challenge” and acknowledges that “the United Nations climate process is the appropriate forum for negotiating future global action on climate change, and the OSCE, as a regional security organization under Chapter VIII of the UN Charter, has a complementary role to play within its mandate in addressing this challenge in its specific region”.

Officially launched at the Chairmanship conference in Bucharest in October 2009, the OCEEA established a project – which will run until 2012 – to address the security implications of climate change in the OSCE region. The project – jointly implemented by the OCEEA and the European Environment Agency (EEA) – will produce regional scenarios on climate change’s impact on security and identify how the OSCE could contribute to mitigating these challenges.

Preventing violent conflict as well as the economic and environmental dimensions of security are also two key pillars of the OSCE. With the 2007 Madrid Declaration on Environment and Security, the OSCE identified climate change as potential contributor to insecurity and conflict. Officially launched at the chairmanship conference in Bucharest in October 2009, the Secretariat established a programme of work – which will run until 2012 – to address the security implications of climate change for the OSCE region. The programme – jointly implemented by the OSCE and the EEA – will produce regional scenarios on climate change’s impact on security and identify how the OSCE could contribute to mitigating these challenges.

1.3 Structure of the Report

This report is a scoping study commissioned by the OCEEA as part of the aforementioned project. It provides an initial overview to explore potential security implications of climate change in the OSCE area, particular the four regions including the Arctic; South East and Eastern Europe; the South Caucasus and Central Asia; and the Southern Mediterranean. It will serve as background document to the project and later scenario development. Adelphi Research has been contracted by the OSCE to produce the scoping study and jointly realised it with the Royal Institute for International Affairs (Chatham House) and CIMERA. It is divided into the following chapters:

- **Chapter 2** provides an overview on climate change and security (or climate security for short), including a literature review on climate security. As assessing the security implications of climate change is essentially a future-oriented activity, scenarios play a key role in identifying main threats and developing policy responses. The last section of this chapter will provide an overview to scenarios and why those related to climate security are unique.
- **Chapter 3** maps the likely potential security implications of climate change for four regions of particular interest to the OSCE.
- **Chapter 4** provides an overview to perspectives in- and outside the OSCE on climate change and security. Prior to this, the global process within the UN on the issue as well as the EU

process, which has been a forerunner on the issue, will be discussed. Finally, the potential added value of the OSCE will be highlighted.

- **Chapter 5** summarises the key findings of the scoping study and develops recommendations for the OSCE how to address the issues.

The report has been produced between November 2009 and March 2010. It reviews key literature, and includes desk-based research and input from regional experts.

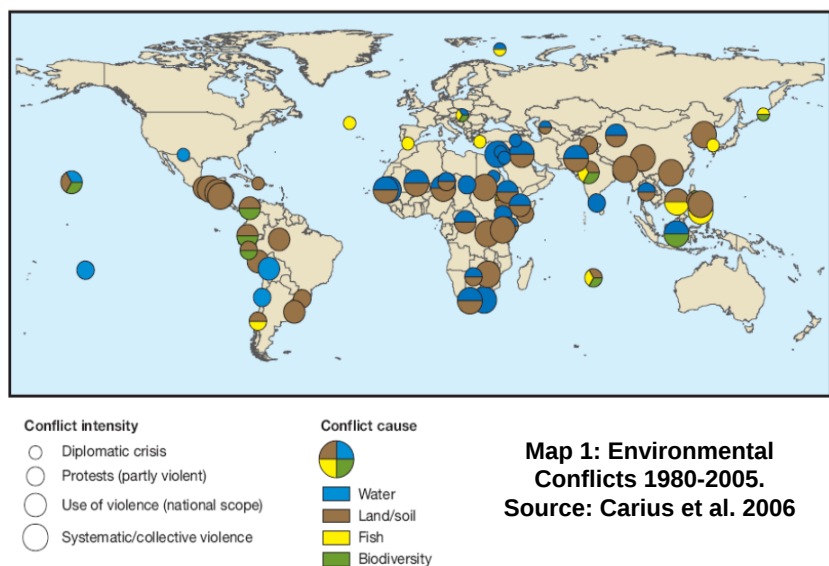
2 Climate Change and Security: Critical Interlinkages

This chapter will provide a general overview on climate change and security. Its intent is to provide background information on the topic: The chapter introduces state of the art concepts in this field and aims to explain how assessment results on security implications related to climate change may differ depending on the regions considered. It is divided in two parts: The first part provides an overview of the literature on climate security. The second part describes the role of scenarios and explains why those related to climate security are unique

2.1 Understanding Climate Change and Security – Where We Are¹

Over the past years, the implications of climate change have been increasingly discussed in the context of international security and violent conflict. Analysts and researchers argue that altering water and food availability, shifting population patterns and the redefinition of territories and coastlines caused by climate change may intensify prevailing tensions and lead to new conflicts. Many institutions investigating these issues have produced a vast body of studies and assessments. These institutions include: Research institutions (WBGU 2007), think tanks (Chatham House 2009, Campbell et al. 2008; CNA 2007, Carius et al. 2008), non-governmental organizations (Smith/Vivekanda 2007; Mabey 2008), governmental organizations (NIC 2009, 2009a, 2009b; Halden 2007), and inter-governmental organizations (UNSG 2009; EU 2008). However, as Gleditsch and Nordås (2009) point out, the amount of peer-reviewed research on climate change and security remains limited.

The debate on climate change and security is largely based on previous research on the interlinkages between the environment, security and conflict (see e.g. WBGU 2007; Carius et al. 2006, Dalby 2002, Carius/Lietzmann 1999 and Gleditsch 1996 for an overview). Studies have identified more than 70 conflicts between 1980 and 2005 which have been linked to environment and natural resources (see map 1). The linkage between environment and security is not deterministic; institutions can often play a key role on whether a potential environmental conflict erupts or not (Kahl 2005). In addition, there is evidence that environmental cooperation and sound natural resources governance may facilitate confidence-building,



Map 1: Environmental Conflicts 1980-2005.
Source: Carius et al. 2006

¹ This review is largely based on Maas/Fritzsche 2009.

stability and peace (see e.g. Conca/Dabelko 2002, Feil et al. 2009, Carius 2006, UNEP 2009b).

The current literature on climate change and security can be divided into three categories: First, a number of largely **desk-based studies outline potential security implications on a global or regional level**. These low-resolution studies highlight regions that are most affected and reveal the complex implications, interactions and feedback loops of climate change on an international scale. However, they lack to provide detailed information on how climate change may act as a security risk in single countries or narrow regions and are therefore less suitable for response formulation. This purpose is better served by the second category of scientific **studies focusing on the national and sub-regional level** which are often produced by development organizations such as CARE and Oxfam (see e.g. Oxfam 2008; Dazé 2007; Erhart/Twena 2006, 2006a). To assess security risks from climate change, these high-resolution analyses take a variety of aspects into account, such as country rainfall patterns, economic, social and demographic structure and potentials of key actors (e.g. ministries, civil society, political groups). Their significance rises and falls with the availability and quality of concrete data, which proves to be difficult. A third category of studies centres on **particular threats to security** that are related to climate change, e.g. **migration, decreasing water availability, food insecurity, and natural disasters**. These studies thoroughly outline the conditions, processes and ramifications attached to one of these specific issues and discuss the implications either on a global, regional or – less often – sub-regional and national level. The value of such studies lies in the detailed analysis of particular pathways of how climate change may lead to violent conflict and instability.

Just as studies differ significantly in scope, methodology, geographical focus, and target audience, their **concepts of the term “security” vary significantly** (see also box 2). Clear definitions are rarely given (cf. Brzoska 2008); some authors even introduced new terms, such as ‘natural security’ (Burke 2009) to the debate. Most studies, however, take a very **broad approach towards security** and include aspects such as water and food security, economic and social development, human health, and the stability of states or institutions. The vast majority of studies share the underlying argument that **climate change does not lead to violent conflict per se**.² It rather acts as a catalyst deteriorating livelihoods, shifting population patterns and causing unequal distribution of resources. In this way, climate change exacerbates existing tensions, creates new ones and

Box 2: Security Definitions

In the debate on climate change and security, a variety of stakeholders are engaged. They range from civil society organisations to intelligence and defence agencies. Consequently, the content of the term “security” varies, ranging from security of access to vital goods such as water and food, to more military-related connotations, such as security of borders. Generally, three levels can be distinguished (quoted from Carius et al. 2008: 17): “(1) **Individual or human security**: This level is about the satisfaction of individuals’ basic needs in the form of food, water and shelter. Security in this sense can be formulated as freedom from want. Individual, human security and “livelihood security” can broadly be used as synonyms. (2) **Internal security**: The second level, in the context of climate change, is about the extent to which the impacts of climate change influence (violent) intra-state conflicts between different population groups or between the state in question and a group or groups in society. (3) **International security**: The third level relates to the potential for conflict between states (i.e. “inter-state” conflicts) and issues of international security that are influenced substantially by climate change. This includes potential conflicts of interest over the use of water, changing borders due to sea-level rises as well as regional destabilising events that may come about as a result of the collapse of states or violent conflicts within states.” The levels may interact, for instance a breakdown of internal security may become a matter of international security as well. In turn, times of instability and insecurity often result in want. Thus, a comprehensive, multi-dimensional concept of security is necessary to address the manifold challenges of climate change.

² Some authors also discussed the case, where climate change could become a direct cause of conflict (Dyer 2008). However, as of now this remains mainly speculative scenario building.

may under certain circumstances lead to armed conflict.

At the beginning of the debate on climate change and security, some studies drew heavily on the environmental security literature (see WBGU 2007) applying a (Neo-)Malthusian approach to the issue (Brown/McLemann 2009). The environmental security literature, however, has been subject to numerous criticisms (see Dalby 2002; Buzan et al. 1998; Brock 1997). Therefore, **more complex analytical frameworks have evolved** over the years to explore the linkages between climate change and armed conflict. Three main approaches can be distinguished within the literature:

The **‘overlay approach’** draws its conclusions by matching potential climate change effects with current hot spots. It does so by applying projected climate change impacts, such as shifting rain patterns, decreasing food production, sea level rise, etc. to up-to-date maps of state fragility, conflict risk or similar maps (see e.g. Smith/Vivekanda 2007; J. Lee 2009, WBGU 2007). The higher the convergence between adverse climate change and conflict, the more likely that climate change will cause further instability or violence. The

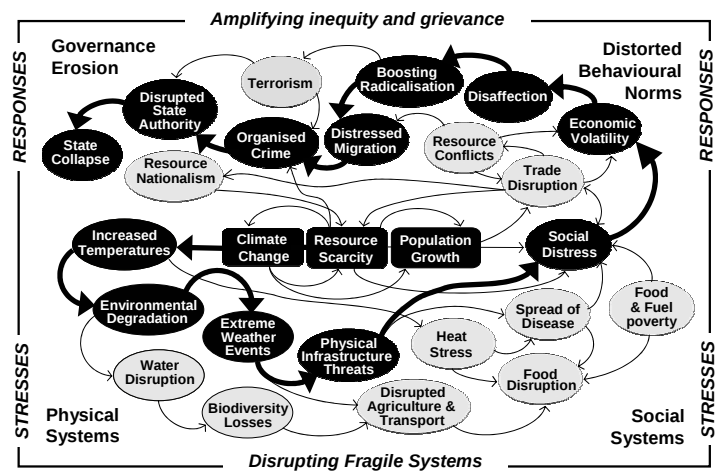


Figure 1: A possible Channel Approach (Graph by David Robson, Scottish Government, UK)

underlying assumption of this approach is that regions already suffering from violent conflict, state fragility, poverty, and environmental degradation will lack capacities to deal with climate change.

A different analytical framework offers the **‘factor’ and ‘channel approach’**. Here, factors correlated to armed conflict by previous research— such as regime type, ethnic diversity, land and resource distribution etc. (see e.g. Buhaug 2008) – are correlated with projected climate change implications to determine the specific aspects which may critically contribute to violent conflict. However, this approach is often limited by the lack of available data and future scenarios. For example, changes such as the potential Savannisation of the Amazon, the melting of the Arctic ice sheets, the move towards a low-carbon/non-fossil fuel economy are unprecedented in history and therefore largely speculative. As mentioned above, climate change does not directly lead to violent conflict but rather affects a variety of factors influencing the risk of conflicts (see WBGU 2007; Carius et al. 2008). Armed conflicts tend to have multiple interacting causes (see e.g. Wils et al. 2006) from which the idea of ‘channels’ developed: Climate change affects and triggers complex processes that involve various factors and may contribute to the outbreak of violence; therefore climate change provides ‘channels’ to armed conflict.³

The idea of channels is closely related to the **‘constellation approach’**, which is used by the German Advisory Council on Global Change (WBGU). The WBGU analyzes climate change’s impacts on

³ For instance, this approach has been applied by the UN Secretary-General report on potential security implications of climate change (UNSG 2009). The report identifies five potential channels: (1) Threat to human well-being; (2) threat to economic development; (3) threat from uncoordinated coping; (4) threat from loss of territory and statelessness; (5) and threat to international cooperation to manage natural resources.

specific issues such as water availability, food security, land loss, etc. It explores how the effects of climate change may lead to violent conflicts by interacting with other factors often referred to as conflict constellations. This approach assumes that climate change, under given circumstances, produces situations where violent means become more likely.

Recently, researchers explored **the underlying dynamics of conflicts** that may come along with climate change.

Jason Lee (2009) argued that rising temperatures may lead to 'cold' as well as 'hot' wars in the 21st century. Cold wars are likely to appear close to or in the Polar Regions, where international conflict over newly available resources could arise. However, the affected states are closely involved in international organizations and security regimes such as the North Atlantic Treaty Organisation (NATO) and the European Union, decreasing the risk of armed conflicts. On the contrary,

where peaceful mechanisms for conflict resolution are lacking and capacities to cope with climate change are low, hot conflicts are more likely to emerge. According to Lee, these types of conflicts are more likely to emerge at the global equatorial belt due to the socio-economic and governance contexts in these areas. Furthermore, approaches have been developed to better understand how **climate change's effects on the local or sub-regional level are inter-linked with regional and international conflicts** (cf. Maas/Fritzsche 2009).

None of these outlined approaches see climate change as the sole contributor to violent conflict. Therefore, the term **threat multiplier emerged as one of the key concepts** within the climate change and security debate (see CNA 2007; EU 2008; Carius et al. 2008; UNSG 2009). It states that climate change may contribute to insecurities and the likelihood of armed conflict depending on given circumstances and the interaction with other factors. This approach implies that there is no determinism that climate change may result in conflict. Brown and Crawford (2009a) argue that governance and institutions have a significant role in the mediation of resources scarcities and therefore in the prevention of violent conflict (see also Smith/Vivekanda 2009). Furthermore, according to the literature on environment and peacebuilding (Feil et al. 2009; Carius 2006), climate change

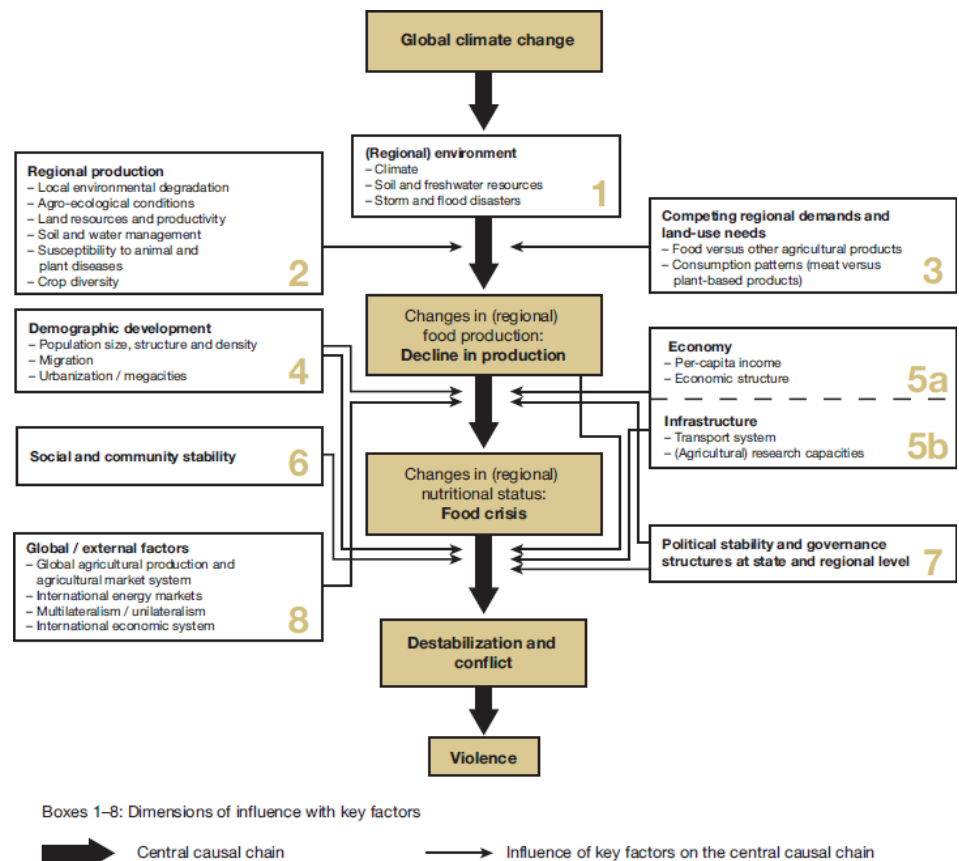


Figure 2: A Conflict Constellation centred on Climate-induced Food Crisis (WBGU 2007)

could actually become a driver for cooperation when joint actions to cope with climate change's impacts ensure benefits for all conflicting parties.

2.2 Scenarios, Climate Security and Strategic Planning

2.2.1 What are Scenarios?

Scenarios and regional assessments are mechanisms that can provide valuable foresight into climate-related security risks. By illustrating what regions might look like in the future, scenarios can provide advanced warning to help decision-makers plan for climate security risks.

Construction of foresight scenarios is not meant to be an exercise in prediction, but rather relies on **tracing the possible pathways of future events**. In so doing, the process of constructing scenarios can provide insight into what assumptions are used when predictions and decisions are made, and helps to illustrate the 'dark spaces' where data are largely unavailable. Rather than focus on what is known about the world, scenarios help to focus on

Box 3: Scenarios

Scenarios as described in this report are structured stories or narratives of how the world might look in the future. Drawing upon the best available scientific data and regional expertise, scenarios are a process of illustrating how changes might occur, what pathways those changes might take, and what the repercussions might be. Scenarios do not attempt to predict the future, but rather help to uncover what is not known, expected or monitored. In this way they help decision-makers deal with uncertainty, and plan for risks that might come as surprises.

critical 'drivers' of change that are either unknown or remain unrecognized. **Scenarios are meant to help organizations handle uncertainty of the future**, as a way of preparing for what would otherwise be unexpected crises. As such they are risk management tools, intended to help decision making in the same way that war games in militaries help officers react to given situations. Part of the process may actually increase uncertainty for a time, as new possibilities are explored and participants grow accustomed to concepts that they may not have considered previously.

A basic starting point is deciding what the key concern or issue to be addressed will be. **Scenarios only work effectively when they answer a key question for the organization and its members.** A potential question could be for example, how could climate-induced decrease in precipitation result in instability? As stated previously, the security risks from climate change are not direct impacts, nor will environmental changes likely lead directly to violent conflict. The security concerns generally rest with second and third-order impacts from multiple environmental changes, which can expose key systemic vulnerabilities. For example, starting with first order effects we can trace possible impacts from:

1. Reduced snowfall in a mountain range, where reduced precipitation of 5% can result in a loss of 15%+ in runoff.
2. Lowered runoff reduces both hydroelectric power potential (often in winter) and irrigated agriculture (often in summer).
3. If power and agricultural industries are not redundant or substitutable, the resulting effects from loss of power and/or foods can be acute and destabilizing.
4. If government actors are unable to cope with the instability, dissatisfaction within the population may grow.
5. If governments react harshly towards potentially protesting population, this may lead to grievances which fuel extremism and serve as catalyst for violent opposition.

6. Feedback effects can accelerate these processes, greatly lessening the response time of governments. Complex systems can exhibit abrupt changes that occur after a longer period of relatively slow change, and certain responses can quickly worsen the initial condition.⁴

The complexity of these impacts is visualised in figure 1 (see above). While there are plenty of factors which may interact with climate change effects, it may set in motion a chain of events requiring intervention to avoid potentially drastic impacts.

2.2.2 Essential Steps for Scenario Formulation⁵

There are many potential ways in developing scenarios. However, the following basic steps are generally taken in formulating a series of scenarios:

1. Decide on a specific question with clear boundaries and the time scale to be addressed. The longer the time frame, the more strategic the potential impacts, but the greater the uncertainty associated with the scenarios.
2. Identify major trends and key uncertainties in the system. There are a number of methodologies for accomplishing this, from research scanning, interviewing/surveying experts (the Delphi method (Linstone/Turoff 2002)), to interactive online systems (e.g. GlobalEESSE⁶). It is important to identify uncertainties, and not simply focus on what is already known.
3. Map the boundaries of risk (i.e. what are the extremes of the plausible?). Often this is done qualitatively, but there are also quantitative methodologies for use with climate and ecosystems.
4. Create scenarios that combine key factors into an understandable narrative, but do not attempt to predict what is most probable. These scenarios provide a picture of what climate impacts might look like in a particular region, with associated impacts and responses. The narratives should correspond to the 'boundaries' mentioned above.

There are a variety of potential foresight methods existing. However, as mentioned in point 2 above, the importance is to identify uncertainties. Thus, methods requiring extensive amounts of data for modelling are difficult to apply as very few data is available. More qualitative methods, such as expert workshops, interview surveys, facilitating brainstorming and similar methods may be more useful to identify the boundaries of plausibility and identify critical uncertainties.

2.2.3 Potential Pitfalls of the Scenario Process

Security scenarios and regional assessments can be quite valuable, but if developed improperly can serve to reinforce pre-existing beliefs rather than providing greater flexibility in policy response. Two instructive cases can be drawn from the RAND Corporation and Shell Oil, which are frequently applying scenarios techniques.

⁴ In economic terms, a bank run is perhaps the best example of feedbacks, where multiple, individual decisions to withdraw money from a vulnerable bank can ensure its failure. When combined with physical feedbacks, environmental systems can quickly fail.

⁵ A more comprehensive listing can be found at US EPA (without date) and Kosow/Gaßner (2008).

⁶ See <http://globaleese.org/> for more information.

A potential error in conducting climate security scenarios is in adhering too closely to formats used in the past by the defence establishment, such as Herman Kahn's work at the RAND Corporation (Kahn 1967). The "what if" scenarios for exploring future security risks often assume a fairly constant background or context, taking existing conditions and projecting into the future. But as the RAND Corporation and Shell Oil understood starting in the 1970s, **sometimes the context of the problem itself changes** (DeWeerd 1973). In this contextual shift, we do not simply consider that existing problems grow worse. Rather, unique challenges can emerge from new background conditions, especially if those changes are abrupt and rather unexpected. Most scenarios of concerning future political developments in the 1980s were understandably outdated only a decade later. It may also be the case that issues normally considered mundane could be transformed into international security risks. Natural disasters, if occurring frequently and/or severely, could create conditions necessitating calls for military involvement beyond the typical disaster relief practices of most states.

Another **common error in foresight related to climate change is in assuming that the median or average results of climate models are the most probable**, and therefore represent the most reliable figures. Risks tend to be averaged out, as a result, creating a false impression that change will be gradual or only affect regions with existing instability concerns. This approach misunderstands the use of uncertainty in assessing environmental risk. The intention is not to predict what is the most likely outcome, because as a risk management tool, the importance is in understanding how to deal with variability and uncertainty. Risk is a function of impact, probability and uncertainty, meaning that high-impact events are still considered substantial risks when the associated uncertainty is high. There is a tendency for people to assume that unknown probabilities are the same as low probabilities, especially when there is not experiential basis to draw upon. The probability of abrupt climate changes cannot be quantified accurately in advance, and climate boundary conditions are far different today than at any time in the paleo-climatic record, leaving uncertainty high (UNEP 2009). But as sudden shifts in temperature, sea level or rainfall are considered entirely possible, we must look beyond the middle ranges to more significant climate impacts.

2.2.4 Why Climate Security Scenarios are Specific

Climate change scenarios differ from traditional security scenarios in that the first-order changes discussed are almost entirely contextual. Rather than visualizing impacts from deliberate action of a known group (e.g. infrastructure attacks by terrorists, changing consumption patterns of the middle class), climate security scenarios focus on the ways in which environmental changes shift basic conditions (GBN 2007). This creates obvious difficulties in terms of complexity, for it is difficult to create *ceteris paribus* assumptions and only focus on two major drivers of change, holding all others equal. In fact, this has been a common error or limitation in many climate assessments, as 'climate change' becomes aggregated into one large category.

Even the more advanced Shell methodologies often focus on a certain number of driving factors that intersect into a simple matrix (typically two variables and two axis matrices that contain four possible future states) (Wack 1985). E3G uses climate sensitivity and resilience on the two axes, suggesting that a highly sensitive climate coupled with low resilience results in the worst outcome.⁷ Other assessments focus on violent conflict as the key measure of security, considerably narrowing potential

⁷ In fairness to E3G, their framework is conceptual and they are well aware of the need for translating climate risks into regionally specific and relevant terms (see Mabey. 2008).

security scenarios. **Climate scenarios, in order to be most useful, should focus on potential pathways for instability rather than focussing on conflict itself.** These potential instabilities will not be the result of just one changing factor (e.g. rise in air temperature), but are more likely to result from a combination of environmental changes that impact a critically vulnerable part of a system, be it ecological, economic, infrastructural or political.

It is possible to map out both the margins of potential scenarios, while retaining a transparent process and still reflecting the complexity of regional variations. The abrupt climate foresight scenarios at the US Department of Energy start with assumptions of certain, abrupt environmental shifts in a given region. Examples would include the accelerated loss of glaciers in Peru, a sudden rise in sea level and storm surge in the Netherlands, or abrupt loss of monsoon rains in India (Briggs/Gonzalez 2010). The geophysical changes are taken from the latest available science, and can themselves be mapped in terms of multi-dimensional factors (Carlsen 2009). From this starting point, participants can map out the first order impacts, and then cascading effects of such a change, including feedback effects from both physical and social responses.⁸

Box 3: Resilience and Sensitivity

Resilience in a system can be measured in terms of its ability to return to a 'normal' condition after an exceptional event. For instance, a resilient community would be able to rebuild and recover from a disastrous flood to its pre-flood situation. Resilience is a function of both available resources, and identity that allows for collective action. Sensitivity is the measure of how adversely a system is affected by an event. For example, a community may be sensitive to floods due to poor land use, geographic location, or particular building practices. Considered together with environmental risk exposure, the term vulnerability is a combination of risk, resilience and sensitivity.

The regional chapters in this report (section 3.1 to 3.4) can serve as starting points for a process of considering security impacts and risks, provided that they are understood as points for discussion, not final analyses. An iterative scenario process allows for greater interaction among experts, especially those with regional expertise necessary for detailed resolution of potential impacts. Climate changes interact with complex, overlapping systems. As impacts differ from one region to another, it is important that regional studies and scenarios maintain a common framework while understanding that the factors involved and impacts discussed may vary widely. The scenarios and assessments must also be transparent enough that it is possible to trace assumptions and judgements. A final scenario narrative is easily disbelieved if the impacts are severe and mechanisms poorly understood. Generating disbelief runs counter to the scenario process aims, but is possible if the cascading effects are not explained fully.

As an example of the need to trace assumptions through complex systems, some scenario work was tested on the issue of marine sources of methane clathrates (hydrates). These are large deposits of frozen methane kept under pressure in oceans, the release of which would greatly accelerate global warming processes as a positive feedback. Their release therefore carries a large risk, but the probability of this risk is unknown, and only initial research exists from late 2008, which suggests that significant CH₄ releases from the Barents Sea might indicate a problem (Shakhova et al. 2008). Prior to this time there was little discussion of methane, save as a source from melting permafrost. Taking clathrate release as a starting point, participants combined this change with other potential energy and environmental changes, worked through potential responses from countries and corporations, and developed multiple potential pathways of impacts, response and feedbacks. The process ultimately highlighted issues of alternative energy development and freshwater supplies, and provided a better

⁸ These are often mapped on a template of sorts during the scenario process. MIT has also been developing a "Climatepedia" online system that can map decision-making and response.

understanding of the role that different sectors might play in such scenarios.⁹

A final point on the application of scenarios and regional assessments to climate security concerns the use of scientific data. It is notable that as climate science advances, the uncertainty ranges have tended to increase. Rather than producing a smaller range of possible temperature increases or sea level rise, recent studies have suggested greater uncertainty, sensitivity and variability in climate systems. This may seem counter-intuitive, but reflects the greater range of possible changes in complex, adaptive systems. Most regional climate security studies and scenarios have relied upon predictions of the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report. It is often used because it is considered 'reliable' (and politically acceptable) in focussing on what can be proven, but its predictions have since proven too conservative in even short-term forecasts of certain environmental changes. Despite the difficulties involved with collecting and applying more recent climate studies, scenarios are often constructed based upon 'weak signals' of potential instability. Weak signals refer to indications that a system is possibly becoming unstable or risky, and often affect sensitive factors (e.g. canaries in a coal mine). Leading edge studies are often a better basis for uncovering new trends than relying upon overwhelming evidence. Once confirmation is received on highly complex issues like climate change or instability in financial markets, it is likely too late to act effectively and preventatively.

⁹ It is not unusual for scenarios to ultimately focus on factors that were unintended or unexpected, and this reflects their potential utility (see US DOE 2009).

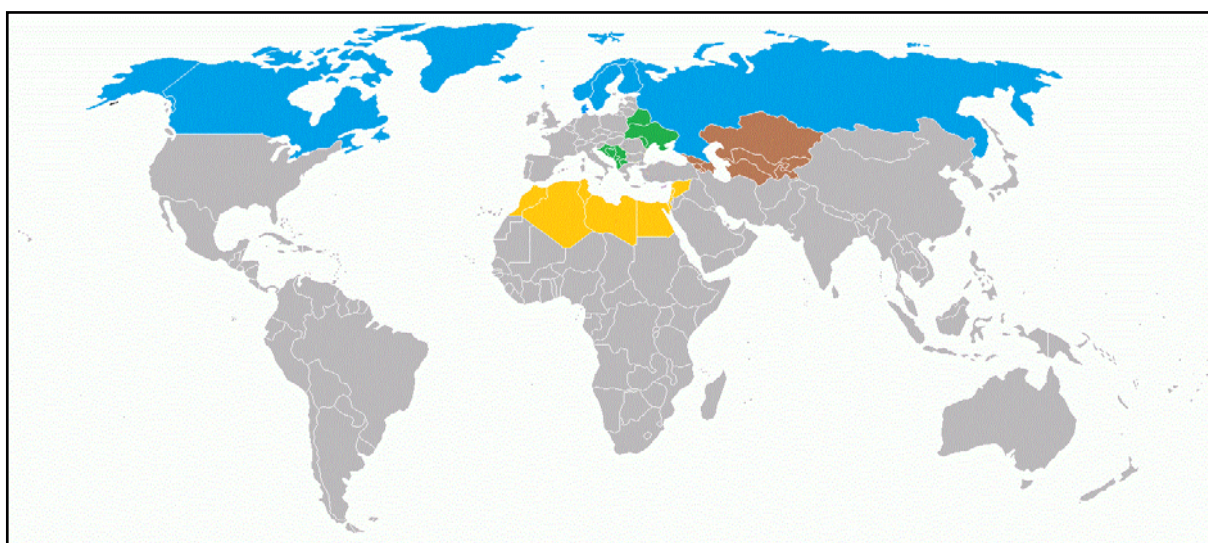
3 Mapping Security Implications of Climate Change

This chapter provides an initial mapping of the security implications for four OSCE sub-regions. The sub-regions (see map 2) mostly include OSCE participating states. The South Caucasus-Central Asia and South Eastern-Eastern Europe sub-regions cover all OSCE participating States with field operations. They have been selected as the aim of the OCEEA project is to identify areas where activities can assist participating States in strengthening their policies and institutions to cope with climate change. These sub-regions are grouped to facilitate the narrative description although each group of countries encompasses different realities that will be reflected in separate Scenario Development workshops.

The two other sub-regions, the Arctic and the Southern Mediterranean, have been selected on the basis of their relevance to Climate Change and Security. They cover a continuous geographic area including OSCE participating States, OSCE partners for Co-operation and non-OSCE countries.

As will be discussed in chapter 3.5, climate change is a global phenomenon, and changes in countries far away may result in security consequences for the OSCE region. This report reflects a first step to study these consequences, and the authors are aware of the limitations and shortcomings of making selections and groupings which should not be seen as a labelling exercise but rather as a pragmatic way to start discussing substantive issues.

Uncertainty is a great challenge in the mapping process: Current climate models are too general to assess implications on countries or sub-national areas. Both, regional impacts of climate change and the resulting consequences also vary: An increase of 2°C could make parts in Northern hemisphere agriculturally more viable, while in South Asia and Latin America this means a significant deterioration of food production (Fetzek 2009; ADB 2009). Hence, while overall trends may be identifiable, the variations between regions and years may be profound.



Map 2: Countries and Regions covered in this Chapter

Wherever an in- or decrease in productive land and its patterns of distribution could become a security threat is a different issue. Naturally, a decrease of food production increases risks of food insecurity if imports are not stable and food price hikes occur or countries ban exports altogether.¹⁰ An increase of productive land due to climate change may draw in external attention. “Land grab” as adaptation strategy to climate change may threaten political stability, similar to Madagascar where acquisition by a South Korean company resulted in massive protests (see GRAIN 2008; Maas/Altenberg forthcoming). Thus, the impacts of climate change on security are mostly indirect and causal chains complex (see also Carius et al. 2008).

Consequently, assessing the security implications of climate change need to be identified on a case-by-case approach. In all cases, the role of other trends and factors, such as dependency on climate-dependent economic sectors or population growth, play a key role in determining whether climate change may have security implications or not.

Assessing all regions in detail is beyond the scope of this paper and has partly been done elsewhere.¹¹ Instead, the sections below will map the general, likely security implications for the region resulting from current trends. The mappings will be structured as follows:

- **First**, a brief overview to each of the region is given.
- **Second**, main trends and impacts of climate change for the region are outlined.
- **Third**, potential security implications of climate change will be mapped.
- **Fourth**, open research questions will be mentioned.

The discussion in this report is premised on two broad assumptions in the way climate change interfaces with security issues. First, climate change is taking place amidst rapid global change. When converged with other trends it exacerbates major challenges, such as assuring access to food, water and energy as well as prosperity for a continuously growing population. Second, it is altering the context of human action and transforms constants into variables, for which socio-political infrastructures are ill-prepared. Both may cause friction within and between societies. Repeating stresses could stall or reverse development, thus degrading already fragile socio-economic capacities to manage change. Competition for scarce resources may lead to violent conflict. States and societies may collapse as the accumulated stresses lead to a breakdown of the social contract.

In mapping the security implications, the dimensions of security used by the OSCE will serve as framework: The OSCE takes a multi-dimensional approach to security. It recognises that good relations between and within states depend on a variety of issues, ranging from military affairs to rule of law. Consequently, the OSCE has divided its work in three main dimensions of security were it seeks to enhance cooperation. These dimensions are:¹²

- **Politico-military dimension** includes aspects of conflict prevention, combating terrorism, arms control, border management, policing and military reform.
- **Economic and environmental dimension**, which focus on monitoring developments in this area among participating states with the aim to promote security and cooperation by

¹⁰ This was the case during the food crisis in 2008 by India, Laos and Vietnam, which accelerated price escalation further (see Evans 2009; Williams/Anthony 2008).

¹¹ See for instance Maas/Tänzler 2009; Campbell et al. 2008; WBGU 2007; Paskal 2010; J. Lee 2009; Wittich et al. 2008; Brauch 2006; Brown/Crawford 2009.

¹² See www.osce.org for more information.

supporting healthy economic activities, transport development, good governance, maintaining a sound ecological base, supporting dialogue on energy security, waste disposal and resource management.

- **Human dimension**, which aims at building tolerance, respect for human rights and fundamental freedoms, abiding and strengthening the rule of law, minority rights, education, gender equality and development of democratic institutions.

The security implications of climate change will accordingly be clustered along the three dimensions. The focus of the mappings is how climate change may become a threat to each of the dimensions. That said, it is also possible climate change impacts could also become a driving force for cooperation. Indeed, there is a growing body of literature which focus on the potential role of environmental issues as catalysts for cooperation (see e.g. Ali 2007; Conca/Dabelko 2002; Feil et al. 2009; Carius 2006). However, assessing the cooperation potentials of climate change in addition to its security implications is beyond the scope of this study.

Regarding climate change impacts, the time horizon for the mapping will be 2050 as global trends such as population growth could be relatively well estimated until then (see J. Lee 2009). Regarding climate change, the majority of the literature assumes an increasing trend in GHG emissions as these cannot be abruptly reduced. Hence, the world is committed to a certain amount of climate change over the next decades. Against the background of the results of the recent UNFCCC negotiations at Copenhagen, it is also unlikely that emissions may decrease significantly in the upcoming years.¹³ Indeed, by March 2010, just 76 out of 194 countries party to the UNFCCC pledged to reduce emissions (UNFCCC 2010). Indeed, with climate negotiations lacking behind the pace of climate change and without a global system in place to address it, more serious impacts of climate change are becoming increasingly likely.

This mapping is based on desk-based research and input by regional experts. It was produced between November 2009 and January 2010. However, the knowledge on climate security, including concrete sub-regional and national impacts of climate change, remains limited for the regions discussed below. Thus, while plausible implications of climate change based on available knowledge are outlined, it should be considered as a preliminary analysis. **The mapping chapters identify key trends for the regions, which may serve as starting point for scenario development**, but more in-depth research will be necessary to validate the findings and develop concrete policy responses.

Finally, as mentioned before, climate change is not linear but highly dynamic and may even include abrupt changes. In addition, there are a number of intervening factors which could have impacts on the regions and their ability to cope with climate change. Assessing them in detail is beyond the scope of this study. Thus they will only be briefly outlined at the end of this chapter.

¹³ Despite significant political efforts, the climate negotiations in Copenhagen yielded no agreement on global emissions. The outcome of the conference, the "Copenhagen Accord", remains a non-binding document providing no substitute for the Kyoto-Protocol and has furthermore not been agreed upon between the conference participants (UNFCCC 2009).

3.1 The Arctic

3.1.1 Overview

The Arctic extends over a vast geographic region. The five coastal states are Canada, Denmark (via Greenland), Norway, Russia, and the United States. These surrounding Arctic states border the Arctic Ocean, but their sovereign area is limited to a 370 kilometers (equaling 200 nautical miles) economic zone around their coasts. In addition, Finland, Sweden and Iceland have articulated Arctic claims and non-Arctic states such as China, Japan, South Korea as well as the EU have recently shown some interests in Arctic affairs (Huebert 2009; Crawford et al. 2008, Airolidi 2008, Paskal 2010: 113-133). The Arctic region consists of an ice-covered ocean surrounded by treeless permafrost. This area is currently shrinking, especially due to tremendous sea ice losses. Although predictions tend to differ about the rates at which ice sheets are shrinking, increasing evidence shows that models have for a long time underestimated the melting process of the Arctic ice (Stroewe et al 2007).



Map 3: The Arctic. Source: UNEP 2009c

The looming possibility of the Arctic becoming ice-free makes the region a **geostrategic hotspot for a number of reasons**: In July 2008, the US Geological Survey published estimates according to which about 13 percent of the world's **undiscovered petroleum reserves and roughly 30 percent of undiscovered natural gas reserves** are located in the Arctic (US Geological Survey 2008). As a result, some are already talking about the “new cold war” in the Arctic due to the better accessibility of these and other resources (see J. Lee 2009). In addition, an ice-free Arctic will open up **new sea routes through the Northwest Passage**; prospects for trade could improve but also lead to competing claims regarding the legal status of these routes.

Apart from the melting ice, there are examples of **ecologically difficult localized pollution** problems which pose a serious threat to the health of people living around these pollution sources. Because of the worldwide sea and air currents, the Arctic area is a destination of long-range transport pollutants. One prominent example is the occurrence of polychlorinated biphenyls (PCB's) threatening Arctic wildlife and people.

3.1.2 Climate Change Trends and Impacts

The Arctic can be considered an early warning system for current climate changes. Today, the Arctic is warming much faster than the global average temperature. Ice melting has accelerated and if current trends continue, the Arctic will allow ships to sail throughout the region during the summer months and possibly throughout the year very shortly. Comprehensive assessments (e.g. Arctic

Council 2004, 2009; Arctic Monitoring and Assessment Programme 2009) give a clear picture of the key trends in this region.

From these assessments, there is overwhelming evidence that **sea ice and permafrost are melting at unprecedented rates** (cf. Stroeve et al. 2007). In the summer of 2009, the Arctic ice pack spanned an area of 4.1 million square kilometers, which represents a 40 percent reduction compared to previous averages (Arctic Council 2009). Some estimates predict that by 2030, the packed ice in the Arctic will have disappeared (Serreze et al. 2007). The Arctic surface waters have been consistently warming in recent years with the retreat of the sea ice. In addition, **the northern coastline of Alaska already shows signs of erosion** due to the retreating sea ice, warming seawater and increased wave activity. These effects also pose a significant threat for Arctic animals and indigenous people (University of Colorado at Boulder 2009). In addition, with the thawing of ground transport routes, other infrastructures will be disrupted as well. Finally, due to the so called Albedo effect – the reflection of sunlight by ice – the implications of the shrinking ice-sheet for the global climate may further amplified: **the melting of highly reflective snow and ice cover could accelerate the warming of the planet.**

The **biodiversity in the Arctic is at risk** (cf. Rasmussen 2009). Most recent trends include: Loss of tundra vegetation, changes in wetlands, shifting vegetation, increased occurrence of fires, the spread of invasive insects, the northern migration of species and threatened marine and land species due to melting ice (Arctic Monitoring and Assessment Programme 2009). These developing trends could bring serious repercussions as the marine ecosystem provides a range of **essential services for the Arctic populations** living on the coastline. More than **150 species of fish exist in arctic waters, including important species for the fishing industry such as cod**. Arctic terrestrial mammal species, such as seals, walrus, sea otters and the polar bear, are currently at risk of extinction. In addition, more than 60 species of migratory and resident seabirds live in the Arctic. Representing one of the largest populations in the world, the Arctic seabirds are particularly sensitive to environmental changes caused by global warming exposing them to face extinction. The additional **pressure caused by the over-exploitation of some marine resources** needs to be considered. Consequently, regional food security will be affected by the loss of biodiversity combined with overexploitation. Strict environmental standards along with technologies supporting sustainable resources exploitation need to be urgently developed. **New fishing opportunities caused by reduced sea ice coverage** and warmer Arctic Ocean may require a review of international conservation and management regulations to prevent unregulated fisheries. Finally, the development of an Arctic commercial navigation channel can generate a number of positive effects (shorter transport routes, energy savings, emissions reduction, trade promotion), but demands strict safety and environmental standards to prevent detrimental effects. As such, navigational safety, search and rescue response systems, environmental monitoring and disaster response mechanisms need to be put in place.

If current trends of accelerated sea ice melting continue in the Arctic, **new channels will open up allowing ships to navigate through the region during summer months** and possibly soon throughout the year. Due to ice shrinkage, shipping companies have already developed plans to use the Northern Sea Route. The new passage could reduce the navigation course from Germany to Japan by about 7.400 km. New construction technology will enable ships to withstand impacts with floating ice. Reduced time and costs for shipping goods from Europe to Asia is making the concept of an ice-free Arctic economically interesting. The persisting threat of piracy in the Gulf of Aden and the Strait of Malacca provides added incentives in moving the shipping lanes to the Arctic.

The large **untapped natural resources of the Arctic** provide another economic opportunity brought about by global warming. The above cited forecast of the US Geological Survey as of 2008 makes the Arctic one of the **world's major sources of oil and gas**. Globally rising demands in natural resources, including fossil fuels for the foreseeable future, make resource exploitation in the Arctic a potential option from an economic point of view. Nevertheless, large uncertainties remain regarding mining activities and their economic viability in the harsh Arctic environment. In addition, there is growing recognition that another source of energy, known as **gas hydrates**, are likely to be located in the Arctic waters (Hubert 2009: 13). Furthermore, the Arctic is estimated to hold significant amounts of **gold, silver, diamonds and other precious resources** (Crawford et al. 2008: 5).

3.1.3 Potential Security Implications

Climate change is creating a unique climate security situation in the Arctic region (see Tänzler 2009; Paskal 2010: 113-133). The Arctic will become more at risk from the combined effects of climate change and increased human activity. However, as outlined above, new options such as new transportations routes becoming viable are already linked to competing claims by different governments. Hence, there is some reason to **refer to the changing Arctic as the first climate change induced constellation of insecurity**, because it amplifies not only already existing environmental stress, but also creates an entirely new regional situation, which in the absence of climate change would not have occurred.

Framed in the three dimensions used by the OSCE, the following security implications emerge:

Economic and Environmental Dimension:

- **Environmental Degradation:** Closely linked to the reasons causing livelihood insecurity, the climate change impacts on the unique nature of the Arctic are tremendous (Rasmussen 2009). Biodiversity losses caused by climate change will be accompanied by trends of overexploitation of natural resources such as over-harvesting of certain key fish stocks or unsustainable logging practices. The **exploitation of the large untapped hydrocarbon reserves will create multiple environmental risks**.
- **Resource claims:** Some experts used the term “gold rush” in order to describe **the prospects for natural resources exploitation regarding oil and gas, but also for fisheries as a result of climate change impacts**. This not only includes the states mentioned above, but also countries like **China or multinational resource companies who have started to invest** in the region, which has been regarded as “virgin area” (Ullbæk Selvig 2009). The prospects of an ice-free Arctic and new routes **causes new geopolitical constellations and new alliances**, e.g. between Russia and China (Paskal 2010: 114-116). The aim is to ensure influence and access to the “big resources bonanza” (Ibid.).
- **Transportation routes:** The new opportunities for trade and transport have already caused some legal disputes among the Arctic coastal states and beyond. Canada considers the **Northwest Passage as part of its “internal waters”** and argues with the articles of UNCLOS (part IV, see UNCLOS 1982). In contrast, the US and other states with interests in international transportation refer to the Passage as the **“international strait”**. Even if it is considered international, Canada would be able to set up a regulatory framework to protect

the environment. However, this would most likely not be as strict as Canada's internal water regulations are. In addition, Canada would be prohibited from closing the passage. Such disputes will cause further political repercussions. The joint paper, "Climate Change and International Security", by the High Representative Javier Solana and the European Commission, stated in March 2008 that — with respect to the Arctic region — **the overall constellation of territorial claims and the potential access to new trade routes challenges Europe's ability to effectively secure its trade and resource interests** in this region (EU 2008). However, when it comes to the question of how strict environmental regulations should be enacted, international solutions apart of UNCLOS or the work of the International Maritime Organization (IMO) on a Polar Code can help reconcile competing interests (Ullbæk Selvig 2009).

Politico-Military Dimension:

- **Territorial claims:** Currently, several coastal states are claiming an **extended continental shelf as part of their exclusive economic zone in the Arctic Ocean**. Russia, e.g., argues that the eastern Lomonosov Ridge is an extension of its Siberian continental shelf (CLCS 2009). In 2001, Russia made an official submission into the UN Commission on the Limits of the Continental Shelf in accordance with article 76, para 8 of the UNCLOS. After the ratification of the UNCLOS, a country has ten years to make claims to extend its 200 mile zone. Norway and Russia already did so whereas Canada and Denmark are in the process to define their respective claims. The US has not yet ratified the UNCLOS. This indicated the first sign that **the competing interests could be resolved peacefully and on the basis of UNCLOS**, the five states mentioned before came together in Ilulissat in May 2008 to discuss this and other matters (Ilulissat Conference 2008). However, Sweden, Iceland and Finland, as the other three Arctic nations, were not invited to this conference. The same holds true for other stakeholders such as indigenous groups, environmental organizations and other interested parties (Crawford et al. 2008).
- **Militarisation of the arctic:** In 2006, Canada ordered up to eight military icebreaker patrol ships and one year later Canada's Prime Minister Harper announced the establishment of a deep-water port in the far North. He claimed that his country is ready to defend its sovereignty over the Arctic (Harper 2007). This represents one of many examples made by some of the coastal Arctic **states that are trying to strengthen the capacities of their armed forces and coast guards to operate in the harsh environment**. Interstate tensions cannot be ruled out. In the so-called "Turbot war" in 1995, Canadian warships fired warning shots to Spanish trawlers just outside of Canada's exclusive economic zone – i.e. international waters – in an "effort to impress Canadian maritime sovereignty upon foreign fishing boats" (Crawford et al. 2008: 9). A race for the Arctic and its resources is therefore likely to cause tensions, particularly if political events and crises in other parts of the world seep into Arctic relations (cf. Ibid.). However, for the time being, territorial claims of the Arctic countries beyond the continental shelf that extends 200 nautical miles will be determined under the International Convention on the Law of the Sea. While the risk of military escalations may be low, it would be all the more disastrous due to the destructive capacities of the states involved.

Human Dimension

- **Impacts on Indigenous Communities:** Due to thawing, the loss of ecosystem services and biodiversity, the Arctic population is likely to face increasing difficulties to ensure their health, traditional means of income as well as their well-being. The Inuit, indigenous people of the Arctic, already claimed greater representation in fora such as at the Arctic Council. From their perspective, climate change is endangering their sovereignty (Lynge 2009). If their concerns are left unaddressed, grievances could develop and transform into organised protests.

Besides the security implications mentioned above, the **impacts on the Arctic also jeopardize global climate security**. As previously mentioned, due to the Albedo effect, the implications of the shrinking ice-sheet for the global climate can be dramatic: **the melting of highly reflective snow and ice cover could in turn lead to a greater warming of the planet**. In the same line of thought, the extraction of the considerable reserves of oil and gas in the Arctic region could contribute to further greenhouse gas emissions, making it impossible to comply with the 2°C target. As a result, **multifaceted conflicts around the world are more likely to turn into violent conflicts** (WBGU 2007; Carus et al. 2008).

3.1.4 Open Questions

The security assessment underlines the relevance of international law, international institutions as well as the important principles of sustainable development in order to build a capable Arctic governance structure (Witschel/Winkelmann 2009). Yet the security challenges instigate a number of questions regarding how to promote security and stability in the Arctic.

Among the key questions are:

- How can existing international institutional arrangements and organisations (e.g. International Maritime Organisation, Arctic Council) address these challenges?
- What international regulations in accordance with the Law of the Sea Convention should be considered to respond adequately to concrete needs in the Arctic (e.g. International Convention for the Prevention of Pollution from Ships (MARPOL), Arctic Environmental protection Strategy (AEPS))?
- Is there a need to consider further implementing agreements to the Law of the Sea Convention beyond the existing ones? Are the arrangements for dispute settlements sufficient?
- How can further international regulations and institutions serve as a means to govern the Arctic ocean and guide sustainable economic development (e.g. Convention for the Protection of the Marine Environment of the North-East Atlantic; Convention on Future Multilateral Co-operation in the North East Atlantic Fisheries; the Northern Strategy)?
- Is there a need to develop further policies and regulatory instruments in the light of a changing climate (e.g. with respect to mandatory measures instead of/or guidelines)?

- How can the international community (e.g. the United Nations, European Union, OSCE, third parties) effectively contribute to addressing these policy challenges in the Arctic region? Which are the appropriate fora?

3.2 Southern Mediterranean

3.2.1 Overview

For the purpose of the study we consider the following countries from the South Mediterranean sub-region: Algeria, Egypt, Israel, Lebanon, Libya, Morocco, Palestine, Syria and Tunisia.

The geopolitical relevance of the South Mediterranean derives from a wide range of aspects. The region is **rich in fossil fuels**; Algeria and Libya are especially important energy exporters to European countries. Turkey, which is an EU candidate country, increasingly takes the role of a link between the Islamic countries and the West. The region is a major theatre of armed conflicts, **with the Middle East conflict and the situation in Iraq as sources of insecurity** for the whole region. Civil strife, clashes between armed/oppositional groups and authorities, Islamic fundamentalism and terrorist attacks further threaten regional stability. Wars have caused **major population displacements** with over four million Palestinian refugees, and some 2.2 million Iraqi refugees constituting an added source of uncertainty. In addition, the **region is an important transition**



Map 4: South Mediterranean

point for illegal migration from African countries to the EU. The region's **proximity to other security hot spots** in Africa, on the Arabian Peninsula, in West Asia as well as Iraq and Iran underlines its strategic relevance.

One major common feature in the region is the existence of **centralised, authoritarian governments** with limited interest and institutional capacity to invest in inclusive socio-political and economic infrastructure. This increasingly leads to a dissociation of the people from the political system and opens space for social unrest as well as extremist and moderate Islamist groups (cf. Spencer 2009).

On a regional average economies in North Africa grow with a rate of five to six percent (ibid.). Nonetheless – with the exception of Israel – the countries of the South Mediterranean suffer from **low industrial and agricultural productivity**. Population growth rates in regional countries have generally slowed down. However, the **demographic imbalance with high levels of young people** poses a serious challenge: Approximately 50 percent of the population are less than 25 years old and 75 percent under 30. Youth unemployment throughout the Arab countries is high - with Algeria occupying the top position with 46 percent¹⁴; under-employment and illicit employment in the parallel economy are further issues posing a threat to social peace, economic and regime stability. The dependency on hydrocarbon income – especially in Algeria and Libya – pertains high risk to economic development, as periods of low oil prices have revealed. The other countries in the region are net importers of energy and have pertained to some success to diversify their economies. However, they

¹⁴ According to the study "Challenges of Development in the Arab World", reported by *Al-Jazeera*, December 21, 2009: <http://www.aljazeera.net/NR/exeres/FC59979D-466E-43E6-ACEB-F53316920CAF.htm>. The official figures are significantly lower with 12-13 percent.

face the problem that their small modern economic sectors exist in parallel with subsistence economies (especially of the rural and urban poor) which reap few benefits from higher growth rates.

The countries' **agricultural sector is a major source of employment** and plays an important role in sustaining peoples livelihoods, albeit at near poverty levels for many. Much of the modern agricultural production is furthermore geared towards export markets; domestic wheat production does not meet even half of the domestic demand in North Africa (Spencer 2008). Algeria, Morocco and Egypt imported 30 percent of the world's imported wheat in 2008-9 to cover domestic needs. Import-dependency was also a vital factor contributing to the bread riots in Egypt when food prices rose in 2008. In the Occupied Palestinian Territories as well as in Lebanon, the agricultural sector suffers largely from armed conflicts. For example, the Israeli military campaign against Gaza (2007-2008) produced six hundred thousand tons of demolition debris, and completely destroyed 17 percent of the total cultivated area (UNEP 2009a). Similarly, the war in Lebanon in 2006, and the use of cluster-bombs by Israel made large portions of agricultural land in Lebanon too dangerous for cultivation.

To sum up, weak administrative structures in the region combined with low economic and social development in many of the countries and the legacies of armed conflicts (cf. Brown/Crawford 2009) **reduce the adaptive capacities** of the South Mediterranean countries to face the projected challenges of climate change in the region (UNDP 2009, 2008).

3.2.2 Climate Change Trends and Impacts

Climate change will have a number of **negative consequences** in the South Mediterranean **on accessing basic needs such as water, food and shelter**. The region is one of the most arid in the world with mainly low precipitation rates and limited fresh and groundwater reserves. Water efficiency is low and agreements over trans-boundary water resources are lacking or highly disputed. As population numbers and industrial activity in the region rise, demand for water is steadily increasing. Therefore, **even without climate change, availability and quality of water are major challenges** to the South Mediterranean countries.

Projections foresee that **climate change will alter the existing water regime** in the region. Precipitation will likely decrease and shift regionally and seasonally (cf. Brown/Crawford 2009). This will have severe consequences for recharging groundwater aquifers and river run-off. It is projected, that rising temperatures will **heavily diminish run-off of the Jordan River as well as Euphrates and Tigris** (cf. Kitoh et al. 2008) – life lines for the countries in the region. Projections on how climate change will impact the waters of the Nile River vary (Arab Water Council 2009). However, there is little doubt that water resources in Egypt will be adversely affected by rising temperatures (Ibid.). Lowered river run-off will likely compromise hydropower generation and increase soil salinity causing land degradation. Furthermore, decreasing precipitation could negatively affect economic activity such as tourism and agriculture in the region. By 2050, **agricultural production may be reduced by one third** due to the effects of climate change and other environmental perturbations. Changing consumption patterns and demographics combined with the lack of appropriate import substitution strategies are likely going to cause food insecurity in many countries of the region. Many crops have **low resilience to higher temperatures and decreased water supply**. The irrigation needs to grow these crops may intensify water scarcity in the region. Furthermore, climate change will likely lead to a **loss of agricultural land through desertification, soil salinisation and sea level rise**. For example, a 0.5 meter sea level rise in the Nile Delta, Egypt's main residential and agricultural area,

could affect 2 to 3.8 million people and destroy 1.800 km² of agricultural land causing an economic loss of over 38 billion USD.¹⁵ In the case of a one meter sea level rise, 6.1 million people along with 4.500 km² of agricultural land would be affected.¹⁶ This is particularly serious given that 95 percent of Egypt's population lives on 5 percent of the land, within 5 km of the Nile.

Sea level rise will have severe consequences as the **Mediterranean seacoast hosts 40 to 50 percent of the region's total population**. Among others, the urban areas of Alexandria, Casablanca, Tunis and Beirut are threatened. Currently, assessments to risks of urban flooding are carried out in the first three cities mentioned (World Bank 2009). Major communication and industrial infrastructure as well as ports, desalinisation plants and the main tourist centres are also located in the coastal areas and could be negatively affected by rising sea levels. Tourism in the region will additionally be adversely affected by rising temperatures (cf. AFED 2009).

Climate change may furthermore amplify **already existing threats to human health** in the South Mediterranean such as poor air and water quality and the spread of diseases such as Malaria, especially in the urban centres of the region. **Extreme weather events such as heat waves, heavy floods and rains** additionally threaten human health and infrastructure in the region. North Africa already witnessed an increase in floods and heavy rainfalls, e.g. in Algeria in 2001 (751 deaths), Morocco 2002, and Algeria and Morocco in 2008. The floods in Ghardaia, Algeria in October 2008 led not only to dozens of casualties, but also **increased social tensions** and protests following the incident with people demanding supplies and equipment (Al Jazeera 2008).

3.2.3 Potential Security Implications

Against the background of the outlined climate change effects, rising temperatures **may exacerbate the already tight security situation** in the South Mediterranean. Climate change will add to existing environmental problems and further degrade the natural basis to sustain livelihoods and economy in the South Mediterranean. Especially the question of water availability and quality will become crucial for the region's development. Security challenges will rise in various dimensions – economic and environmental, politico-military as well with regard to human rights and governance. **Existing tensions** between countries **hinder cooperation within the region** and add to climate change as a security threat.

Framed within the three dimensions used by the OSCE, the following security implications emerge:

Economic and Environmental Dimension:

- **Decreasing water and food security:** Due to climate change, water will become scarcer in the already water scarce region. In addition, it is likely that agriculture will take up additional shares of water consumption to sustain crops through irrigation, exacerbating water shortages even more. Water development projects of upstream countries additionally deteriorate water availability and quality in the Southern Mediterranean. Hence, agricultural productivity may severely diminish under these conditions. This puts food security in the South Mediterranean

¹⁵ These estimates should be revised as the regional demography continues to develop rapidly (see GRID-Arendal 2008; UNDP 2009).

¹⁶ The population of Egypt is estimated to reach around 84 million in 2010, and by 2050 it is projected to grow between 111 to 149 million (see UNPD 2008).

at risk. Especially countries with high food import dependency and low fossil fuel reserves such as Egypt may be especially affected as they lack resources to compensate for declining domestic food production.

- **Displacement of large populations:** Population displacement as a result of climate change is another potential threat to security. The South Mediterranean could become both a source and destination of population movements. Different projections place the number of African environmental refugees within the range of 50 million people in the next fifty years.¹⁷ These people will most likely want to relocate in Europe, while an important percentage could be “trapped” in North Africa and Middle East, thereby increasing the pressure on resources such as shelter, water, food, and energy.
- **Economic stagnation or decline:** Sources for external revenues, such as the tourism industry and export-oriented agriculture, may suffer from climate change implications and lead to economic losses. Power generation as well could be challenged by rising temperatures posing a further risk to economic and industrial development. However, a number of countries in the region are talking, if not already acting, on exploiting the potential of solar power and other renewable energies. Despite the mounting challenges from rising temperatures and environmental degradation, awareness and knowledge about climate change implications and environmental interrelations is still low in the South Mediterranean region. It is therefore likely that countries in the region will continue on their development paths and only slowly catch on to more sustainable economic practices, such as water and energy efficiency. However, this poses a severe threat to the diminishing natural resources in the region as well as to economic and human development. Besides the deterioration of natural resources, climate change will take up financial means for repairing infrastructural damages, compensation of losses in agricultural productivity and overall adaptation. This may strain budgets of countries and lead to stagnation or even decline of economic output, especially if the shift towards more sustainable economic practices is missed.

Politico-Military Dimension:

- **Militarization of disputes over water:** The South Mediterranean region could witness violent conflict over water. The three major hotspots are the river basins of the Nile, Jordan, and the Tigris-Euphrates. Most regional surface running water is of external source, therefore increasing the risk of international conflict.¹⁸ Currently, there are international agreements regulating management of the Nile waters. However, the division of Nile waters of 1959 between Egypt and Sudan does not satisfy Ethiopia, from where 70 percent of Nile water resources originate (Conway 2005). The exploitation of the Jordan River is source of tension between Syria, Jordan, Israel and Palestinian Authorities, has lowered the level of the Dead Sea (Presses de Sciences Po 2008). The 1990s peace agreement between Jordan and Israel led to arrangements over water sharing between the two countries. There are currently no legal regimes to regulate the Tigris and Euphrates rivers, which could be a potential source of tension between countries in the future (Maas/Fritzsche 2009). As water sources decline

¹⁷ For a detailed description on future projections of environmental refugees, see GRID-Arendal 2009.

¹⁸ In the Arab countries, 57 percent of total available surface water is from outside the region, increasing political tensions, and having caused numerous armed conflicts in the past (see UNDP 2009).

further, agreements may become less likely and existing ones may come under pressure, increasing the risk of militarizing disputes over water.

- **Weakening of authorities and civil unrest:** Increasing environmental stress from climate change, combined with water and food insecurity may challenge authorities and cause civil unrest. There are already signs of such developments especially in Algeria. Already, tensions arose over disaster management as well as during the 2008 food crises when there were protests and riots in Egypt. Weakened authorities may add to further destabilization of already fragile domestic security situations in the South Mediterranean countries.
- **Intensifying civil unrest and extremism:** Civil unrest and protests may grow stronger as access to resources deteriorates. Furthermore, resistance to occupation is likely to be exacerbated in the Occupied Palestinian Territories. Failing of the states in managing environmental change as well as the perception of upstream countries as threat to water security may deliver additional narratives for violent actions. In Pakistan, for example, extremist groups already included disputes over the Indus River into their justifications for attacks on India (cf. Renard 2008; Swami 2008).

Human Dimension:

- **Violation of human rights:** Going along with the problem of mass population displacement, human rights issues become more crucial, e.g. regarding the treatment of environmental refugees from Africa in the Arab Maghreb countries as well as internal migrants (e.g. rural-urban).
- **Impacts on civil liberties and political rights:** Against the background of the outlined security threats, it is likely that these developments will challenge civil liberties and political participation in many of the countries in the South Mediterranean region. This could happen, as multiple crises – be it e.g. riots caused by water and food insecurity – will put additional pressure on governments and lead them to tighten political rights and put restrictions on oppositional groups.

A major obstacle in addressing risks linked climate change and environment degradation is the **lack of adequate research institutions, scientific reporting, and knowledge about the inter-linkages** of environmental systems in the South Mediterranean. Also, **very little public awareness exists** towards the risks, and the policy choices available.¹⁹ Environmental movements evolve slowly; however, many environmental activists belong to NGO's supported by international aid agencies. Furthermore, regional lobbies linked to hydrocarbon sector push against linking human activities to environment change (Arab News 2009).

¹⁹ Recent report by Arab Forum for Environment and Development gives an astonishing positive image of Arab environmental consciousness, reporting that 98 percent of the public thinks climate change is happening, 89 percent believing that climate change is the result of human activities, and 51 percent said their governments were not doing enough to face the risks (see AFED 2009). However, it should be noted, that the sample for the survey included a significant portion of well-educated, young males with above-average incomes and therefore does not represent a proper profile of the population in Arab countries.

3.2.4 Open Questions

The outlined security threats disclose a wide range of unresolved issues regarding climate change security implications in the South Mediterranean:

- What are potential pathways towards conflict on the local, national and regional level? More in-depth studies are needed to identify threats and find suitable counter-measures.
- How could climate change actually become a source of better cooperation between the regional countries? What are interests and stakes of the countries and how could they be managed to benefit all affected states?
- How may regional organizations such as the Union for the Mediterranean contribute in mitigating the potential impacts of climate change?
- How will climate change converge with social, economic and political trends on national and local levels? For example, how will climate change and decline in agricultural productivity in the Nile Basin affect Egypt's social, economic and political geography?
- How will environmental degradation and climate change affect migration within as well as into the countries of the South Mediterranean?
- How will climate change impact agriculture, infrastructure, tourism, and other industrial sectors (e.g. energy production)? Which economic chances and risks may climate change provide for the countries of the region and what are the social repercussions?

3.3 South East and Eastern Europe

3.3.1 Overview

South East and Eastern Europe are here defined as encompassing Albania, Belarus, Bosnia-Herzegovina, Croatia, the Former Yugoslavian Republic of Macedonia (FYROM), the Kosovo, Montenegro, Moldova including the break-away region Transnistria, Serbia including Kosovo and Ukraine (see map 5).



Map 5: South East and Eastern Europe

The common denominator of the region is that the above are characterized as **newly independent states, with developing yet considerably weak state institutions**. Among the countries under consideration, only Albania had statehood before 1989, the other states being subjects of Soviet or Yugoslav federations until that time.²⁰ Additionally, Kosovo and Transnistria are reminders of the violence that accompanied the process of state disintegration and state formation.²¹ **Violent conflicts have died down since 1999, yet a number of societies remain in a post-conflict stage.** The

²⁰ They include: Montenegro, Serbia, Bosnia and Herzegovina, Croatia, Macedonia, Belarus, Ukraine, and Moldova.

²¹ Kosovo's unilateral declaration of independence on February 17, 2008 received recognition by 63 states. No state recognizes Transnistria as independent.

relationship of economic decline, systemic crisis, and the rise of nationalism both in former Yugoslavia and in the former Soviet Union has been documented. Therefore, **economic decline in the future could lead either to reinforcing populist and nationalist currents, or generate new radical political currents.**

The economies of the region remain fragile, and heavily exposed to global fluctuations. Monoculture and industrial concentration (such as in the case of the Donbas area in Ukraine), and the **underdeveloped middle and small enterprise sector makes the regional economies dependent on the whims of international markets.** High unemployment reveals both the importance of international aid in preserving the status quo, as well as its inability to bring development to post-conflict regions. High energy imports (Serbia²², Belarus, Ukraine) mean that the **regional economies are vulnerable to potential hikes in oil and gas prices.**²³

The Balkan countries are all considered potential candidate EU countries, some having already become actual candidates (Croatia and FYROM).²⁴ Acceding to the EU would not only result in a significant economic boost, but would also allow the countries to access EU crisis management capacities and safety nets (WBGU 2007; Olsson 2009).

3.3.2 Climate Change Trends and Impacts

Average temperatures across the region have already registered an increase of 0.5°C in the south and 1.6°C in the north. **A temperature rise of 2°C will raise both risks and opportunities for the region.** The risks are decrease of precipitation in the southern regions, longer heat waves, and change in agricultural productivity and food security. On the other hand, in some regions such as northern and eastern Ukraine, an increase in precipitation and temperature would create more favourable conditions for agricultural productivity.

In fact, many studies pin hope on northern Eurasian regions to increase agricultural production due to more favourable climatic conditions, and support closing the “productivity gap” on a global scale due to climatic factors. Yet, a World Bank (WB) report cautions that countries like Ukraine (and others such as Russia and Kazakhstan), have **not profited this far from more favourable climatic conditions, mainly due to structural difficulties and legacies of the Soviet period.** In order to increase productivity, mainly in northern regions, massive rehabilitation of the sector will be necessary for upgrading road infrastructure, land-clearing, production and marketing – all requiring investments that may be difficult to find. The WB suggests increasing “the productivity of land currently under cultivation” rather than seeking costly new opportunities (World Bank 2009a).

However, the potential beneficial effects aside, **natural catastrophes such as forest fires, heat waves, floods and landslides will accentuate.** All countries concerned will witness more frequent floods. Heavy rains in the summer of 2008 led to floods of the Dniester and Prut rivers. Some 60 thousand people were evacuated in Ukraine and Moldova, with damages estimated at 300 million USD. Such climatic events are thought to increase in the future in intensity and frequency, causing

²² In Serbia, 93 percent of all energy produced is of hydrocarbon origin, depending on imports (see Jefferson Institute 2009).

²³ Global demand of primary energy is projected to rise between 44 percent and 55 percent by 2030 compared to 2005. Fossil fuel will compose 84 percent of primary energy source at that time (see IEA 2007).

²⁴ For more information, see the website of Directorate-General Enlargement of the European Commission (http://ec.europa.eu/enlargement/countries/index_en.htm).

population movements that could generate frictions in politically sensitive regions, such as in Bosnia-Herzegovina, Kosovo, or Transnistria. Particularly Albania, Bosnia-Herzegovina, Croatia, Macedonia and Serbia may see an increase in forest fires (Pollner et al. 2008). Repetitive natural disasters could cause significant population displacements, which, on the background of continuing ethno-political tensions, carry the potential to spin into violence.

South East Europe will also face water stress. Decrease in annual runoff between 20–30 percent in south-eastern Europe (IPCC 2008: 94). Precipitations will decrease in the south of the region, while increasing in Northern Europe. **Some projections for 2050 estimate annual runoff to decrease up to 25 percent compared to 1990** (Westphal 2008: 7 and 47). Water stress could have grave influences on public health, as well as economic activities: Cultivation of the cereal crops that dominate the current structure of agricultural production will negatively affect yields in new climatic conditions, and this is likely to be permanent. For example, winter yields may decrease by 22 to 50 percent by 2050 (UNDP 2009a: 24).

The agricultural sector needs special attention and adaptation. For instance, more than a third of Moldovan agricultural surface is planted with only three species: Winter wheat, corn and vineyards, which will be exposed to changing climate conditions (Bobeica 2000: 38). Climate shocks and the emergence of new pests due to warming could destabilize agriculture, with economic and social consequences: in Serbia agriculture accounts for 12.3 percent of the Gross Domestic Product (GDP) and 30 percent of the workforce; in Ukraine 9.3 percent of GDP and 19.4 percent of the workforce, and in Albania 20.5 percent of GDP and 58 percent of the workforce (CIA 2009).

Moreover, **tourism** will be another key sector impacted by climate change. In Croatia, it is projected that up to one third of the national workforce will be employed in the tourism sector by 2018.²⁵ Due to warming, existing studies expect mild deterioration of tourism conditions, from unfavourable conditions in the summer season, to more favourable ones in the spring and autumn (UNDP 2008a: 57). Sea-level rise of 0.5 to 0.8 meters puts a number of coastal regions at risk, with land loss values estimated between 2.7 to 7.1 billion EUR (UNDP 2008a:81). However, knowledge about the ways in which climate change and the potential rise of sea levels could influence the tourism industry remains limited.

Hydropower is a key source of energy in the region. The impacts of climate change on the potential of hydropower to provide the needed energy are varied. This potential could increase by 15-30 percent, but it will have negative impacts on southeast Europe, where it can decrease from 20 to up to 50 percent in the Mediterranean region (UNDP 2008a: 81). Indeed, the decrease could reach up to 50 percent in Croatia (UNDP 2008a: 96), and would in these cases need major infrastructure investments to ensure energy provision.

3.3.3 Potential Security Implications

Areas to the south and south-west could witness precipitation decreases, droughts, and more frequent hot days. This, in turn, could lead to the disruption of agricultural production. Climate change could also lead to floods causing material damage, human losses, and population movements. These combined factors could amplify existing social tensions and overwhelm areas of institutional

²⁵ In 2007, the Croatian tourism sector generated some 20 percent of GDP, with a value of 6.7 billion EUR, and provided 336 thousand jobs (see UNDP 2008a: 52-54).

weaknesses. Major investments are needed to prepare East Europe to climate change adaptation, and diminish major risks and upheavals.

A further problem in the region is that governments still view threats as having a military nature, and are only slowly starting to pay attention to concepts of “human security” and to integrate new notions such as environmental risks. As a result, there is little conceptual knowledge and practical preparedness to face risks, as some East European leaders’ recent handling of the Swine Flu pandemic revealed (cf. Sergunin 2009).

However, Eastern Europe and the Balkans are not considered a ‘hot spot’ by many studies with regard to climate security. While in this region warming is projected to surpass the global average in the next decades, some northern parts of the continent could witness increases in precipitation, and profit from milder climates. Also, the close proximity to the EU, the deep integration into the European Neighbourhood Policy (ENP), or the potential of many countries to join it, provide the region with additional opportunities to cope with challenges of climate change.

Framed within the three dimensions used by the OSCE, the following security implications emerge:

Economic and Environmental Dimension:

- **Economic Deterioration:** Agriculture is a key sector for employment and income in the region. In addition, many countries depend on hydropower for electricity generation. Tourism is a key emerging sector particularly in Balkan coastal areas, but will be challenged by sea-level rise, increased climate variability such as heat waves, and more unfavourable conditions in some parts of the year. The combination of these impacts may slow down poverty eradication and economic development.
- **Energy Insecurity:** Energy management is a crucial national security issue for all of the countries concerned. The dilemma is that while resources should go toward finding alternative energies to reduce hydrocarbon dependence, the decrease in precipitation will add additional challenges to a number of East European countries already relying heavily on it. Increasingly administrations in the region are looking at nuclear power as alternative solution. In Ukraine, nuclear power use is likely to rise significantly by 2030, with others such as Belarus and some Balkan countries potentially following suit (cf. WNA 2010). Climate-induced reduction of electricity supply would provide a further incentive for this.
- **Food Insecurity:** Change in agricultural yields could have grave consequences on food security in a number of countries (Albania, FYROM, and Moldova, among others). Substituting domestic loss, however, will be difficult as global food availability is also likely to decline and thus food prices likely to increase. As agriculture is also a main economic sector, financial capacities to purchase food will also fall. While climate change may also create more favourable conditions in some countries, the current economic structures prevent making effective use of it.
- **Population Movements:** Decreasing economic opportunities plus increased risks of disasters such as flash floods may provide incentives for migration. The European Union could be among the primary destinations, particularly if travel becomes facilitated by accession. Migration, however, could also take place within the region, thus aggravating the economic situation further.

Politico-Military Dimension:

- **Ethno-Political Tensions:** Climate change could cause long-term (e. g. because of decreases in precipitation), but also short term population movements (e.g. because of disasters). Such movements, overlapping with previously unresolved conflicts (Bosnia-Herzegovina, Kosovo, Transnistria) and political tensions, could create new conditions for violence.

Human Dimension:

- **Social Tensions:** The EU is attracting increasing numbers of migrants from Africa, the Middle East, and Asia. The impacts of climate change as well as other global trends may add to this (WBGU 2007). EU Member states are already upgrading their frontier controls, which are likely to increase further in the future. This could lead to the accumulation of potential migrants on the borderlands of the EU, including in the Balkans and East Europe, generating new forms of social tensions, and potentially violence. As economic opportunities may falter (see above), “new arrivals” may be greeted with increasing hostility (see also Wittich et al. 2008).
- **Authoritarian Governance:** Climate-aggravated economic, food and energy crisis could challenge democratic processes and institutions. Authoritarian rule may appear as a more effective way to handle issues related to climate change, as they are less concerned with balancing interests than democracies (cf. Leggewie/Welzer 2009). Dissatisfaction with democratic governments could thus lead to a backlash. Furthermore, the region has experienced several political crises over the past years and is hardly consolidated.

3.3.4 Open Questions

Serious efforts are needed to understand the consequences of the changing climate and to develop local capacities for adaptation, in order to avoid eruption of violence in this part of the European continent. Therefore, the following issues in particular need to be further researched:

- What will be the concrete impacts of increasing temperatures and decreasing precipitation on agriculture in the west Balkans, south Ukraine and Moldova?
- How would be the impact of climate-induced population movements and likely routes of migrants across political sensitive borders in Moldova, Kosovo and Bosnia-Herzegovina affect social relations and societies?
- How will sea-level rise affect the west Balkan and Ukrainian coasts, including infrastructure and the tourism industry?
- What are the perspectives, awareness and knowledge of decision-makers and the general public on climate change?
- How will the accession process to the EU affect the countries' abilities to cope with challenges of climate change?
- What is the likelihood of states to build cooperative regimes to address climate change in the region?

3.4 South Caucasus and Central Asia

3.4.1 Overview

The South Caucasus and Central Asia are here defined as encompassing Armenia, Azerbaijan and Georgia including the areas of Abkhazia, South Ossetia and Nagorny Karabakh, as well as Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan (see map 6).

The South Caucasus and Central Asia consist of newly independent states (re-)emerging after the fall of the former Soviet Union. The aftermath of the fall was riddled with both interstate and civil war. Their legacies continue to this day: **In the South Caucasus, several conflicts remain unresolved**



Map 6: South Caucasus and Central Asia

and escalated to a brief military confrontation in August 2008 between Georgia and Russia (ICG 2008). In **Central Asia, inter- and intra-state disputes over access to resources** and tensions between governments and opposition exist (see Giese/Sehring 2006; HIIK 2008). The states remain far from consolidated and have experienced repeated political crises over the past years, including post-election riots and violent extremism (see Wittich/Maas 2009; WBGU 2007).

In the South Caucasus and Central Asia, Azerbaijan, Kazakhstan, and Turkmenistan are **rich in fossil fuels** and profit from high energy prices. However, large parts of the Central Asian population have insufficient access to electricity. **Agriculture is a second important economic** sector and a key sector for employment and income generation. Much of the region's current economic shape are a legacy Soviet era times (Perelet 2007). Water-intensive crops such as cotton and largely **unsustainable practices of water use** prevail, with the degradation of the Aral Sea highlighting the critical impacts of local economies and communities (cf. Perelet 2007; WBGU 2007). Aside from agriculture, **water is a major resource for electricity** generation in parts of the South Caucasus and Central Asia.

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Both regions are **geostrategically important due to their role as source and transit corridor for fossil fuels**. The **close proximity of global conflict hot spots** in the Middle East and Afghanistan contribute to the overall sensitivity of the region (Maas/Tänzler 2009).

3.4.2 Climate Change Trends and Impacts

Even without climate change, the **South Caucasus and Central Asia face a range of environmental problems** related to unsustainable development, uncoordinated urban growth, legacies of past conflicts and the Soviet era (UNEP 2003, 2004). While in Central Asia the trends and impacts of climate change are relatively similar across the region – generally warmer and drier – the eastern South Caucasus area will be far more and potentially differently impacted than the western parts.

In **Central Asia** climate change will likely lead to **significant decreases in water availability**. Glaciers are melting at an alarming rate. While the melting may lead in the next few decades to increased run-off, evaporation due to regional warming will increase as well. Thus, while water flows may increase in the short-term, it will significantly decrease in the long-term. Furthermore, with growing populations demand will increase as well, most likely faster than any increase in run-off (Perelet 2007). The scarcity is exacerbated by the fact that water is unequally distributed and the countries are **dependent on few large rivers**. As a result, **the past has seen tensions over water** between several countries and within states over water allocation (Perelet 2007, Giese/Sehring 2006). Aside from impacts on agriculture, this will impact several countries with large installed hydropower capacities such as Tajikistan and Kyrgyzstan.

However, accentuated seasonality may fuel interstate tensions (cf. Giese/Sehring 2006): In the summer time, when irrigation demand is high, little water will be released to keep the hydropower stations running, while too much water may be released due to the snow melt in the winter and spring time, increasing the risks of floods downstream.

Increased warming will also accelerate **desertification and soil degradation, risks of heat waves and droughts**. Agricultural productivity will thus decrease in addition to water-related impacts, particularly for water-intensive crops such as cotton and rice. Overall, food production could decrease by as much as 30 percent in Central Asia by the middle of the century if present trends continue and parallel demands continue to rise (WHO 2008: 20). Soil erosion will increase the likelihood and severity of sand storms. Both, sand storms and heat waves **negatively affect human and animal health**, aside from facilitating the **spread of disease** (Giese/Sehring 2006; cf. Perelet 2007). The **Aral Sea is likely to become particular hot spot** within Central Asia, as several developments – decreased water availability due to evaporation, desertification and soil erosion – may coalesce, thus imperilling also current efforts in reviving the Aral Sea (c. Giese/Sehring 2006).

In the **South Caucasus**, climate change impacts are diverse and countries unevenly affected. **Azerbaijan** is likely to experience the greatest amount of regional warming and substantial reduction in precipitation. Currently, most of its agricultural production is located in arid or semi-arid areas. In 2007 38.6 percent of Azerbaijan's labour force was employed in this sector (UNSD 2007). Warming will require more water for irrigation but due to desertification and heat stress the amount of available water will decline. Employment opportunities in this sector may contract while demands will rise: Azerbaijan's population is projected to grow by approximately 20 percent by 2050 and would consequently require more jobs, food and water (UNPD 2008). The situation is similar in **Armenia**, although here the impacts of climate change will be less severe (WWF 2008) and population growth is lower (UNPD 2008). As an upstream country and in contrast to Azerbaijan, which is dependent on both Armenia and Georgia for its access to larger parts of its freshwater, Armenia is less dependent on its neighbours in this respect. Within **Georgia**, climate change may result in decreasing precipitation and agricultural productivity in the eastern parts of the country. The western parts of Georgia, however, may experience an increase in productivity and very limited regional warming compared to the rest of the country by mid-century (WWF 2008). Concurrently, increasing precipitation and glacial melt is likely to increase the output of hydropower stations, but also the risks of floods and soil erosion.

Azerbaijan, Turkmenistan and Kazakhstan together with Russia and Iran border the **Caspian Sea**. Increased evaporation is likely to lead to a decline in sea level by several metres, possibly up to 9 meters by end of the century with strong decadal variation (Elgundi/Giorgi 2006; Renssen et al. 2007). Clearly, this will impact the coastal infrastructure, port cities, and fisheries. Currently, there is no

agreement in place on sharing the Caspian Sea territory and maritime borders are disputed (see Janusz 2005; Eurasianet 2009). The reduced water levels may also accelerate desertification on both sides of the Caspian Sea (UNEP 2007).

3.4.3 Potential Security Implications

Climate change will have a number of direct effects, which will impact human livelihood. Particularly significant will be the impact on water. Economic development will also be impacted, as the South Caucasus and Central Asia are depending in large parts on climate-dependent sectors, particularly agriculture. Beyond these impacts, a number of factors may affect social and political relations within and between states. The South Caucasus and Central Asia are both regions which have experienced a history of violent conflict in the past two decades at local and international levels. Several unresolved conflicts remain. Coping with climate change could fuel tensions and dissatisfaction, if they remain unaddressed. Furthermore, international tensions over shared resources may intensify if not managed cooperatively. Conflicts over water in Central Asia have been identified as a major threat in the region (Giese/Sehring 2006; WBGU 2007; J. Lee 2009).

Framed within three dimensions used by the OSCE, the following security implications emerge:

Economic and Environmental Dimension:

- **Decreasing food and water availability:** Food production will likely decrease throughout the region as a result of climate change, as will water availability, leading to food and water insecurity. As populations continue to grow, absolute and relative scarcity of food and water will increase.
- **Contracting economy:** Agriculture is a key sector for labour and income generation. Water is critical for electricity generation in several countries. The export of fossil fuels is a key source of revenue for several countries. Agriculture will diminish in large areas, particularly in Central Asia, as will hydropower potential. Together, this will diminish the financial capacities of people and states alike to adapt to climate change and slow development. The export of fossil fuels may remain high in the next few decades, but if and when a global transition to a low-carbon economy takes off, it will fall.
- **Disasters and health impacts:** Glacial melting will increase the risk of floods and land slides in the South Caucasus and Central Asia. Furthermore, the frequency and severity of sandstorms and heat waves may likely increase due to desertification and soil degradation. Regional warming will also negatively impact health and may increase the spread of diseases (WHO 2008). Malaria returned to Armenia in the 1990s and could spread further due to climate change (cf. WWF 2008). Sandstorms will likely result in increased respiratory diseases (Giese/Sehring 2006).
- **Migration:** The combination of the above mentioned impacts may provide incentives for populations to **migrate to more productive and more secure areas** (see WBGU 2007). There are already established migration patterns to Russia, Europe and the USA, from which the majority of remittances are also received (IOM 2006). However, little research has been conducted yet on this topic. Furthermore, the Georgia including its western parts is ethnically diverse. It includes a large Armenian population in the south-west. As the region may actually

benefit from climate change, compared with other areas, incentives increase for moving there (either from Armenia to Georgia or from the east to the west of Georgia).

- **Degradation of the Aral Sea:** While efforts such as the Kokaral dike has increased the water level of parts of the Aral Sea again (World Bank 2008), the effects of climate change – particular regional warming leading to reduced water flows as result of increased water needs and long-term glacial melt – may again lead to a reduction of the Aral Sea level (Giese/Sehring 2007). The past degradation of the Aral Sea already resulted in a difficult socio-economic situation and severe health impacts due to increase in sand storms (Ibid.). While the situation improved recently (see e.g. Greenberg 2006), climate change is likely to imperil these recent developments. In the long-term, the economic-environmental deprivation could also lead to instability in the region.

Politico-Military Dimension:

- **Escalating water-related tensions:** The decrease of water availability may have security implications within and between Central Asian countries. Some states experience weak governance and corruption, which leave the population discontented (WBGU 2007). A deterioration of water resources may thus additionally fuel tensions. Particular hot spots include the **Fergana Valley** (WBGU 2007: 143), where Tajikistan, Kyrgyzstan and Uzbekistan meet, and the **Amurdaja delta** (Giese/Sehring 2007: 36), where Turkmenistan and Uzbekistan meet. The tensions are not limited to the region, but may also impact relations between Central Asian countries and China (Ibid.: 15). Similar tensions can emerge in the South Caucasus as well: Azerbaijan will likely be more severely impacted than Armenia. Furthermore, Azerbaijan is a downstream country depending to large extent on freshwater flowing from Georgia and Armenia. There is currently no effective water agreement in place and water sharing is a line of friction between all three countries. Furthermore, the Sarsang reservoir, which used to irrigate fields in western Azerbaijan in Soviet times, lies within Nagorny Karabakh and its irrigation capacities are defunct (Wittich/Maas 2009).
- **Increases in extremism:** Central Asia has suffered extremism and terrorist attacks in recent decades resulting in harsh responses by host governments (Halbach 2007). If governments are unable or unwilling to cope with the impacts of climate change, the dissatisfaction of the population may increase and these trends may be exacerbated, leading to a vicious circle (cf. WBGU 2007; cf. Renard 2008). In addition, as a result of climate change, desertification may lead to the emergence of “badlands”, creating more favourable terrain for insurgencies (Tesoriere 2009). As mentioned before (see section 3.2.3), grievances related to water and other resources may well become a justification for action.
- **Disputes in the Caspian Sea:** Substantial resources lie under the Caspian Sea. The legal status of the Sea remains unclear. The littoral countries dispute the extent of their maritime territories and suggested different proposals (see Eurasianet 2009). Changing sea levels – whether decreasing or increasing – will make dispute settlement more challenging and complex.

Human Dimension:

- **Impact on human rights and minorities:** The South Caucasus and Central Asia have both experienced political instability in the past years and are far from consolidated (WBGU 2007). The riots following presidential elections are just one example (cf. Wittich/Maas 2009). If extremism increases (see above), harsh state reaction is likely. Climate change and the general social and political situations may drive countries further towards instability. In addition, migrants and large minority populations may face hostility if interstate tensions escalate due to water scarcity or other reasons.

The South Caucasus and Central Asia border regions will also be severely affected by climate change. This includes in particular **Afghanistan**, which is currently highly unstable and may in addition also face negative impacts of climate change (see Carius/Maas 2009). The Middle East in general will be particularly strongly impacted, with countries such as Iraq facing enhanced internal friction (Carius et al. 2009). The **neighbourhood instability** may have further repercussions for the region.

Conversely, a severe destabilisation of both the South Caucasus and Central Asia may result in **extra-regional intervention**: **China's** territory bordering Central Asia has faced instability and local level conflicts, which may become aggravated if neighbouring countries destabilise (WBGU 2007: 143, cf. Haas 2007). **Russia**, the **USA** and, to a lesser extent, the **EU also** take an interest in Central Asia and the South Caucasus, as sources and transit corridors for energy. The August 2008 war in Georgia showed, how sub-regional conflicts can result in tensions between major powers and vice versa (Maas/Tänzler 2009).

3.4.4 Open Questions

Against the background of the findings, the following questions merit further investigation:

- National and sub-national impacts of climate change need to be correlated with concrete socio-economic structures. This includes identifying how climate change may alter relations between and within communities in areas such as the Fergana Valley and the Aral Sea.
- How will the impacts of climate change on neighbourhoods of the region interact with security implications within the region? This includes in particular the impacts on Afghanistan and western China.
- To which extent will climate change impacts within the region affect relations between external powers (particularly Russia, China, USA and EU)?
- How could the looming energy, food and water crises in Central Asia be mitigated in a cooperative way?
- How do Caspian Sea level variations impact on economic, political and social relations? Of particular interest would be identifying a legal arrangement which can account for varying sea-levels.
- What role could other international organisations, especially the Commonwealth of Independent States, the Collective Security Treaty Organisation and the Shanghai

Cooperation Organisation, play in mitigating the impacts of climate change on regional cooperation?

3.5 Ancillary Dynamics

The four regions analysed in this study do not exist in isolation. Fossil fuel exporting countries in the Mediterranean and Central Asia are dependent on global energy markets for their revenues. Several countries such as Egypt are food importers and in addition dependent on rivers originating outside of their territory. The food price hikes in 2007 and 2008 were the result of an interaction of several global events, which translated into protests and riots in over 40 countries (see Evans 2009, Grebmer et al. 2008). These events included failing harvests due to heat waves and natural disasters – all of which could become aggravated by climate change.

Hence, climate change produces a number of ancillary dynamics, which could impact the regions unpredictably. These dynamics are “wild cards”, which are highly difficult to assess. Five of these potential dynamics are mentioned here and will require scrutiny in future research. The first two outlined below are related to the impacts of climate change. The latter three are related to responses to climate change, which may in themselves have security implications.

- **Abrupt climate change:** As has been mentioned before, climate change is not linear. Indeed, it has been historically established that ocean levels may rise or fall by significantly in less than a century (see Paskal 2010). Furthermore, **the true sensitivity of the climate remains unknown:** The so-called “**tipping points**” could be reached without prior warnings, resulting in rapid changes in regional and global climate (Allison et al. 2009; Lenton et al. 2009). Such events could have dramatic consequences. They include: The breakdown of the Atlantic thermohaline circulation which could lead to a new ice age in Europe; the collapse of the Greenland ice sheet resulting in a quick global sea rise; or the collapse of the Indian summer monsoon causing severe impacts on food production (see Lenton et al. 2009). Authors have additionally argued that such scenarios could have dramatic political consequences as well, such as a **collapse of the European Union** due to the supranational body’s slow or inappropriate reactions (Schwartz/Randall 2003; Dyer 2009). Despite the historical evidence supporting society’s vulnerability to climate change, not much research has been carried out on the potential social, political and economic repercussions associated with a sudden change in climate. (see e.g. Diamond 2005).
- **Interconnectedness:** Due to globalisation and increasing integration of economies and markets, **shocks resonate quickly worldwide.** The global energy, food and financial crises are key recent examples. In the future, as agricultural productivity will likely fall while population growth will increase in many countries, food crises could become much more aggravated. National food security policies supporting agro-investments, export bans and quotas could further exacerbate the crisis (cf. Kumetat 2009; Carius/Maas 2009). Hydropower represents a major source of energy for many countries within the OSCE area. Water availability may amplify existing food, water and electricity crises. On the one hand, this can have positive effects for oil exporting countries as energy prices would increase. On the other hand, the OSCE regions could be negatively impacted by soaring food prices due to climate change’s impact on harvests. The underlined interconnectedness will make the impacts of climate change, both within and outside the OSCE regions, become relevant issues for all countries.

- **Low-Carbon Transition:** Limiting global warming to 2°C will require a drastic reduction in our dependence to fossil fuels, the conservation of important carbon sinks such as forests, and improved agricultural practices. There exists a very small window of opportunity in which this change of course needs to occur. The present generation will be responsible for those changes to come true. These changes could significantly affect oil exporting countries as their main export figures would dramatically reduce. Countries in the Southern Mediterranean could invest in renewable energy technologies (particularly solar and wind energy) and provide European states with electricity. However, besides a shift in the political economic balance within these countries, this would also create vulnerabilities (see Tänzler et al. 2007). Where no alternative is available, **the reorientation of major economic sectors could become a source of friction as well**. Bio fuels serve as a good example. Originally thought of as a promising replacement of fossil fuels, reality has shown that a number of severe negative side-effects need to be considered such as deforestation, loss of biodiversity, and an overall increases in carbon emissions, (Ibid.). While climate change may cause severe economic repercussions, it remains important to further investigate the potential impacts caused by mitigation strategies.
- **Uncooperative Responses:** Our understanding of climate change and its potential impacts is developing rapidly. The anticipated effects will hopefully lead to proactive responses supporting the development of sound mitigation strategies. **If responses are uncoordinated, they may reduce the threats of climate change for one party while increasing the threats for others**. The water sector is an area of concern. Adaptive measures used by upstream countries – such as the construction of dams and water reservoirs – could have important repercussions on downstream countries. What sets such tensions apart from the security implications outlined above is the fact that **the threat of climate change is leading to tensions and potential conflicts, even before the impacts have occurred**. Such trends are particularly worrying, as they may fuel an atmosphere of distrust and tensions, which could rapidly worsen once the actual climate change impacts are felt.
- **Geoengineering:** The potential consequences of climate change have also driven an increased interest to artificially manipulate the climate. This refers mainly to “geoengineering” – the use of **technological means to alter aspects of climate**, such as (global) warming, precipitation and the like. Advocates argued that this would be far more cost-effective and feasible than mitigation and adaptation (Bickel/Lane 2009). Others have argued further that the slow pace of cutting carbon emissions will leave geoengineering as practically the only option to prevent dangerous climate change (Dyer 2008). Artificially changing the global climate in a short period of time is already technologically feasible and costs are in the range of a few billion US Dollars (Bickel/Lane 2009) – a sum that a large company or small country could have access to. However, the impacts and potential consequences are not yet fully researched. In fact, the knowledge on the potential side effects is so low and the risks of potential negative consequences are so large that applying geoengineering is hardly an acceptable option (see Royal Society 2009). Some authors even argued that **if geoengineering solutions would go awry, they could trigger security implications and result in tensions between states** (cf. J. Lee 2009). However, in the event that climate change impacts escalate, geoengineering may be considered as a viable option despite the side effects it may have. Currently, there is no international agreement or other form of governance in place to regulate geoengineering.

Similar to climate change, the above mentioned issues may not directly affect the OSCE regions. However, they all are related to climate change – either as results of climate change or as results of a response mechanism – and may have second or third order impacts on the OSCE regions. Developing scenarios that analyse how climate will impact a region or country has to go beyond the direct impacts of climate change within the respective country: It has to recognise the interconnections between global dynamics and processes and show how to integrate these accompanying challenges.

4 Processes and Perspectives

This chapter highlights activities of selected international organisations and countries in response to security implications of climate change. Since late 2006, the potential security implications of climate change have received global attention by policy-makers and the public alike. While it is not a new issue on the international agenda, the results of the IPCC, the Stern Review on the economics of climate change, and other major reports elevated it to the top of the international agenda. The EU and its member states in particular repeatedly placed it on the agenda of international bodies and organised consultations and conferences to raise awareness for the issue and catalyse action. Concurrently, many states and international organisation conducted scoping studies and regional assessments on ways in which climate change may impact national interests. Interestingly, despite the fact that climate change is often regarded as an environmental issue, ministries responsible with foreign and security policy, defence, intelligence, development and disaster response have become quickly and significantly active across the globe.

While few countries disagree with the view that climate change may have dramatic consequences for development and human well-being, several countries reject the notion of linking climate change and traditional concepts of security such as military affairs. Many states reject discussions on the impacts of climate change in bodies considered as inappropriate, such as the UN Security Council. The UN Framework Convention on Climate (UNFCCC), due to its work on mitigation and adaptation, has been frequently considered as best suited to develop a global response to climate change.

Considering that the OSCE is recognised as a regional security organisation under Chapter VIII of the UN Charter, the next chapter outlines ways in which the potential security implications of climate change have been addressed within the United Nations. Subsequently, the evolving political process in the EU will be scrutinised, as it has been a key player in the international debate and is a significant state bloc within the OSCE. Selected perspectives of countries and organisations within and outside of the OSCE will be presented. Finally, against the background of the preceding sections, the potential added value of the OSCE will be discussed.

4.1 Political and Technical Processes at the United Nations

Within the United Nations, the potential security implications of climate change or environmental change is not a new topic: They were highlighted with others in the context of the United Nations in 2002 during the UNFCCC conference of parties (COP) in Bonn. The German Ministry for the environment presented a paper on climate change and conflict prevention (see Oberthür et al. 2002). In 2004, the Secretary-General's High-Level Panel on Threats, Challenges and Change also explicitly referred to security threats resulting from environmental degradation (HLP 2004).

However, despite the reports and isolated statements made by member states, the topic as a whole remained off the UN agenda. This changed in 2007 when the UN began to address the security implications of climate change on multiple levels:

On the political level, the United Kingdom of Great Britain and Northern Ireland (UK) used its **United Nations Security Council (UNSC)** presidency to discuss in April 2007 the security implications of climate change. It was the very first time that the UNSC debated this topic and more than 50 delegations delivered statements. The issue was controversially discussed and neither a resolution

nor a presidential statement was issued. Many countries, particularly India, China and the Group of 77 (G77) objected to discussing climate change in the context of international security. In their understanding, climate change as a socio-economic development issue ought to be dealt with by the General Assembly and the Economic and Social Council, thus ensuring a wider representation (UNSC 2007).

Development policy and the work done within the framework of the **United Nations Convention on Climate Change** are considered as more adequate bodies to cope with climate change (Ibid.). This is in line with the interest of several developed countries, as adaptation will be critical for preventing climate-induced conflict.²⁶ Indeed, several plausible options show how adaptation could be fruitfully linked with conflict prevention and peacebuilding (cf. Tänzler et al. 2009). However, specific negotiators have opposed to include security implications of climate change or any related issue in the UNFCCC negotiations, as it would make reaching consensus even more difficult. Consequently, despite side-events organised during the Poznan (2008) and Copenhagen (2009) conferences, the issue has not yet been taken up concretely.

Although the UNSC debate remained without positive conclusions and the UNFCCC has not yet addressed the issue, climate change's implications were debated in multiple fora, bodies and agencies from 2007 to 2009. This includes the **United Nations Human Rights Council** (UNHRC 2008) focusing on the implications of climate change for human rights and adopting resolution 7/23 "Human Rights and Climate Change" in March 2008. The political debate within the UN climaxed so far in the **UN General Assembly resolution A/63/281 on climate change and security** (UNGA 2009). The process leading to the resolution was driven by the small island developing states (SIDS) and EU Member States. The resolution is noteworthy in two respects:

- First, it requested the UN Secretary-General (UNSG) to produce a comprehensive report on climate change and its potential security implications (UNSG 2009). The UNSG invited all member states, observers and UN bodies to submit perspectives on the matter before a final report was published in late 2009. The report establishes the relevance of the issue and identifies five key potential areas where climate change impacts could translate into security threats.
- Second, the resolution calls upon all relevant UN organs to intensify their efforts, as appropriate within their mandates, in addressing the possible security implications of climate change. As climate change may affect a wide spectrum of issues from food security to conflicts over scarce resources, this call is flexible enough to be heeded by most UN organs.

Together, the **UNGA resolution and the UNSG report provide a political mandate and framework for action for the UN**. However, while UN bodies can refer to the UNGA resolution and reflect the findings of the UNSG report against their respective mandate, few UN bodies have yet gone much further. Still, the recent activities established the relevance of the topic.

Climate change and its possible security implications also **appeared on the agenda of several technical bodies**. The focus of these activities has been largely on conceptualising the potential threats of climate change and assessing its concrete implications:

The UN Development Program (UNDP) focused in its human development report (HDR) 2007/2008 on climate change and particularly on its consequences for human security (UNDP 2007). The United

²⁶ Personal communication with EU Member State official via phone, October 2009.

Nations High Commissioner for Refugees (UNHCR) explicitly mentions climate change as a threat to international security, stating that related to climate change effects “(i)ncreased social tension and political conflict is thus likely, both within and between states” (UNHCR 2008: 3).

However, UNHCR also pointed to the fact that there is a lack of understanding of the relationship between climate change, environmental degradation, armed conflict, displacement and migration (UNHCR 2008: 8). Concurrently, the International Organisation for Migration (IOM) began assessing the challenges from climate-induced migration, including conflict risks (IOM 2008). The World Bank is researching the linkages between climate change and violence prevention (see Buhaug et al. 2008), while the UN Environment Program (UNEP) is currently assessing the role of adaptation to climate change in post-conflict situations.²⁷

However, few concrete projects have been conducted. A key challenge is to operationalise the challenges of climate change in a convincing way, as contemporary development priorities must be judged against potential future impacts. The UNDP’s Pacific Centre has developed a proposal to work on the interface between climate change, disasters and conflict on the Pacific island states.²⁸

4.2 The EU Process on Climate Change and International Security

The EU remains one of the frontrunners in the international debate on climate change and security: EU institutions and member states have been active in putting the topic on the agenda of multilateral fora. The EU Process on Climate Change and International Security (CCIS) has developed over the past years and benefits from the regular engagement of multiple member states and EU bodies. The process itself is decentralised and loosely coordinated at the Brussels level between EU bodies and interested member states. Its main activities currently involve consultations, integrating climate change concerns and security threats into EU policies by adapting existing strategies and instruments or producing new ones; and conducting additional studies on the impacts of climate change.

Issues of global environmental change are present within the European Security Strategy (ESS) of 2003 (EU 2003). In 2006, the European Commission (EC) initiated a review of its foreign and development policy capacities to address conflicts related to natural resources. Climate change was identified as major future challenge in the report (Carius et al. 2007).

The CCIS process began under the German EU presidency in 2007. Then-High-Representative for Foreign and Security Policy Javier Solana and the EC were invited in June 2007 to produce a joint paper on climate change and international security (hereafter Joint Paper).

The Joint Paper was published in March 2008 (EU 2008) and has since then been the conceptual reference document of the EU process. Within the Joint Paper, climate change was considered primarily as a threat multiplier: It may exacerbate existing tensions and risks for armed conflict. If not addressed properly, climate change will threaten the interests of the EU and its partners in a stable and secure world.

²⁷ Personal communication with staff member of UNEP’s Post-Conflict and Disaster Management Branch, November 2009.

²⁸ Personal communication with UNDP representative, New York, June 2009.

The report was welcomed by member states and the Council Secretariat (SEC) and the EC was requested to produce a roadmap that would implement the main recommendations of the report. These recommendations are:

- **Enhancing capacities at the EU level** for early warning, analysis and response to climate-induced implications for security.
- **EU multilateral leadership** to build and implement a successful post-2012 international agreement on climate change and to promote global climate security.
- **Cooperation with third countries** to strengthen dialogue, create awareness, operationalise response capabilities, carry out scientific cooperation across the many facets of climate change dynamics and its impact, share analysis, and cooperatively address the challenges of climate change.

The roadmap was developed by the SEC and the EC and covered the years 2008 and 2009, with an interim report issued in late 2008 to the General Affairs and External Relations Council (GAERC). While the EC and SEC managed the implementation of the roadmap, an informal steering group consisting of representatives from the EU presidency and interested EU member states was established.

Over the course of 2008 and 2009, the EU then engaged in multiple activities focusing on information gathering, strategy development and consultation. The activities focused thereby less on developing a systematic response, but instead to close knowledge gaps, review and adapt existing capacities and exchange perspectives with other stakeholders. Among its activities in the two years are the following:

- Climate change's potential security implications were discussed bilaterally with more than 40 countries, several consultations with international organisations conducted, and dialogue processes initiated. Follow-up events in 2010, such as with the ASEAN Regional Forum, were also agreed upon (ARF 2009).
- At the UN level, the EU proactively supported UNGA resolution A/63/281 on climate change and security and organised side events on the matter at the UNFCCC COP in Poznan and Copenhagen. A consultation between EC/SEC staff and staff members of UN agencies was held on 10 June 2009 in New York (Carius/Maas 2009).
- On the EU level, several workshops and conferences were conducted to discuss the formulation of a joint policy within the EU. In addition, new policy documents such as the Arctic Strategy (EC 2008) and the strategy for disaster risk reduction explicitly focused on

Box 5: The EU and the Arctic

For a long time, the Arctic was a lesser priority for the EU, as few Member States were directly concerned with the region. Climate change has turned that around with the opening of the Arctic (Airoldi 2008). In 2008, the joint paper on climate change and international security pointed out that environmental changes are altering the geo-strategic dynamics of the Arctic, with potential consequences for international stability and European security interests. With three member states, Denmark, Finland and Sweden, having territories in the Arctic, the EU reconfirms its interest for the Arctic region. As a result, the Commission presented a communication entitled "the European Union and the Arctic region" (EU 2008a). Within the Communication, three main policy objectives are outlined: (1) protecting and preserving the Arctic in unison with its population; (2) promoting sustainable use of resources; and (3) contributing to enhanced Arctic multilateral governance. Since there is no specific treaty regime for the Arctic, the EU is working toward a cooperative Arctic governance system, which could be based on the UN Convention on the Law of the Sea.

climate change and its potential threats. The review of the implementation of the ESS prominently featured climate change as an emerging challenge (EU 2008a).

- Finally, EU institutions and member states commissioned several studies and a synopsis report (Maas/Tänzler 2009) on regional security implications of climate change. The studies aimed at closing knowledge gaps and reflecting potentials for the EU and/or member states to curb potential security threats.

A joint progress report on the roadmap was developed in late 2009 and approved by the GAERC on December 8 (EU 2009, 2009a). The GAERC supported the recommendations of the progress report – among others integrating climate change's implications into strategies, continuing dialogue, closing knowledge gaps, improving cooperation and coordination with other stakeholders – but did not take any definite decision on concrete activities.

With the Treaty of Lisbon now in place and the EU structures changing, it remains to be seen how the EU process will continue. In addition, the EC features now a new directorate-general for climate change. The distribution of responsibilities remains to be determined.

The current budgetary cycle of the EU, which runs from 2007 to 2012, has been negotiated and agreed upon before the process commenced and then matured to its current level. This leaves little room for any large or new projects before 2013 at the EU level. However, a key window of opportunity will emerge in 2011 and 2012: The EU negotiates so-called country strategy papers (CSP) with partner countries and jointly develop priority areas for cooperation, which cover the periods of the budgetary cycles. Integrating the findings of current studies and consultations into CSPs as well as the regional strategies of the EU would allow for systematic action in tackling the challenges of climate change on a country-by-country and region-by-region basis.

4.3 Perspectives of OSCE Participating States

There has been consensus at the OSCE that the environment is related to security: The **2007 Madrid Declaration on Environment and Security** (OSCE 2007) was adopted unanimously at the ministerial level. It also identified climate change as a potential contributor to conflict. As the name implies, the Declaration was negotiated and adopted under the Spanish chairmanship of the OSCE.

While the conceptual linkage between climate change and security is thus accepted, perspectives on addressing it and preventing climate-induced insecurity differ. Concepts such as interlinkages between environment and security are still new and unfamiliar and policies still take a “silo-approach”, making it difficult to address the cross-cutting nature of climate change across the OSCE (Sergunin 2009; Adelphi Research 2009; Youngs 2009). EU Member States and North America most proactively engaged with the security implications of climate change. Still, while the EU has developed a common position with major political documents, the individual approaches of Member States differ.

Within the **United States** a change of position towards climate change following the change of administration in 2009 was preceded by the intelligence and defence establishment, which started conducting assessments on the likely implications of climate change. The Centre for Naval Analysis (CNA) assembled an advisory board of retired US generals and admirals, which identified climate change as a threat multiplier to global insecurity (CNA 2007). Additionally, the National Intelligence Council (NIC) started conducting assessments on the impacts of climate change in several countries (NIC 2009, 2009a, 2009b) and how this may threaten US interests.

The **United Kingdom** listed climate change as key driver of insecurity in its national security strategy (Cabinet Office 2009) and established the post of climate and security envoy. The facts that the position is held by a military officer, Rear Admiral Neil Morisetti, and that the Foreign and Commonwealth Office (FCO) and Ministry of Defence (MoD) are taking the lead underscore the perceived level of threat. The UK has been active raising awareness across the globe and put the climate change's threats to security on the agenda of the UNSC in 2007 (see section 4.1). The UK also funded the establishment of the **Military Advisory Council (MAC)**, a board similar to the CNA board mentioned above, but with an international member composition (IES 2009; Adelphi Research 2009a).

In continental Europe, several countries have started to consider the threats of climate change as well. Agencies in **Spain, Italy** and **Sweden** associated with defence ministries conducted studies on the security implications of climate change (CESEDN 2009; Gabrielli 2009; Halden 2007). Also, the Swedish EU presidency conference "Environment, Climate Change and Security – Facing the Challenges"²⁹ of October 2009 was organised by the Swedish Defence Research Agency (FOI). In **Germany**, the Federal Ministry for the Environment (BMU) first raised the issue during the 2002 UNFCCC conference in Bonn (Oberthür et al. 2002) and continues to highlight the potential interlinkages between climate change and security. They were joined by the Ministry for Development (BMZ) and Foreign Affairs (AA), which consider the threat of climate change an issue for **civilian crisis prevention**, and are focusing on preventive diplomacy and development cooperation (cf. Adelphi Research 2009c).

Similarly, **Finland, Denmark** and **Greece** focused on the implications of climate change for livelihoods, human security and social stability. Finland considers climate change as a global security threat that requires a broad set of tools in the area of multilateral cooperation (particularly UN, EU and OSCE) and risk prevention (Adelphi Research 2009b). Denmark took a facilitating role by financing multiple studies on climate change and security (Drexhage 2007; Brown/Crawford 2009, 2009a) and raising the issue in multiple consultations, conferences and summits throughout 2009, including sponsoring side-events at the UNFCCC Copenhagen negotiations in December 2009. In addition, Denmark – and Greenland alongside (Yalowitz et al. 2008) – has taken a significant interest in the Arctic issues related to climate change. As mentioned above (section 3.2), **Canada** has taken a particularly strong interest in the Arctic, considering large swaths as internal waters and increasing its defence spending accordingly (Paskal 2010; Brown et al. 2008; Crawford et al. 2008; Yalowitz et al. 2008). Greece has taken a strong human security approach during its chairmanship of the Human Security Network and the OSCE, sponsoring major studies (Dokos 2008) and the OSCE Chairmanship Conference³⁰ in 2009.

Aside from North America and the EU, it is noteworthy that during the debate on adopting the UNGA resolution on climate change and security, **Turkey, Croatia, FYROM, Albania, Montenegro, Armenia, Georgia, Ukraine** and **Moldova** associated themselves with the statement of the EU (UNGA 2009a). However, none of the countries actively contributed to the debate in the UNSC or submitted perspectives to the report on the UN Secretary-General report. In addition, neutral, non-EU countries such as **Norway, Iceland** and **Switzerland** participated in the debates in the UNSC and UNGA, highlighting the potential impacts of climate change on livelihoods and increased risks of tensions and conflict similar to those put forward by the EU (UNSC 2007, UNGA 2009a).

²⁹ For more information, see http://www.foi.se/FOI/Templates/ProjectPage____7838.aspx (17 December 2009).

³⁰ For more information, see http://www.osce.org/conferences/eea_2009_climat.html (17 December 2009).

Russia recognised the potential security implications of climate change with regard to the impacts on small island states (UNSC 2007, Russian Federation 2009). Indeed, in March 2010, the Security Council of Russia debated the potential implications of climate change (President of Russia 2010). However, Russia criticised in general the linking of climate change and security, considering this as an inappropriate framework and the UN Security Council as an inadequate forum to address the potential implications of climate change. It cautioned against overdramatizing the issue, which may not be useful to reach a long-term, comprehensive agreement on addressing the challenges of climate change. Concurrently, while sovereignty in the Arctic is a key political issue for Russia (Yalowitz et al. 2008: 15), there is interest in new international fault lines, as the declaration of Ilulissat also highlighted (Ibid.). Indeed, Russian policymakers have sometimes held a positive view of climate impacts, due to large parts of Russia becoming potentially more habitable (cf. Götz 2009; EKD 2009).

In Central Asia, **Kazakhstan** recognised during the OSCE Chairmanship Conference on climate change and security in October 2009 the threats of climate change for water, energy and food security for its state and people as well as the potential impacts on tensions and conflicts (Tultabayev 2009, Rakhmetullin 2009). Climate change has been considered part of a wider environmental change, which may have negative impacts on Kazakhstan's citizens. Water has been considered as a main challenge. Aside from **Turkmenistan**, which as a member of the G77 has been represented at the UNSC debate in April 2007³¹, neither Azerbaijan nor any of the other Central Asian states have as yet participated in the political debates at the UN and the OSCE Chairmanship Conference, or have aligned themselves with any other position except for the Madrid Declaration.

4.4 Perspectives of OSCE Partners for Cooperation and Beyond

The global debate on climate change and security sparked very different reactions. While Western European countries strongly advocated for the link between climate change and security including armed conflict, many other countries have shown reluctance in fully accepting this view. Frequently, the UNFCCC has been considered as a more adequate forum to discuss the implications of climate change: Mitigation would prevent the occurrence of climate change in the first phase, during which adaptation to climate change preventing food insecurity, water scarcity and disasters risks could materialise. The need for a comprehensive post-Kyoto agreement including significant commitments by industrialised countries to reduce emissions has been stressed around the globe as more important.

The Southern Mediterranean countries increasingly **view climate change as a threat especially to water resources and food production**. However, the countries took a rather sceptical position towards the discussion of climate change and related security threats within the realm of the UN. Criticism was voiced especially regarding the role of the UN Security Council in dealing with this issue; countries such as Libya and Algeria stressed the need for reform of the UN bodies and the reinforcement of the role of the Economic and Social Council (ECOSOC), as well as the need to properly include the interests of developing countries. Nonetheless, Egypt, Lebanon and Libya (as well as a number of other Arab countries) as part of the "like-minded group" joined the consensus on the draft resolution entitled "Climate change and its possible security implications" (UNGA 2009). Yet, none of the Maghreb and Levant states have published their contributions to the UNSG report on

³¹ For the position of the G77, see G77 2007.

climate change and security (the only available contribution from countries in the Arab region was submitted by Oman).³²

Of the OSCE's Asian partners for cooperation, **Japan** has in particular focused on human security aspects of climate change, stressing the impacts on food and water security, as well as increased disaster risks, while other partners have not yet addressed the issue so far. Other countries in Asia, particularly **China** and **India**, have taken a similar position as Russia, considering the UN Security Council as an inadequate forum to address the impacts of climate change: The potentially severe impacts of climate change on human society are hardly questioned (see ARF 2009, UNSC 2007), but discussing them in terms of international peace and security would not support solving these issues.

Finally, the **North Atlantic Treaty Organisations'** (NATO) new Secretary-General, former Danish prime minister Anders Fogh Rasmussen, explicitly linked climate change and international security as well (Rasmussen 2009). Accordingly, climate change would need to be integrated into the defence planning of NATO. However, climate change is a threat unlike any other, and hence it has to be addressed differently: Secretary-General Rasmussen consider capacity building and cooperation in the area of disaster management, as well as serving as a forum for consultation and information exchange, as primary tasks of NATO in this regard (Danish MFA 2009). While concrete actions have yet to follow, this would be the first collective defence organisation attempting to address climate change's implications for security.

4.5 The Added Value of the OSCE

The OSCE is the largest and most inclusive regional security organisation in the world, and participating states include former antagonists of the Cold War. From the outset, it applied a comprehensive approach to security which covers also economic and environmental questions (Wohlfeld 2008). The OSCE has actively contributed to stability and peace in several regions and continues to have field presences in many countries. With the OSCE's role in establishing the Environment and Security Initiative (ENVSEC)³³, the OSCE has also been among the key organisations addressing interlinkages between environmental and security affairs (see also Snoy/Baltes 2007). With a mandate to monitor and assess and potential risks to security and stability arising from environmental factors (Ibid.: 314), it is **in principle well positioned** to address risks stemming from climate change:

From an **institutional perspective**, the OSCE provides an added value compared with the UN Security Council or similar bodies. It does not have the powers of the UNSC, such as sanctioning military means or making legally binding decisions, but this is precisely what allows for more open discussions. It can more easily debate issues related to climate change and security as it has a 'lower profile' than the UNSC, yet is more inclusive. Furthermore, the three security dimensions of the OSCE allow for a broader perspective compared with the UNSC or NATO. These broader views help to address potential threats from climate change long before they may become militarised. The OSCE

³² The submissions can be seen here: http://www.un.org/esa/dsd/resources/res_docugaecos_64.shtml (4 January 2010).

³³ ENVSEC is a partnership of several international organisations working the interrelations between environment and security. It has been established by the OSCE, UNEP, UNDP and the Regional Environmental Centre for Europe (REC) in 2003. For more information, see www.envsec.org.

also provides a (sub-) regional platform and institutionalised forum based on common norms, which are smaller and more manageable than the United Nations and more inclusive than the EU. Regional cooperation will be crucial in resolving climate-related challenges, such as in the Arctic, transboundary water issues in Central Asia and the South Caucasus, or other areas. While other agencies, such as the Arctic Council, may already exist, the OSCE's unique trio of dimensions may add a key forum for dialogue and exchange of perspectives.

In addition, the OSCE has developed an extensive network of **field presences**, particular in South East and Eastern Europe, the South Caucasus and Central Asia. Through the field presences, the OSCE has access to a wide variety of stakeholders, making it ideal for information dissemination at the local level and serving as impartial mediator. The mandates of the field presences can be flexibly developed in cooperation with the host countries, allowing tailoring activities and projects across multiple dimensions towards local needs. This provides unique comprehensives if compared to other international organisations such as UN specialised agencies with an overriding theme (see among others Erler 2006; Salber/Ackermann 2007; Evers 2002).

Yet **the past decade challenged the OSCE** in several ways (Zellner 2009). This includes military confrontation between participating states in 2008 as well as stagnation regarding arms control and disarmament (see Kühn 2009; Zellner 2007). There have also been criticisms by participating states that election monitoring is unbalanced. These tensions within the organisation have been between "western" and "eastern" participating states, with the political tensions between Washington and Moscow occasionally most obvious. The eastward growth of NATO and the EU further amplified the alienation between participating states (Bailes et al. 2007: 67). Indeed, the "monolithic bloc" representing the EU in the OSCE, and its agenda, has been resented by non-EU OSCE participating states (Ibid. 69f.).

From a **political perspective**, however, the different perceptions on climate change are reminiscent of the observable divisions within the OSCE: Predominantly West European and North American OSCE participating states have framed climate change in hard security terms and elevated it to the UNSC. Several states have been more sceptical to this view. Differing perspective already paralysed the OSCE on occasion (Zellner 2007, Bailes et al. 2007) and Kazakh foreign minister Kanat Saudabayev, chairperson-in-office in 2010, called the 'current crisis of confidence' (OSCE 2010) as a main challenge. If unresolved, it may also prevent climate change being purposefully addressed within the OSCE on a political level. In particular, if climate security is largely perceived as an agenda driven only by a subset of participating states. Aside from this division, participating states may then refuse to discuss climate change implications within the OSCE if perceived.

In conclusion, the main added value of the OSCE compared to other organisations in working on climate security is its ability to serve as an inclusive regional platform for dialogue and catalysing political will. Particularly with regard to regional cooperation, but also in managing environmental and economic consequences of climate change within states, this will be vital to preventing the transformation of first-order climate change impacts into security threats. The key challenges will be avoiding that climate change's security implications remains an agenda driven by an exclusive group of states within the OSCE, and that tensions between participating states "spill-in", thus preventing purposive discussion.

5 Conclusions and Recommendations

The climate negotiations in Copenhagen have yielded only limited results: By March 2010, 76 countries pledged to reduce their emissions, of which the majority (41) are OSCE participating states (UNFCCC 2010). Even if the results of Copenhagen would have been more ambitious, global emissions are likely to rise for the foreseeable future, while the impact of past emissions will continue to unfold for the next decades irrespective of mitigation actions. The Arctic is currently among the most visible symbols of how climate change is radically altering the geopolitical landscape. These trends will continue and impact the lives of millions around the globe. The future times of change and uncertainty may also spin out of control if left unaddressed.

Identifying early signs is vital for timely action. With conflict prevention and stability as core functions of the OSCE, it will be a key task for the organisation to identify the challenges of climate change and avoid them turning into security risks. If managed adequately, climate change may serve as a catalyst for cooperation among countries.

This chapter presents conclusions and key findings from the preceding sections, followed by recommendations to the OSCE on addressing the described challenges. These recommendations, however, can only be a first step and departure point for further discussion.

5.1 Key Findings

Climate change has been identified as either a threat multiplier, such as intensifying resource competition, and viewed as creating genuine threats, such as those posed to island states. The impacts vary across the globe. Regional assessments are necessary to identify potential security implications. However, the nature of climate change also results in a set of common aspects:

- **Climate change is transforming contextual conditions.** Thus, history is becoming a bad reference for the future as the boundary conditions have changed. With this transformation, **climate change is adversely altering the livelihood foundations of societies.**
- Climate change rarely results in direct security threats. It is rather a set of forces and factors that define a chain of events leading to increased insecurity. For example, global warming affects local harvests which in turn lead to food insecurity and unemployment. Thus, **climate change increases insecurity through a number of interacting impacts.**
- **Climate change is increasing complexity and uncertainty by altering the contextual condition and generating a multitude of impacts**
- Finally, current **climate change is taking place in times of rapid global change**, which are amplifying potential security risks.

The impacts of **climate change will affect primarily the economic and environmental dimensions** of the OSCE. It will shake the foundations of these two sectors particularly in Southern Mediterranean, South Caucasus and Central Asia. Tensions may develop in the region over shared resources or those becoming available with the melting of the Arctic.

The Arctic and the Caspian Sea highlight the **impacts of climate change on the politico-military dimension**. It raises a set of questions around territory and border claims. The consequences of

climate change may fuel existing conflicts or cause the outbreak of new conflicts at the local and/or international level over natural resources. The incapacity to resolve the challenges posed by climate change may also fuel dissatisfaction and grievances within governments, thus potentially fuelling extremism and terrorism.

The **impacts of climate change on the economic, environmental and politico-military dimensions will also affect the human dimension**. If conflict erupts or political stability fails, tolerance, human rights, the rule of law and democratic institutions are all at risk (OHCHR 2008). In addition, minorities, migrants and other groups may face hostilities if resource competition increases. Hence, climate change has the potential to affect all three dimensions of the OSCE (see figure 3).

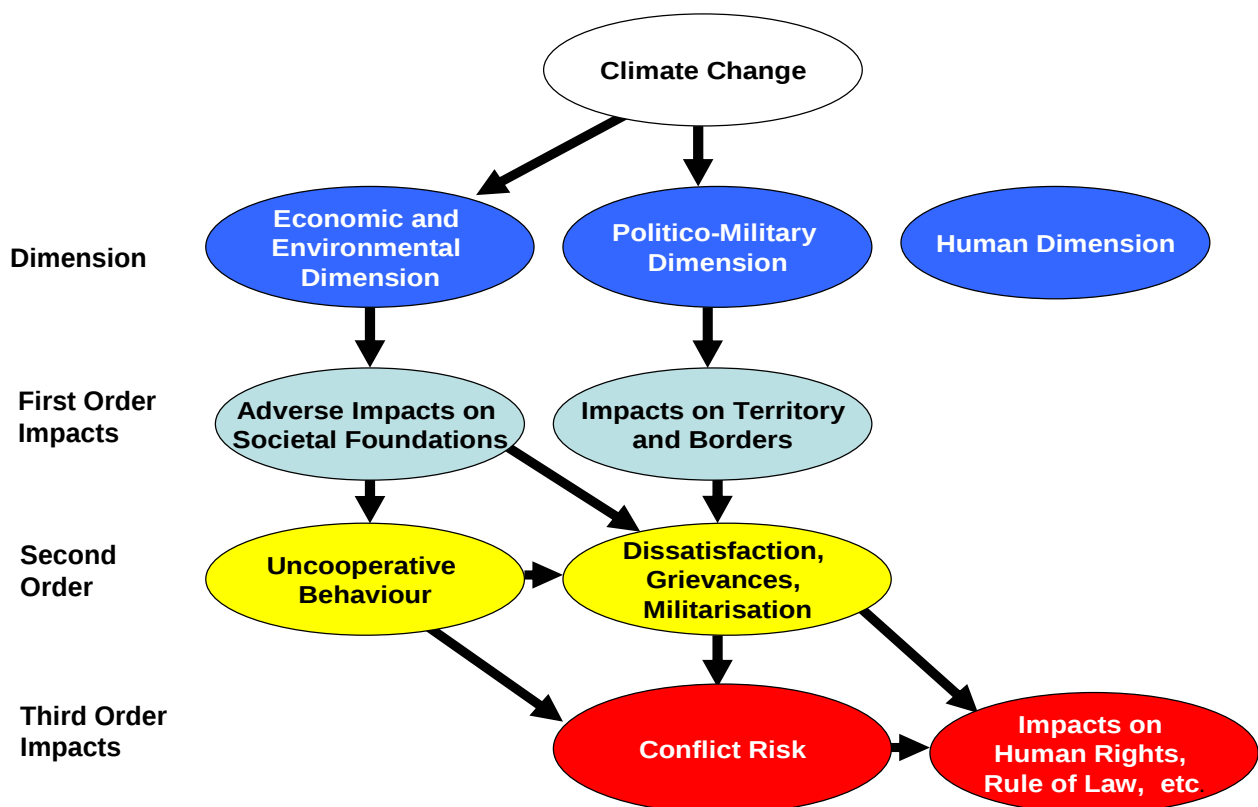


Figure 3: Simplified³⁴ Model of Impacts of Climate Change on OSCE Dimensions

As figure 3 shows, the impacts of climate change will not directly result in insecurity and instability. Instead, **climate change will trigger first and second order effects, which may transform subsequently into hard security risks**. First order impacts can hardly be prevented due to the unavoidable impacts of climate change: Even if global warming can be limited to 2°C above pre-industrial levels, this will have large-scale impacts on Arctic ice, and on food production and water availability in the entire OSCE region. **The aim must be to mitigate first order impacts and in parallel prevent them from triggering second and third order impacts.**

While figure 3 shows general climate change impacts, there will be significant regional differences. These result not only from different climatic impacts, but also from the various interests and capacities

³⁴ For reasons of readability, feedback loops and interactions have been left out from the model.

of the respective states to handle the challenges of climate change. Table 1 summarises the main security implications for each region.

Table 1: Summary of Security Implications on OSCE Regions

Dimension Region	Economic and Environmental Dimension	Politico-Military Dimension	Human Dimension
Arctic	(1) Livelihood Challenges (2) Environmental Degradation (3) Resource Claims (4) Transportation Routes	(1) Territorial Claims (2) Militarisation of the Arctic	(1) Impacts on Indigenous Communities
Southern Mediterranean	(1) Decreasing Water and Food Security (2) Displacement of Large Populations (3) Economic Stagnation or Decline	(1) Militarisation of Water Disputes (2) Weakening of Authorities, Civil Unrest (3) Intensifying Extremism	(1) Violation of Human Rights (2) Impacts on Civil Liberties and Rights
South East and Eastern Europe	(1) Economic Deterioration (2) Energy Insecurity (3) Food Insecurity (4) Population Movements	(1) Ethno-Political Tensions	(1) Social Tensions (2) Authoritarian Governance
South Caucasus and Central Asia	(1) Decrease in Food and Water Availability (2) Disasters and Health Impacts (3) Migration (4) Aral Sea Deterioration	(1) Escalating Tensions over Water (2) Increase in Extremism (3) Disputes over the Caspian Sea	(1) Impacts on Human Rights and Minorities

Beyond the security implications of climate change within the OSCE region, a **set of ancillary dynamics related to climate change may have additional repercussion**. Two major types of dynamics can be distinguished: First, dynamics related to impacts of climate change elsewhere in the world, which may impact the OSCE regions. They include for instance food price hikes due to a global reduction in agricultural outputs or loss of harvests due to disasters. Second, dynamics related to responses to climate change, such as the needed socio-economic transformation to mitigate climate change, uncoordinated adaptation measures, or measures to actively manipulate the climate.

5.2 Recommendations to the OSCE

The potential risks of climate change for human well-being are hardly disputed globally. **Many OSCE participating states have already voiced their concern** regarding the possible security implications of climate change. The OSCE is well placed to address these issues with its **comprehensive approach to security**, the high-level of **inclusiveness**, and to serve as **regional platform for cooperation and dialogue**. Ideally, the threats of climate change can not only be averted, but used as catalyst to improve cooperation between states within the environmental and economic as well as the politico-military dimension. However, a key challenge in addressing these issues will be to **find a balance between the different perspectives** and priorities of participating states. A number of recommendations are outlined below for the political as well as the operational level of the OSCE.

5.2.1 For the Political Level

On the political level, the key aims of the OSCE need to be on the one hand to improve common understanding and knowledge of potential impacts of climate change within participating states. This is a necessary precondition to finding cooperative solutions. Second, the OSCE needs to reach out to other relevant stakeholders, including international organisations as well non-participating states such as China. In particular, the following activities should be considered:

- **Climate Change Survey³⁵:** The different perspectives of OSCE participating states on climate change and its implications need to be gathered. The results of the survey should be used to start a debate within the OSCE on addressing future security challenges induced by climate change with a view to develop a common understanding, norms, and progressive arrangements where necessary.
- **Joint Sessions:** The impacts of climate change will be predominantly within the economic and environmental dimension. Consequently, the topic needs to be discussed continuously within the environment and economic forums of the OSCE. However, due to the interlinkages with politico-military issues, joint sessions between both areas should be considered where appropriate. Thus, a joint session between Forum for Security-Cooperation (FSC) and the Economic and Environmental Forum should be considered.
- **International Partnering:** The OSCE should actively identify and approach organisations and negotiation formats within the assessed regions relevant to coping with the challenges of climate change. This includes for instance the Arctic Council or the Union for the Mediterranean. The extent to which security implications will and can be addressed, and how the OSCE could contribute, must be identified.
- **Approaching non-OSCE Stakeholders:** China is a key emerging political power that borders Central Asia and has also claimed interests in Arctic shipping. Although China is currently not a partner for cooperation of the OSCE, it is necessary to include China into deliberations regarding its immediate neighbours, particularly the Central Asian region. In addition, other key stakeholder, such as Iran – with respect to the South Caucasus, the Caspian Sea and Afghanistan/Central Asia – should be approached where necessary.
- **Follow-up on Bucharest:** The chairmanship conference in Bucharest in 2009 marked the first official OSCE event focusing on climate change and security. The conference was important in raising awareness for the role of the OSCE and bringing a broad range of stakeholders together. As the next years will be critical in preparing for the impacts of climate change and potential security implications, the OSCE should consider holding periodic events on climate change and security. The events should serve as forum to exchange views within the OSCE and highlight specific regional aspects.

5.2.2 For the Operational Level

On the operational level, the key goal must be to assess how the concrete impacts of climate change may translate within a given situation into a security concern. Awareness of the impacts of climate change will be of key importance in mitigating its effects, thus information dissemination on concrete

³⁵ The authors would like to thank Anthonius DeVries for this idea.

impacts and strategies as well as capacity building need to be among the priorities. In particular, the following activities should be considered:

- **Coordination and Cooperation:** The OSCE should actively seek cooperation with other international agencies on the security implications of climate change. Regular consultations with specialised national and international agencies should be considered.
- **Information Dissemination:** The OSCE should contribute at field level in disseminating information on climate change impacts. The OSCE's wide ranging networks of offices, missions and centres should be used to for this. Information must thereby be scaled and tailored to the national, and if possible sub-national, levels and to stakeholder needs. Aside from the OSCE Field Presences, the Aarhus centres play a key role here.
- **Improving Networking and Communication:** As climate change has transboundary and even transregional impacts, it is also necessary to improve cooperation and communication between stakeholders across borders. In particular, adaptation responses to climate change that may have negative effects for other parties need to be avoided. Communication and exchange regarding climate change between OSCE field missions and presences via the Economic and Environmental Officers of the OSCE on climate change and its impacts should be regular.
- **Regional Assessments and Consultation:** The mappings provided in this report can only be a starting point. Further in-depth assessments on regional, national and local levels will be necessary to identify concrete impacts. This requires also consultations with national and local stakeholders, again to develop a common understanding on the threat and the implications of climate change.
- **Capacity Building:** Climate change will make it necessary to revisit current thinking on planning, as it is changing the very context of economic and environmental affairs. It is necessary to train OSCE staff members in the challenges climate change will pose for strategic planning and operations. In particular, training in scenario development and improving the understanding of uncertainties with respect to climate change will be key strategic skills.
- **Climate Change Manual:** A manual for OSCE staff but also for other interested stakeholders should be prepared, on ways in which climate change may impact the OSCE and its three dimensions. Such a manual needs to go beyond the content of this report by providing practical tools on integrating climate change into daily operations.
- **OSCE Climate Centre:** Climate change is a cross-cutting topic which affects all levels and sectors of society. Similar to (or integrated in) the OSCE Academy in Bishkek, the development of an OSCE centre for climate change should be considered. Its main goal should be to provide training and education regarding climate change, as well as conducting research. The climate centre should also serve as a central helpdesk within the OSCE.
- **Expert Advisory Group:** A group of experts with knowledge in the area of climate security and related fields should be assembled. The competencies of the group should be utilised to provide trainings for OSCE staff members, supporting the aforementioned OSCE Climate Centre with regard to research and analysis, as well as providing expert input for strategic decision-making at headquarters and field level. The group could also support the OSCE and EEA in implementing the 2010-2012 project.

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