Climate Change and Security

Three Scenarios for

South West Asia

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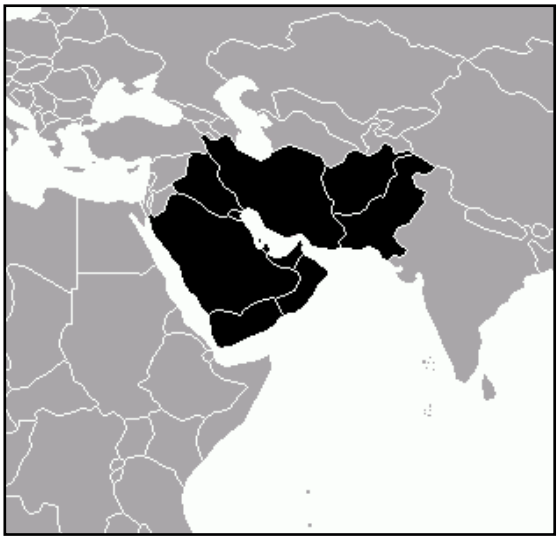
Executive Summary

South West Asia comprises **heterogeneous countries with varying adaptive capacities** to climate change. The region has strong geopolitical relevance and owns large fossil fuel resources which are unequally distributed throughout the region. The populations of South West Asian countries mainly consist of **various ethnic and religious groups**. South West Asia is **ridden by conflict** with tensions and clashes spreading easily across borders. Major conflict areas currently exist in Yemen, Iraq, Pakistan and Afghanistan. **Islamic fundamentalism and terrorism is a threat** to several national governments as well as regional and international security.

Despite the large differences, the South West Asian countries share common challenges such as **water scarcity and rising food insecurity**. All countries in the region experience **large population growth rates** and **increasing urbanisation**. Migration within the region and from the Horn of Africa, as well as internal displacement due to ongoing conflicts, may be **future catalysts for tension**. Fossil fuel is the most important source of revenues. Especially the countries of the Arabian Peninsula, as well as Iraq and Iran, are **highly dependent on oil and gas exploitation**. In other countries, such as Afghanistan and Yemen, the production of narcotics such as **qat and poppy are important economic factors**.

Water is scarce in the arid and semi-arid South West Asian countries. Climate change will **exacerbate water scarcity** as rising temperatures lead to higher evaporation, alter precipitation patterns and river run-offs, and increase the melting of the Himalayan glaciers. Salt water intrusion will furthermore **deteriorate water quality**. Higher temperatures will **worsen conditions for agriculture** as many crops such as wheat have only low resilience to rising temperatures and lower water supply. Throughout the region, climate change will decrease food security and **increase dependency on imports and agricultural investments** abroad.

Extreme weather events such as **droughts and floods will increase in frequency** and threaten infrastructure and human health in South West Asia. Sea level rise poses a major threat to newly recovered lands in the Gulf region as well as to coastal cities such as Karachi, Manama and Abu Dhabi.



South West Asia

As climate change converges with potentially decreasing fossil fuel revenues, this may **trigger social tensions** related to economic stagnation or even downturn in resource-rich countries. Furthermore, climate change may become an **obstacle to reconstructing conflict-ridden countries** in the region. Existing tensions such as the dispute between Pakistan and India over the Kashmir region may **gain new momentum** as climate change alters the basis of existing agreements. New conflicts over scarce resources may rise on the national as well as regional level.

Currently, there are **no programmes tackling climate change explicitly as a security threat**. However, there is a wide range of projects and activities improving water and natural resource management in the region, especially in resource poorer countries such as Yemen, Afghanistan and Pakistan. Efforts are underway to **better understand vulnerabilities** in the countries of the region. Cooperation between the countries of South West Asia is low, but **awareness and joint activities are slowly evolving.**

As rising temperatures will be a major threat to the region, **mainstreaming climate change into**

various activities in the political, economic and scientific realm needs to be fostered. The scientific knowledge on climate change implications is still not sufficient to provide a **sound basis for adaptation measures** and needs to be expanded. Costs of inaction, as well as negative impacts of adaptation measures, require further research. Issues such as water and energy efficiency should be included in the economic development plans of the region. Furthermore, **dialogue and cooperation** between the countries of South West Asia need to be enhanced. It should also be considered how climate change affects **reconstruction efforts** in conflict-ridden countries.

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List of Abbreviations

ADB	Asian Development Bank
AR4	IPCC 4th Assessment Report
ASEAN	Association of South East Asian Nations
CCIS	Climate Change and International Security
EC	European Commission
ENVSEC	Environment and Security Initiative
EU	European Union
GAERC	EU General Affairs and External Relations Council
GCC	Gulf Cooperation Council
IOM	International Organization for Migration
IPCC	Intergovernmental Panel on Climate Change
ISAF	International Security Assistance Force
JRC	EU Joint Research Centre
NATO	North Atlantic Treaty Organization
NGO	Non-Governmental Organization
NWFP	North-West Frontier Province
OPEC	Organization of the Petroleum Exporting Countries
OSCE	Organization for Security and Co-operation in Europe
PSC	Political and Security Policy Committee
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNHCR	United Nations High Commissioner for Refugees

1. Introduction

Climate change is likely to be among the key challenges for international security and stability in the 21st century (EU 2008). The European Union (EU) initiated the EU Process on Climate Change and International Security (CCIS) in response to climate threats. The process commenced with the Joint Paper by High-Representative Solana and Commissioner Ferrero-Waldner in March 2008 (EU 2008a). A progress report was submitted by the European Commission (EC) and the Council Secretariat (SEC) to the General Affairs and External Relations Council (GAERC) in December 2009. Additionally, the United Nations (UN)

As part of EU process, a synopsis of findings of regional studies on climate change and security was produced (Maas/Tänzler 2009). Within the scope of the study, four regions were identified, which have been less researched so far. Based on the synopsis, four additional studies were commissioned by the EC. The purpose of the studies is (1) to provide an overview to the region and likely climate change impacts; (2) outline potential security implications of climate change; and (3) to develop recommendations for the EU's foreign, security and development policy.

The regions are Middle America, South East Asia, South West Asia and the Indian-Pacific Ocean Island States' region. This study focuses on South West Asia which is defined as stretching from the countries of the Arabian Peninsula, namely Saudi Arabia, Yemen, Oman, Kuwait, United Arab Emirates, Qatar and Bahrain, to Iraq, Iran, Pakistan and Afghanistan.

The study focus on the region as a whole; individual countries and sub-national regions will be examined where appropriate. A common structure was defined for all regional studies. It is as follows:

- **Section 1** provides an executive summary on major findings and recommendations.
- **Section 2** provides a regional overview to the region. It will briefly discuss issues of demography and migration, key economic challenges, as well as outline main lines of political and social instability and conflicts in the region.
- **Section 3** summarises the key impacts of climate change on the region.
- **Section 4** outlines potential conflict constellations and scenarios, how climate change may lead to insecurity and instability. These constellations are plausible, yet hypothetical and are based on literature review and expert assessment; more research is needed to improve validity.
- **Section 5** outlines how different stakeholders have already begun to cope with the challenges of climate change for security. The section concludes with recommendations to the EU.

Security is broadly defined in this study. Climate change is best viewed as a threat multiplier, which may create or exacerbate insecurities and tensions from the individual to the international level (EU 2008a). There are a variety of studies categorising and analysing the different channels, pathways and linkages between climate change and insecurity.[1] A key difficulty is the use of the term 'security': Depending on its context and use, it may denote 'hard' (political/military conflicts) or 'soft' (access to food and water) issues. Climate change may impact 'hard' and 'soft' dimensions of security. Also, impacts on one dimension, such as food insecurity, may also have impacts on the other dimension, such as via food riots (cf. Carius et al. 2008). Thus, 'security' is broadly defined within the scope of the studies below. In particular, we will focus on the following aspects:

- **Contributing to violent conflict and disputes** from the local to the international level.
- **Leading to state fragility**, radicalisation and degrading state capacities to implement policies.
- **Degrading human security and livelihoods** via increased risks of disasters, food insecurity, energy poverty and the like.

Regarding climate change impacts, there is emerging consensus that climate change impacts will be far more drastic than assessed in the 4th Assessment Report (AR4) of the Intergovernmental Panel on Climate Change (IPCC). For instance, sea-level rise (SLR) is likely to be twice as high as estimated by the IPCC (Richardson et al. 2009). Also,

1 For a more in-depth discussion on interlinkages between climate change and different definitions of security, see Carius et al. 2008, WBGU 2007, Brown 2009, Smith/Vivikanda 2009, EU 2008.

limiting global warming to 2°C, as intended by the EU and many other states, is already no longer possible: It would require emission cuts within the next decade unlikely to be achieved (Fetzek 2009: 2). Instead, global warming of 4°C (with strong regional variations) by end of the century is currently becoming a more likely scenario (Richardson et al. 2009; Allison et al. 2009). However, a strong uncertainty remains when and how concrete impacts of climate change will manifest. Thus, the studies will focus on the general climate trends already observable within the regions. They will span the period from the present day to 2050 as social, economic and environmental trend estimates are comparatively accurate for this time period, compared with 2050-2100 (cf. Lee 2009). **Methodologically, the studies are based on** desk-based research, interviews with experts and technical workshops held in Bangkok (Thailand) on September 3; Suva (Fiji) on September 10; Quito (Ecuador) on November 4; and Beirut (Lebanon) on November 18. **38 working days have been allocated for each study including research, travel, workshop facilitation and report writing.** Due to regional specificities, the studies slightly vary with regard to their structure and approach.

The studies do not aim to be comprehensive. Analysing potential future developments is always speculative to some degree. The scenarios are thus assumptions about likely relationships between climate change trends and the current regional context. Hence, this study provides an overview to key emerging issues related to climate change and security. More research will be needed to identify concrete national and sub-national hot spots and develop tailored recommendations.

2. Politics, Society, Economy and Environment

South West Asia comprises **heterogeneous countries with varying adaptive capacities** to climate change. The region is **ridden by conflict** and has been the focus of geopolitical interests for the large resources of fossil fuels situated in most South West Asian countries. Major conflict areas currently exist in Yemen, Iraq, Pakistan and Afghanistan with conflict spreading easily across borders. **Terrorism is a major threat** to stability.

Fossil fuel is the most important source of revenues in the region. Especially the countries of the Arabian Peninsula, as well as Iraq and Iran, are **highly dependent on oil and gas exploitation**. In other countries, such as Afghanistan and Yemen, the production of narcotics such as **qat and poppy are important economic factors**.

Despite the large differences between the countries they share common challenges such as **water scarcity and rising food insecurity**. Furthermore, the South West Asia experiences **large population growth rates** and **increasing urbanization**. Migration within the region and from the Horn of Africa as well as internal displacement due to ongoing conflicts may be future catalysts for tension.

2.1. Political stability and security situation

The South West Asian countries are closely intertwined by historical, economic and political ties, yet they display strong heterogeneity. Resource rich countries such as the members of the Gulf Cooperation Council (GCC)[2] have experienced unprecedented economic growth in recent decades due to oil and gas exploitation. They still **depend heavily on fossil fuel revenues** and have managed to provide political stability during the last decades, largely based on the provision of welfare services to their citizens as well as on repressive politics towards oppositional groups. Civil unrest, especially from religious minorities, occasionally erupts in Bahrain and Saudi Arabia. After the presidential elections in 2009, Iran experienced the strongest civil disturbances since the 1979 Iranian Revolution. The country owns the third largest oil and second largest natural gas reserves in the world.

Other countries in the region, such as Yemen, Iraq, Afghanistan and Pakistan, are characterized by **long-time violent conflicts**. As borders cut across ethnic and religious groups and are often merely "virtual" in nature, **conflicts spread easily**: In late 2009, Saudi Arabia got militarily involved into Yemen's internal

2 Namely: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates. Yemen has applied for membership.

struggle as rebel groups crossed the border. Yemen's political stability is heavily under stress from separatist movements and internal conflicts (ICG 2009a). Therefore concerns exist in Saudi Arabia, that a failed Yemen may trigger the influx of terrorists. In Afghanistan and Pakistan, the security situation has rapidly deteriorated over the past years. Insurgency and extremist movements in the two multi-ethnic states challenge security forces and the troops of the International Security Assistance Force (ISAF). The problem of large-scale poppy growth in Afghanistan prevails, although it has decreased considerably in 2008 and 2009 (UNODC 2009).

However, as a major financial source for insurgents and corruption it continues to contribute to the destabilization of the country. Additionally, Afghan poppy growth accounts for 90 percent of the global heroin production (UNODC 2009), with Europe a major destination market. In Iraq, sectarian violence has decreased over the past years. Yet, it may gain new momentum with the gradual withdrawal of the U.S. forces from urban centres. A solution to the territorial disputes between the Kurdish North and the central government is not yet tangible (ICG 2009b). Relations between Iran and Iraq improved after the fall of the Saddam regime, yet unresolved questions continue to exist over border and water-sharing issues.

In Afghanistan, Pakistan, Saudi Arabia and Iraq, **terrorist attacks against the countries' population and authorities**, foreign institutions and troops (in Afghanistan and Iraq) as well as high-end hotels (especially in Pakistan) pose a challenge to regime stability. The ongoing conflict with India over the Kashmir region adds to the domestic struggles within Pakistan and further challenges the regime's authority. Furthermore, **tensions exist over regional hegemony** between Iran and Saudi Arabia.

2.2. Socio-economic trends

The existing security challenges on the basis of territorial, political, tribal and ethno-religious frictions within and between the countries converge with a range of social, demographic, economic and ecological trends. South West Asia has **one of the largest population growth rates in the world.** In

several countries, population will nearly double within the next 40 years; Afghanistan's population is estimated to rise from 24.5 million in 2005 to nearly 74 million in 2050 if present trends continue (UNPD 2008, see Table 4). Pakistan, the most populous country in the region, has currently approximately 180 million inhabitants and is likely to reach more than 335 million by 2050 (UNPD 2008). This rapid increase results from high birth rates, increasing life expectancy and the influx of labour migrants especially to the GCC countries. In addition to its equally escalating population, Yemen experiences an **influx of refugees from Somalia and Ethiopia**, which put further stress on the country. The UN High-Commission on Refugees (UNHCR) estimated that in 2008 alone 50,000 Somali refugees crossing the Gulf of Aden reached Yemen (Russo 2009).

Country	Estimated 2010 population (thousands)	Estimated 2050 population (thousands)	2005 share of population under 15 years (%)	Rate of Urbanization (%)
Afghanistan	29,117	73,938	46.8	22.9
Bahrain	807	1,277	27.5	88.4
Iran	75,078	96,975	26.4	66.9
Iraq	31,467	63,995	41.8	66.9
Kuwait	3,051	5,240	23.8	98.3
Oman	2,905	4,878	33.9	71.5
Pakistan	184,753	335,195	38.5	34.9
Qatar	1,508	2,316	17.9	95.4
Saudi Arabia	26,246	43,658	34.5	81.0
United Arab Emirates	4,707	8,253	19.6	77.7
Yemen	24,256	53,689	45.7	28.9

Table 1: Population Trends in South West Asia. Source: UNPD 2007; UNPD 2008.

Unemployment rates especially among the young populations in South West Asia are high and likely to increase as diversified productive sectors are slow to emerge compared to the vast population growth. Ongoing conflicts in many of the region's countries as well as structural constraints in the economies of the major oil and gas exporting countries hinder economic development. Resolving labour market problems in the whole region is therefore a major challenge regarding poverty reduction, improving living standards and regime stability.

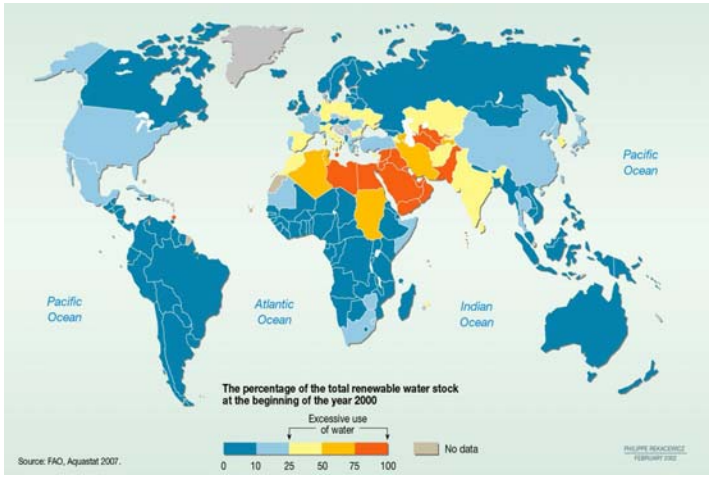
The **degree of urbanisation in the South West Asian countries varies** considerably. In the income-rich countries of the Arabian Peninsula, as well as Iraq and Iran, 67 to over 98 percent of the population live in cities (UNPD 2007). Urbanization in these countries mainly followed the development of the states' fossil fuel sectors and the oil boom in the 1970s and 1980s, matching the vast population growth. Countries with low natural oil and gas resources such as Yemen, Pakistan and Afghanistan show a significantly lower urbanization rate, only about 23 to 35 percent (UNPD 2007). In these countries however, there is a continuous and strong movement from rural areas to urban centres. Annual urban growth rates range between 2.82 percent in Pakistan and 5.43 percent in Afghanistan for the period of 2000-2005 (UNPD 2007).

Energy demand is rising quickly in South West Asia as populations, mobility and industrial consumption increase. Preserving energy security led many countries, such as the GCC members, Iraq, and Iran to consider **renewable and nuclear energy as alternatives** for electricity production. However, Iran's advanced nuclear program has raised wide concern within the international community and the neighbouring Arab Gulf countries. Large potentials of energy efficiency are currently not utilized in the South West Asian countries. Yet, it is inevitable, that they will have to enhance their productive capacities and energy efficiency to meet their growing domestic energy demand.

Rapid urbanisation and high population growth leave many cities unable to cope with the influx of new inhabitants. Where new suburbs emerge, social, health and environmental problems aggravate. Informal settlements are often poorly connected to water and sanitation systems, lack schools and hospitals, and are particularly vulnerable to natural catastrophes such as flooding and earthquakes (IRIN 2009). Afghanistan's capital Kabul, for example, has grown significantly over the past decade and is now home to over five-million people, approximately 75 percent of them living in informal settlements (Ibid.).

2.3. Ecological development

Eco-systems throughout South West Asia are under heavy stress from population growth, unsustainable industrial and agricultural development. **Eco-systems throughout South West Asia are under heavy stress** from population growth, unsustainable industrial and agricultural development. In countries with ongoing or past military conflicts, war remnants threaten environment and human health. Deliberate destruction is another reason behind environmental damages: Under Saddam Hussein the Mesopotamian Marshes, a unique wetland eco-system, were nearly completely dried out, with disastrous implications for biodiversity and people's livelihoods (UNEP 2007). Arable land and rangelands in South West Asia also suffer from degradation due to **overgrazing, salinisation and desertification.**



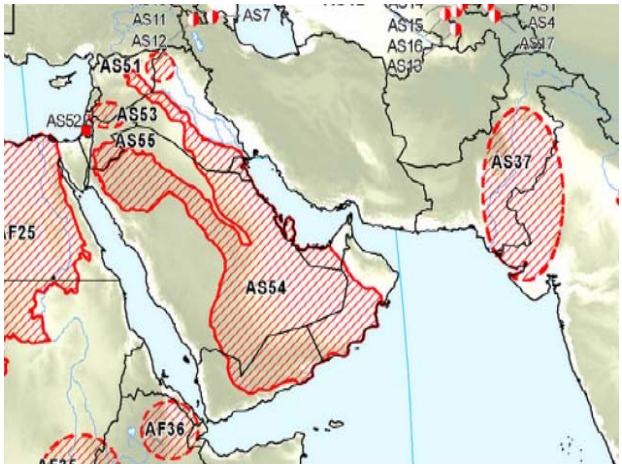
Map 1: Percentage of total renewable water stock at the beginning of the year 2000. Source: FAO, Aquastat 2007.

Water is unevenly distributed among countries and regions in South West Asia (Bates et al. 2008). Most countries have low surface fresh water resources and heavily rely on deep, often non-renewable aquifers that are often shared with neighbouring countries.

This is especially the case on the Arabian Peninsula with its far-reaching system of transboundary aquifers (IGRAC, UNESCO 2009). There has been already some tension between Saudi Arabia and Jordan over

Map 2: Transboundary aquifers in South West Asia 2009. Source: IGRAC, UNESCO, WMO 2009.

the Disi aquifer; as water resources deplete,



transboundary aquifers may become a source of further contention in the region.

Water is wasted in large quantities through **inefficient irrigation systems** and polluted by the lack of waste water treatment as well as industrial and communal waste. In Pakistan, for example, more than 95 percent of the country's freshwater resources are used for irrigation (Bhatti et al. 2009). Water shortage adds to the fragile situation in the region's trouble spots Yemen, Iraq and Afghanistan. Yemen's capital Sana'a may likely become the first capital to be abandoned due to water scarcity (Johnsen, Boucek 2009); in Iraq, an **unprecedented drought fuelled tensions** between local tribes (Aswat al-Iraq 2009) and may contribute to existing tensions between the national Iraqi government and the Kurdish North in the future (ICG 2009c).

Closely linked to water shortage is the question of **food security**. In Yemen, Pakistan and Afghanistan, agriculture contributes significantly to sustaining people's livelihoods and is a major source of employment: In Afghanistan more than 70 percent of the labour force is employed in the agricultural sector (ADB 2003). In Pakistan, it provides a living to 66 percent of the population and employs over 43 percent of the total labour force (Ahmad et al. 2008).

In Yemen, the agriculture contributes to the livelihoods of two thirds of the Yemeni population and employs more than half of the total labour force (EC 2007c). These countries are especially vulnerable to water shortages and external shocks such as rising global food prices.

The 2008 food crisis highlighted the **varying vulnerability and adaptive capacities** in the region. Afghanistan, Pakistan and Yemen were severely hit by the increase in food prices, and depended largely upon foreign aid to endure the crisis (cf. IRIN 2008, USAID 2009). On the contrary, GCC countries were capable of putting into place subsidies, allowances, public sector wage increases, and rent caps to cope with food inflation (Woertz et al. 2008a). Their dependency on food imports and exposure to volatile global food prices has increasingly led the gulf countries to invest in agricultural land in African and Central Asian countries (Woertz et al. 2008b).

3. Climate Change Trends and Impacts

Climate change will **exacerbate water scarcity** in the region as rising temperatures lead to higher evaporation, alter precipitation patterns and river run-off, and increase the melting of the Himalayan glaciers. Higher consumption of water from growing populations, as well as increased demand for cooling and power generating will aggravate water shortages. Decreasing river run-off and salt water intrusion will **deteriorate water quality** in the region.

Higher temperatures will furthermore **worsen conditions for agriculture** as many crops such as wheat have only low resilience to further rising temperatures and lower water supply. This may for instance foster the growth of poppy and other non-food crops that show higher resilience towards climatic changes. Overall, climate change will increase food insecurity in the region and make it **more dependent on imports and agricultural investments** abroad.

Extreme weather events such as **droughts and floods will increase in frequency** and threaten infrastructure and human health in the region. Sea level rise poses a major threat to newly recovered lands in the Gulf region as well as coastal cities throughout the region. Furthermore, power generation may suffer from decreased river run-off and overheating, and may lead to **shortages in energy supply** throughout the region

Water scarcity is already a matter of fact in most countries of the region and will likely be exacerbated by rising temperatures. Estimates indicate that in Asia the area-averaged annual mean rise in temperature will be about 3°C by 2050 (cf. Lal et al. 2001) and therefore exceed the global average. Rising temperatures heavily affect the water balance in South West Asia as they **alter precipitation patterns and quantities** and may change seasonal rainfalls such as the Monsoon (Pakistan 2003, ADB 2009). Although estimates vary, it can be generally stated that areas with low rain- and snowfall are likely to face further decreases in precipitation. This will contribute to the depletion of ground water aquifers, decrease run-off from rivers and turn perennial rivers into seasonal ones. Higher temperatures additionally aggravate evaporation and lead to a decline in soil humidity, further adding to **soil degradation and desertification** (cf. Michel 2009, Islamic Republic of Iran 2003).

Rising temperatures may furthermore significantly **decrease the Himalayan glaciers** which may adversely affect Pakistan's water regime. The country has a total glaciated territory of nearly 17,000 square kilometres (Jilani et al. 2007). For a few decades, rivers that are fed by the glaciers could experience summer swells due to increased melting, followed by a decrease in run-off as glaciers gradually retreat (Kelkar/Bhadwal 2007). Additionally, glacier retreat leads to the creation of melt water lakes, which may overflow and create heavy flooding (Bajracharya 2007: 113 et seq.; Jilani 2007). Water scarcity in the region is amplified as higher temperatures, less precipitation, and increased evaporation do not only exhaust water resources but also **raise the demand and consumption** of water for irrigation and as coolant for industrial facilities (Bates et al. 2008).

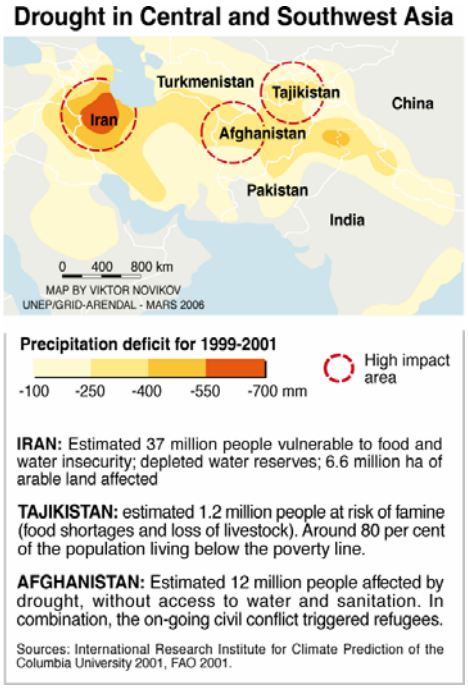
Furthermore, flooding and salt water intrusion deteriorates water quality and cause further decline in the quantity of fresh water (Ibid.). For example, more than half of Bahrain's groundwater reserves have already been lost due to salinisation from sea water intrusion (Kingdom of Bahrain 2005). Yemen, Iran, Pakistan, Saudi Arabia, and other small Arab Gulf countries face the same problem. Water scarcity will have a comprehensive impact on the South West Asian countries. It puts more stress on already fragile and vulnerable political situations and **may hinder the economic development** of the region. As the region has many transboundary rivers, the potential for conflict between states over fading water resources cannot be excluded.

Shortages in energy supply are likely to occur as climate change related declines in river run-off will affect thermal power and hydropower plants (Islamic Republic of Iran 2003). At the same time, demand for electricity is expected to rise as there will be an increased need for electricity to run pumps and cooling devices as the region heats up.

Declining availability and quality of water as well as rising temperatures have **negative effects on human health** as they foster the spread of infectious diseases such as malaria (IPCC 2007). Heat waves, lowered air quality and natural disasters are further threats to human health in the region. Studies indicate that especially children in developing countries that will be most affected by climate change, belong to a high risk group for negative health impacts of climate change (Akachi et al. 2009). The very young South West Asian populations with their high birth rates are therefore especially vulnerable towards climate change implications harmful to health.

Aside from water scarcity, rising temperatures **diminish agricultural productivity** and lead to food insecurity as they render conditions for breeding livestock and crop growing unfavourable (IPCC 2007; Islamic Republic of Iran 2003). Studies indicate that many crops such as wheat and rice are highly vulnerable towards reduced water availability and increases in temperature (cf. IFPRI 2009; IPCC 2007). Sustaining these crops would increase water scarcity even further as it requires extensive irrigation to compensate for low precipitation, high temperatures and evaporation. On the contrary, non-food crops, such as the **poppy in Afghanistan**, have proven to be **more resilient to increasing temperatures** and capricious weather (Savage et al. 2009). In Yemen qat, a mild narcotic consumed by about 75 percent of Yemen's male population, proved to be more resilient than other crops, thus aggravating Yemen's water crisis: Its productivity increases proportionally with the amount of water used, which is why it is often subject to over-irrigation (Boucek 2009).

As shifts in precipitation patterns go along with changes in cloudiness, wind velocities, and evaporation, they will likely cause **extreme weather events.** On the one hand, the frequency and intensity of heavy rainfall and storms are expected to increase in the future (cf. UAE 2006). On the other hand, the same holds true for droughts and heat waves caused by the extreme absence of precipitation (Bates et al. 2008). Both extremes result in loss of lives, damages to infrastructures, crops and arable land from landslides, flash floods, increased soil degradation and desertification. In South West Asia these effects have already manifested: Yemen observed increased



Map 3: Drought in Central and Southwest Asia. Source: FAO 2001.

flooding during 2005-2008 (Yemen 2009). Pakistan witnessed serious flooding and landslides in its Northern part due to heavy monsoon rains in 2006 as well as in Southern Pakistan in 2009. **Vulnerability to sea level rise differs largely** among South West Asian countries, although all, with the exception of Afghanistan, share minor or major coastlines. Possible implications depend on the proximity of settlements and infrastructure to the coast as well as the state of major ground water aquifers. Rising sea level for example decreases the coastal drainage area and makes coastal sites more vulnerable to flooding from heavy rainfall. Pakistan's largest city, Karachi, home to 10 percent of the country's population and 40 percent of its manufacturing units, will very likely be affected in such way (Pakistan 2003; Carius et al. 2008). In the Persian Gulf area, sea level rise threatens the existing infrastructure and newly recovered land of the Arab sheikdoms in particular (cf. Kingdom of Bahrain 2005; UAE 2006; Raouf 2008).

Water scarcity, natural disasters, and eroding livelihoods may **trigger migration** especially from rural areas to urban centres, putting further stress on existing infrastructure and services. Thus, migration will not only occur within the countries of South West Asia but also across borders. Mutual migration

between countries with rather virtual or porous borders, such as between the North Western Frontier Territory of Pakistan and Afghanistan, has always existed. It enabled people to move to other places in case of temporal scarcities in natural resources. General deterioration of livelihoods could thus trigger conflicts between migrants and receiving communities (cf. WBGU 2007). Migration trends additionally **converge with existing tensions and security challenges** as in the case of Yemen and Saudi Arabia as well as Afghanistan and Pakistan.

4. Risk Analysis and Scenarios

The countries in South West Asia have **varying adaptive capacities** to cope with climate change. Especially Iran and the countries of the Arabian Peninsula depend heavily on oil revenues, which are likely to decline in a few decades. Along with climate change this may **trigger social tensions** related to economic stagnation or even downturn.

The conflict-ridden countries in the region may face climate change as an **obstacle to reconstruction**. Coping with climate change effects could overburden the already weakened governments and lead to **further destabilisation** of conflict areas.

Existing tensions may **gain new momentum** as climate change alters the basis of formerly settled water sharing agreements. New forms of violence, for instance an increase in terrorist attacks, may lead to a further **deterioration of the relation** between both countries and lead to an escalation of violence in the region.

Awareness of climate change risks is low in South West Asia, although there are a few countries, such as Iran[3] and the United Arab Emirates, where climate change is gaining increasing attention. Regional cooperation to tackle common challenges is in its beginnings.[4] In the realm of the Arab League, there are some joint activities underway (see also next chapter).

Lacking regional cooperation is most visible – and risky – in the case of water sharing. Currently, there **are no effective agreements** in place that regulate sharing of water sources and transboundary wetlands in the region. For example, the 1960 Indus Waters Treaty with India divides the water of the Indus and five tributaries between the two countries. Pakistan's water supply relies heavily on the Indus River and its tributaries, most of them sourcing in the Himalayan glaciers. Lately, the agreement has come under pressure and it seems likely that it will not be able to address well enough the challenges of climate change. This is especially true as the climate change induced melting of the Himalayan glaciers is altering the hydrologic basis of the agreement.

Furthermore, access to water may likely be used as a tool to enforce political interests in the region, given the existing political and ethno-religious cleavages (cf. Abdel Hamid 2009: 50). In the case of the India-Pakistan conflict, the **water issues have become a new justification of terrorist acts** by extremist groups (cf. Renard 2008; Swami 2008).[5] Cross-border migration as a result of water shortages and declining food production will further contribute to tensions in South West Asia.

Capacities to cope with climate change vary within the region. The resource rich OPEC member states own the financial means to buffer adverse climate change impacts, such as rising food prices, destruction of infrastructure etc. However, they have not yet introduced major changes to their economic structures and policies for becoming more resilient to climate change effects and contributing to mitigation. Resource poor and conflict-ridden countries in the region will likely **become more dependent on outside aid** as they lack the ability to counter climate change impacts by distributing financial means for

3 Interview UNEP expert on August on 6 August 2009.

4 Interview with expert from IISD on 5 August 2009; UNEP expert on 6 August 2009; UNEP expert on Post-Conflict and Disaster Management on 13 August 2009 and expert from University of California, Irvine on 22 September 2009.

5 Interview with expert from University of California, Irvine on 22 September 2009.

instance to comprehensive adaptation programmes or the stabilization of food and energy prices.

Adverse effects may result from adaptation strategies to climate change. The construction of dams on the upper Euphrates and Tigris Rivers already led to tensions between Iraq and its up-stream neighbours Iran, Syria and Turkey.[6] Furthermore, as energy demand will rise, partly due to increasing temperatures, the **usage of nuclear power** may gain additional momentum. Nuclear energy is already an option for many South West Asian countries and higher energy demand for cooling and water desalinisation may drive plans for nuclear power plants forward. This may **decrease regional stability** as nuclear energy is closely linked to issues such as proliferation and the threat of developing nuclear weapons. Especially the countries of the GCC view the Iranian **nuclear program as a security threat** and expressed their concerns that Iran may build up a nuclear weapons arsenal. An arms race in the region is a possible scenario in case the international community cannot prevent Iran from developing a military nuclear program (Stracke 2008). A nuclear military strike in the region would then have severe implications far beyond South West Asia. Furthermore, Arab Gulf States perceive Iran's nuclear power generation programme as a risk of ecological disasters in the region (Khaitous 2008).

There is also a strong trend among the GCC countries towards **investing in agricultural land abroad** for domestic food security purposes. However, this practice may create other insecurities as it exacerbates food shortages and **raises tensions in the producing countries** (cf. Woertz et al. 2008b; Grain 2008). Furthermore, securitisation of food production could occur. Already, Pakistan offered foreign investors one million acres of farmland for lease or sale and assured to protect it by special security forces (Bakr 2009). Another adaptation strategy with rather adverse effects is the **growth of climate resilient crops** such as poppy to gain higher incomes as climate change renders other crops less productive. Thus, displacing food crops contributes to food insecurity and perpetuates the financing of insurgencies.

Heterogeneities, tensions, and ongoing conflicts in South West Asia, leading to varying adaptive capacities, provide for a **multitude of scenarios on the security implications** of climate change in the region. Below three scenarios outline how climate change may affect stability and security in the region. They are based on the findings above and each begins with a set of "key assumptions" on factors that are either already present today or which will likely be further aggravated in the future by climate change. While the scenarios have been analytically distinguished, they may well occur simultaneously or become interlinked. Also, the focus of the scenarios outlined below is on potential security implications, meaning how the adverse impacts of climate change will act on different dimensions of security if left unaddressed.

It should be noted that violent conflict as an immediate result of the effects of climate change seems very unlikely. However, there exist in some countries long standing underlying inequalities and threats to stability, where climate change and disasters could act as triggers for violent expressions of discontent.

The focus of the scenarios is on possible worst case developments, which need to be avoided. Additional scenarios will be necessary to develop to identify policy pathways in preventing climate-induced crisis. The scenarios below could serve as an input to this, but would require expansion.

4.1 Economic decline and stagnation in resource rich-countries

Key Assumptions

- The chance for turning to a sustainable and more climate resilient economic model was missed.
- Depletion of natural resources such as water and arable land exerts heavy stress on the South West Asia countries.
- Coping with climate change implications binds large financial resources straining even the budgets of oil exporting countries.

6 Interview with expert on Post-Conflict and Disaster Management on 13 August 2009.

- Climate change converging with a decrease in fossil fuel revenues leads to an economic downturn in South West Asia.

The economies of the resource rich South West Asian countries are largely dependent on fossil fuel exports. Many GCC members have started to diversify their economies, for example by developing the financial sector, real estate, and tourism industries. However, due to the dominance of the fossil fuel sector, high bureaucracy and a capacious state sector, diversification and privatisation generally proceed only slowly (cf. Saif 2009). Small, highly specialised industries are developing, such as aqua culture production in Saudi Arabia (Shafi 2009), but their share in exports and job creation remains low.

The scenario is based on the assumption, that despite increased investments in sustainable and low-emission projects such as Masdar City in Abu Dhabi, the resource rich countries in South West Asia miss the opportunity to turn to a more sustainable and climate resilient economy. Tourism is highly vulnerable to increasing temperatures (cf. AFED 2009). Land recovery and construction of artificial islands for high-end real estate is prone to inundation as sea level rises with climate change. The financial industry – as the financial crisis 2008 proved – is highly volatile and may react sharply to external effects. Creating a sound economy aside from the fossil fuel sector is therefore a major challenge for the South West Asian countries, in terms of coping with unemployment, maintaining living standards and enhancing social development.

Climate change is putting heavy stress on the South West Asian countries as it leads to further deterioration of water and air quality, increased water stress, as well as extreme weather events such as heat waves and droughts. Higher investments in adaptation become necessary on a broad range, including infrastructure, sanitation systems, energy supply, health care systems, and so on. For example, as non-renewable ground water aquifers deplete further and fresh surface water decreases, imports of potable water, waste water treatment and the application of desalinisation plants increase. Yet, there are limits to technical adaptations to climate change, as for example treated waste water has only limited use and water desalinisation entails a range of negative environmental impacts (Al Zubari 2009).

Resource pressure and the need for large investments in adaptation measures strain the budgets of the resource rich countries, unless they turn combating adverse climate change effects into a business case. The situation aggravates as oil revenues decrease due to the depletion of fossil fuel resources and the rise of new energy efficient technologies and alternative energy resources. It is predicted that fossil fuels will continue to play a major role in the OPEC member states' economies until 2030. However, its overall share in satisfying world energy needs will fall (OPEC 2009), which will likely lead to a decrease in revenues from fossil fuel export. The process becomes accelerated when China and other major emitters implement a low-carbon growth model. China has already developed plans for doing so as early as 2020 (Fu 2009).

Climate change converging with lower fossil fuel revenues therefore leads to economic stagnation or even downturn. Even individual countries in the region that do well on diversification and creation of non-oil productive sectors are adversely affected by a general economic downturn in the region. Social pressure mounts as the economies of the GCC members remain poorly diversified and prove unable to provide employment opportunities to the growing, well educated population. Domestic tensions result from such developments. Especially in countries such as Bahrain and Saudi Arabia, with large ethno-religious minorities, social unrest becomes likely.

Furthermore, most Arab Gulf countries host a large pool of migrant labourers. This group is especially vulnerable to social tensions and to government strategies implemented to relieve resource pressures. Arab Gulf countries decide to expel migrant labours, which heavily affects their home countries that are mostly highly dependent on migrant remittances. An economic crisis in the Gulf therefore easily spreads to India, Pakistan, Bangladesh and a wide range of Arab countries where migrant labourers come from.

4.2 Arresting Instability in Conflict Areas

Key Assumptions

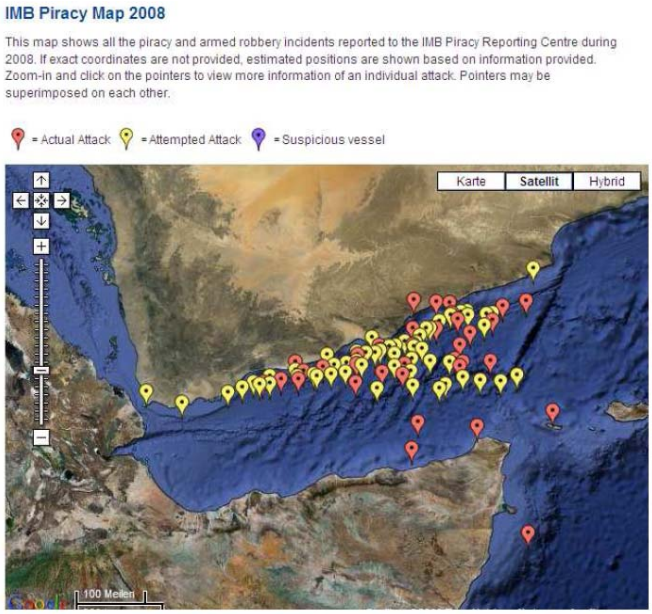
- Climate change overburdens the adaptive capacities of already weakened governments.
- Shortages in water, food and energy supply create tensions and public discontent and challenge governments' legitimacy.
- Lacking regional cooperation aggravates the situation; the conflict areas become more dependent on outside aid.
- The countries destabilise further and pose security risks also to their neighbouring countries.

In the region's conflict areas in Afghanistan, Pakistan, Iraq and Yemen, climate change and especially water scarcity pose severe hardships to the population. Government authorities are challenged to find suitable responses for dealing with adverse climate change impacts. The agricultural sector – the economic backbone especially in Pakistan, Yemen and Afghanistan – experiences productivity losses. Food insecurity will overall rise. Extreme weather events such as droughts and floods hit these countries especially hard as their infrastructure is already damaged from wars and conflicts. Reconstruction efforts are jeopardized, and health care systems are further stressed by the adverse effects of climate change on human health.

Coping with reconstruction, potential internal tensions, and adverse climate change impacts overburden the governments of the conflict-ridden countries. Except for Iraq none of them has high natural resources comparable to those of the main oil and gas exporting countries in the region. Yemen's oil reserves, a major source of revenues, are running out. Iraq has not yet reached its pre-war productive capacities. Existing revenues are not sufficient to provide enough financial means to cope with climate change effects.

Water, which is becoming a main issue in all of these countries, gets politicised leading to further destabilisation. Internal pressure on the governments to solve water issues increases and as governments fail to offer solutions their authority is challenged. Water conflicts within countries arise along ethno-religious and tribal frictions. Iraq in particular is vulnerable to such developments as its population consists of various segments that struggle over political power and territorial hegemony. Besides, neighbouring countries such as Syria, Turkey and Iran – all of them upstream countries of rivers flowing into Iran – play the "water card" to influence political developments in that country (cf. Bitterlemons-International.org 2009).

The lack of regional cooperation aggravates the situation for downstream countries such as Iraq and Pakistan. As there are no effective water sharing agreements in place – and comprehensive treaties seem unlikely in the near future – tensions over water



Map 4: Piracy and armed robbery incidents during 2008. Source: IMB Piracy Reporting Center 2008.

becomes more frequent between riparians and further weakens countries such as Iraq and Pakistan.

Armed conflicts are unlikely due to the continued presence of foreign troops and lacking local capacities. However, this may change for instance if foreign troops withdraw from conflict areas.

As a result of climate change impacts and lacking regional cooperation, the conflict-ridden countries remain largely dependent on foreign aid and cannot develop capacities to free them from the development trap they are in (cf. Collier 2007). They fall short of becoming strong economic partners to

the other South West Asian countries for a long period of time

The failures described above thus put the whole region's security at risk. Influx of migrants into neighbouring countries such as Iran and the GCC member states create social tensions (cf. WBGU 2007). In addition, as Yemen for example becomes a failed state, security in the Gulf of Aden, an important shipping route, decreases heavily as piracy from the Yemeni coastlines becomes a new feature in the region (Middleton 2008). The revenues gained by piracy fund the emerging "regime" and conflicts in Yemen similar to Somalia. As the Gulf of Aden becomes even more dangerous, global trade will be negatively impacted and alternate routes, such as through the Arctic, may become more relevant.

4.3 India and Pakistan – New Turns on Old Conflicts?

Key Assumptions

- Current agreements regulating water sharing between the South West Asian countries are inefficient in coping with climate change.
- Especially in the case of India and Pakistan, water sharing will need a new basis due to the melting of the Himalayan glaciers.
- Existing tensions may gain new momentum due to climate change implications and their effects on existing water regimes.
- New forms of conflict may develop under the impacts of climate change.

This scenario is based on the assumption that the Indus Water Treaty negotiated between India and Pakistan in 1960 falls short of providing a framework for water sharing under the challenges of climate change. It served well the provision of water resources to Pakistan by regulating the use of the Indus and its tributaries; yet, it has come increasingly under pressure in the past years. Furthermore, the treaty did not develop means of cooperation over water issue between the two countries – it merely divided the existing water resources.[7]

The treaty is challenged under climate change as rising temperatures likely alter the hydrological basis on which the agreement was made. For its water supply, Pakistan is heavily dependent on the Indus and its tributaries for water supply. These rivers are fed by the Himalayan glaciers. It is estimated that they may experience strong variation in their run-off due to accelerated melting and gradual glacial retreat. India's Northern Provinces experience water stress as well and domestic conflict increases as an outcome of climate change (NIC 2009). Under these conditions, the conflict between the two nuclear powers Pakistan and India over the Jammu and Kashmir provinces gains new momentum.

Water has initially been an important issue in the Kashmir conflict (Singh 2008). With Pakistan's central government coming under stress for its inability to provide a solution to the water problem, aggressive rhetoric towards India increases and the Kashmir conflict gets increasingly attached to the question of water security.[8] With both countries' governments domestically challenged to provide more water for its impoverished, water lacking provinces, and with long histories of enmity regarding Kashmir, neither is likely to cede a single drop.

As the issue remains unresolved for a longer period of time, new violent forms of expressing dissent may evolve. In the past, terrorist groups have already justified their attacks on India by that country's water policy towards Pakistan (cf. Shafi 2009). Given the increased water stress in Pakistan and the internal struggle against the insurgency in its North Western Frontier Territory, the number of attacks on India rises. India comes under increasing domestic pressure to prevent such attacks, elevating the risk of violent conflict between both countries.

[7] Interview with expert from University of Vermont, 27 July 2009.

[8] Interview with expert from University of Vermont, 27 July 2009.

4.4 Conclusion

The above-mentioned scenarios reflect only plausible speculations based on existing trends and knowledge. Their intention is to outline how climate change could impact the region and interface with existing threats of instability. Reviewing these threats it becomes clear that violent conflict in South West Asia may first and foremost be related to water scarcity exacerbated by climate change. Furthermore, deteriorating livelihoods and economic downturn and stagnation may challenge governments' authority in the region and – where other factors such as ethno-religious frictions or existing tensions converge – may trigger violent conflict. In the conflict-ridden countries of the region, climate change could also foil reconstruction efforts and lead to prolonging the unstable situations in these countries or even further destabilise them. The **pathway for a climate change induced crisis** in the region – along with low regional cooperation and deteriorating natural resources – leads to increasing tensions and eventually to the outbreak of violent conflicts. If outside actions are missing – either to relieve resource scarcity or to provide mediation – this scenario becomes very likely for the region.

5. Recommendations

Currently, there exist **no activities tackling climate change explicitly as a security threat**. However, there is a wide range of projects and activities improving water and natural resource management in the region, especially in the region's resource poor countries. Cooperation between the South West Asian countries is low, but **awareness towards climate change and joint activities** are slowly evolving.

As climate change will be a major threat to the region, **mainstreaming it into various activities** in the political, economic and scientific realm is necessary. The scientific knowledge on climate change implications is still not sufficient to provide a **sound basis for adaptation measures**. The costs of inaction should be further researched as well as the negative impacts of adaptation measures.

Climate change and related issues such as water efficiency should be **included in the economic development** of the region. **No-regret measures** enhancing sustainability and resource efficiency should be implemented on a broader basis. Furthermore, **dialogue and cooperation** between the countries of South West Asia need to be enhanced. Repairing countries should consider climate change impacts in their **reconstruction efforts**.

Climate change will affect the countries of South West Asia in three major ways: 1) acting as a **threat multiplier** in the ethno-religious heterogeneous and already conflict-ridden region, 2) **hindering economic development** and leading to contracting economies throughout the region, and 3) **spurring new conflicts** between or within countries and exacerbating already existing tensions.

A **scenario to prevent such developments** would require early action to identify key hot spots in the region and the development of adequate, conflict-sensitive adaptation measures. Sustainability and resource efficiency should be at the heart of the economic development of the region as well as the exploitation of comparative advantages such as the potential for solar power generation. Not only climate change, but also the decline in oil revenues should be considered in the future development of the region.

Many of these issues are already integral parts of programmes and projects of different actors in the region: The European Commission has developed country strategy papers for Afghanistan, Yemen and Pakistan for the period of 2007 to 2013. The **EC tackles important topics**, such as rural development, environmental and water management issues, good governance, food security and poverty reduction. In its country strategy papers for Pakistan and Yemen, the EC explicitly **alludes to the risk of conflicts** and instability due to diminishing water resources (EC 2007b). As for Pakistan, high priority is therefore given to rural development and natural resource management in the North Western Frontier Province (NWFP) and Balochistan (EC 2007b).

Regarding Yemen the activities of the EC center on poverty reduction including food security. However, EU member states such as Germany and the Netherlands engage in the development and improvement of the water sector (EC 2007c). Rural development is also a focal point of EC engagement in Afghanistan (EC 2007a).

The **UN plays a major role in the reconstruction** of the region's trouble spots Iraq, Afghanistan and Yemen, but without tackling issues under a climate change and security perspective. Thus, in late 2009, the UN and the specialised agencies and Member States of the League of Arab States agreed to conduct a **regional vulnerability assessment** focussing on the impact of climate change on water resources. Part of the assessment will include identifying hot spot areas and providing a better understanding of the socio-economic implications of climate change. Other donors in the region's trouble spots include among others the World Bank, the Asian Development Bank, the UK Department for International Development, and the World Food Programme. They provide assistance in rural development as well as energy and natural resource management.

In the South West Asian countries, awareness towards climate change implications is still low, but gradually on the rise. The decline of water resources – and linked to that the issue of food insecurity – are at the centre of attention. However, these concerns do not transform into a **general perception of climate change as a security threat**. In the joint "Arab Ministerial Declaration on Climate Change" (League of Arab States 2007), the Arab ministers responsible for the environment stated the urgent need and their willingness to react to climate change by fostering sustainable economic practices, scientific research and risk reduction measures. Yet, the declaration did not allude to security implications of climate change. Most countries, especially those ridden by internal conflicts, focus on other priority areas. Yet, climate change is understood as a **threat to economic development**, particularly by the oil exporting countries in the region. They point out to adverse effects on their economies through mitigation measures leading to a decline in oil demand. Therefore, these countries are in favour of a cleaner use of fossil fuels and technologies such as carbon capture and storage (CCS) (cf. OPEC 2006).

Within the debate on **climate change and security on the UN level**, aside from Pakistan and Oman, no other South West Asian country has agreed to make their contributions to the UN Secretary General's report on climate change and security public. However, in its speech at the 64th session of the United Nations General Assembly, Saudi Arabia's King Abdullah emphasized that climate change requires equitable solutions taking into account the differences between developing and developed countries as provided under the United Nations Framework Convention on Climate Change (Kingdom of Saudi Arabia 2009).

Joint activities to tackle common climate change impacts are emerging slowly in South West Asia and focus on Arab countries. For example, from 21-23 November 2009, a regional workshop on Disaster Risk Reduction and Climate Change took place at the League of Arab States in Cairo. Furthermore the Arab Water Council deals with adaptation to climate change. **Civil society engagement** on environmental and climate change issues in the South West Asian countries is weak, but there is a **growing scientific community** dealing with climate change effects. However, security implications remain of minor concern. Furthermore, the scientific findings and debates **only slowly translate into concrete measures**.

In particular, **development cooperation will be the main instrument** in mitigating the challenges of climate change. A complementary use of thematic and national/regional programmes will be necessary to maximise the impact. The already existing strategies and activities to address climate change implications on security in the region could be complemented by the following measures:

Research, Analysis and Methodologies:

- **Foster research on climate change impacts and costs of inaction**. Adapting to climate change requires more accurate data on country-level impacts and the potential costs of maintaining the status quo.
- **Conduct in-depth research on socioeconomic impacts** of climate change. This should enhance the understanding of processes that may potentially lead to conflicts, such as shifting population patterns.

- Provide **in-depth knowledge on adverse effects of adaptation**. More research is needed on the implications and possible scopes of the wide-range application of adaptive strategies such as desalinisation plants and dam construction.
- Take an **ecosystem approach to understand climate change** implications. Ecologic and hydrologic systems are complex and the ways in which climate change will affect them is not yet fully understood.
- **Develop new approaches for water sharing agreements.** New strategies are needed to put effective agreements into place especially in the case of strong frictions between participating states, such as in the case of Pakistan and India.
- Encourage research and **dissemination of information on possible investment opportunities** in the countries of South West Asia. This is especially true for clean technologies and renewable energies but also the preservation of important natural landscapes.

Institutional Development and Response Formulation:

- **Encourage awareness raising of climate change in the region.** Awareness and understanding of climate change in the countries of South West Asia is generally low.
- **Upscale capacities for research and analysis.** Establishing joint research centres on climate change implications could assist countries in the region.
- **Foster dialogue between relevant ministries** of the countries in South West Asia. Ministries dealing with water, energy, agriculture and economic development could use synergies to develop a joint strategy to cope with climate change. This applies for the country- as well as for the regional level.
- **Factor in climate change into economic development.** Countries need assistance in increasing the sustainability and resource efficiency of their economies.
- **Support no-regret measures on all areas** to improve resource efficiency, to reduce environmental impacts, and to improve water, food and energy security.

Regional Cooperation and Dialogue:

- **Foster regional dialogue on climate change implications** to facilitate defining common positions on a regional level.
- **Initiate dialogue between repairing countries in Iraq and Afghanistan** over the water issue. A common strategy dealing with water scarcity needs to be created and included in the reconstructing efforts of Iraq and Afghanistan.
- **Encourage water sharing agreements** between the countries of South West Asia, over transboundary rivers and wetlands.

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